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THEODORE H. FRISON, *Chief*

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The Plant Lice, or Aphidiidae, of Illinois

BY

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AND

THEODORE H. FRISON



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THE PLANT LICE, OR APHIIDAE, OF ILLINOIS

FREDERICK C. HOTTES* AND THEODORE H. FRISON

PART I

INTRODUCTION

A cursory examination of the literature relating to any phase of the study of the plant lice, or Aphididae, is sufficient to show that Illinois has contributed much to our present knowledge of these small but nevertheless often destructive and biologically most interesting insects. In fact, all of the four State Entomologists of Illinois, Walsh, LeBaron, Thomas, and Forbes, have given them considerable attention and published much of a varied nature concerning them.

Benjamin Dann Walsh, the first official entomologist of Illinois (1867-1869), besides writing about the life histories and control of plant lice, described ten species which he thought to be new to science. William LeBaron, State Entomologist for five years (1870-1875), published the least concerning plant lice of any of the State Entomologists of Illinois, but even he went so far as to describe one plant louse which he thought to be new. The publications on plant lice of Cyrus Thomas, the third State Entomologist of Illinois (1875-1882), are without doubt the most important contributions to an understanding of the classification and bionomics of the plant lice of North America published prior to 1880. Succeeding Thomas came Stephen Alfred Forbes as State Entomologist from 1882 to 1911; and he, like his predecessors, recognized the importance of studies of plant lice. Besides the naming of several forms supposed to be new, he published much concerning the biology of the species attacking corn and strawberries, his studies of the species attacking corn being particularly noteworthy.

Apparently the study of plant lice has been so long and so inherently a page in the history of entomology in Illinois, that many others at one time or another connected with entomological investigations in the state have been drawn to the study of these insects. The numerous and valuable papers of Davis, Hart, and Weed are proof of this; the first mentioned, in fact, being one of the two greatest contributors to our knowledge of the plant lice of Illinois. Others, too, such as Shimer within the state, and Monell working close to our borders, without official connections with the work in Illinois, have helped to swell our knowledge of the plant lice. As a result of all of these studies, Illinois may well be thought of as one of the chief centers of aphidology in North America until within recent years.

In view of all of this previous work on plant lice in Illinois it may seem a bit paradoxical, then, to state that the present paper adds approximately one hundred species to our list of potential enemies, of

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which thirty-six species are new to science. The reason for this situation lies not in the fact that the plant lice of Illinois have been neglected in comparison with other political or geographical areas, but because of the wonderful and varied assortment of these insects within our boundaries, and the exceptional facilities and opportunities presented during the last three years for their intensive study.

Beginning in May, 1928, the Natural History Survey started a faunistic study of the plant lice occurring in Illinois, with the purpose of providing information concerning the number of kinds found in the state, their characteristics, distribution, host relationships, seasonal adjustments, importance as potential enemies, and a general concept of their life histories. To accomplish this program it was necessary at the very outset to plan a systematic inventory of the plant lice fauna of the state. Accordingly, a study was made of all published Illinois records of these insects, and the possibilities of extending this list, based upon a knowledge of the flora of Illinois and of plant lice recorded elsewhere, were considered.

Although many species had been recorded from the state, the Survey collection of these insects was very poor and, except for a few slide mounts, consisted of old material in poor condition preserved in vials and representing but a few species. Previous to extensive field work, this old material was remounted and as much of it salvaged as possible. Based upon a knowledge of zoo- and phytogeographical differences in the state, certain localities in diverse sections were selected as offering exceptional opportunities for enriching the Survey collection and increasing our general biological knowledge of the plant lice.

Field investigations were made during three summers, 1928-1930, beginning in May of each year. Collecting was first carried on in the southern part of the state, then the central part, and finally the northern part. This order was followed in spring and summer because of the seasonal differences exhibited between southern and northern Illinois, vernal conditions appearing in the latter section about two weeks later than in the former. In fall, these localities were usually visited in the reverse order. Each of these sections of the state was visited two or three times a year in order that various forms of the same species might be taken and no species overlooked because of different seasonal adjustments. Special attention was given to certain widely varied local habitats, such as the sand areas associated with Lake Michigan and the glacial drainage courses, the swamps and bogs in the northeastern counties, the cypress swamps in the extreme southern counties, and the widely distributed biotas of deciduous forest and the prairie or oak-grove savanna. Over 12,000 miles were traversed by automobile in our field work, the general routes followed being shown in Fig. 1.

To avoid unnecessary duplication in our collecting over a period of three summers, lists were prepared in advance of field trips giving the names of species previously taken in the locality about to be revisited. A somewhat similar scheme of preparing lists was used in checking up on the work in a restricted area over a period of a few days. After a certain number of species had been taken in a given area it was usually found expedient to shift to a new locality.

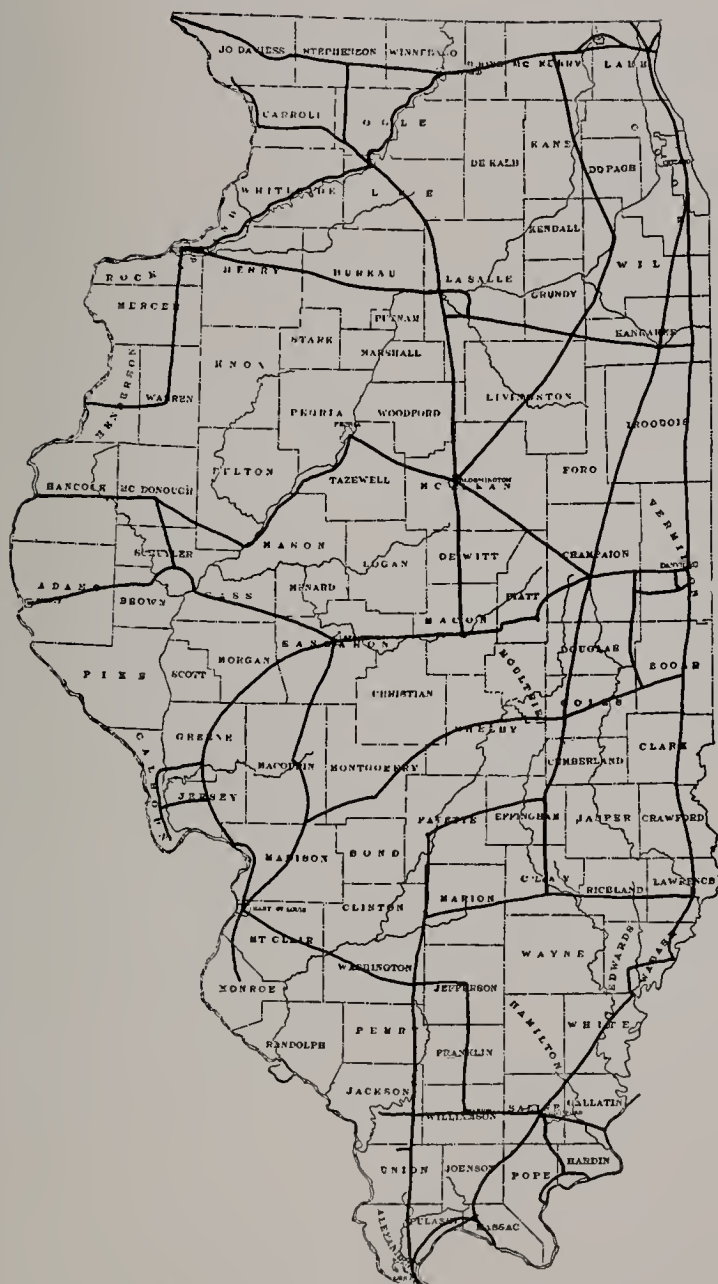


Fig. 1. Map of Illinois showing routes followed in making collections of plant lice in the state, May, 1928, to October, 1930. Many of the routes were traversed several times at different seasons of the same and different years.

LIMITATIONS

This paper is purely a faunistic or synoptic study of the plant lice of Illinois and is not to be considered as revisional or monographic in scope. Therefore, only those references are cited in the text which refer to the original description of the species, or which are necessary because of the introduction of new synonymy, or which provide an understanding of the specific names adopted in this paper. A revisional paper should summarize the literature of each species to date and pass upon the correctness of previous determinations recorded in the literature. This we have not attempted to do. As a result, some references in literature dealing with species by the same names as those used by us may refer to different aphids because of misidentifications upon our part or by others. We have tried, however, by careful studies of descriptions, comparisons with types in the Survey collection and elsewhere, and the submission of doubtful determinations to various specialists, to make our determinations as correct as possible.

The lack of comprehensive revisional papers in this group of insects has been a great handicap to such a study as the present because many nomenclatorial and taxonomic problems have had to be investigated and decisions made which are really within the field of the revisional paper. The voluminous and scattered literature, too, although providing an enormous fund of useful and indispensable information of varied extent, has presented some problems which previous revisional work would have simplified.

No attempt has been made to cite in the text all references regarding the species reported or to summarize all information in the literature. We have tried briefly to call attention to previous records from Illinois, and by the incorporation of a few statements or citations to give the general reader some insight into the interesting features in the life histories, classification, or problems of the various species discussed.

The keys have been prepared almost entirely on the basis of the alate viviparous females, since these forms are the ones usually taken in the field and since they usually present a better combination of characters for recognition than do the other forms. The ideal revisional paper would present keys to all forms. The keys given here are not devised to show phylogenetic relationships, even though at times they may do so; but they are intended primarily to make identifications as easy and simple as possible. If these keys are not all that might be desired, the difficulty of defining certain species and groups must be considered in addition to our own shortcomings. Again, it must be remembered that these keys are intended for the determination of plant lice found in Illinois, and for several obvious reasons they may prove misleading if used blindly in other parts of the country.

The problem of generic concepts has been a difficult one. In some cases it has seemed to us that certain proposed genera are more comparable to the subgenera, or unnamed groups and complexes, of other families or orders of insects than they are to genera. This was particularly forced upon our attention in the preparation of keys, and we have solved this problem to our own immediate satisfaction by re-

ducing to subgeneric status certain groups which were formerly considered as genera but which we could not sharply differentiate in our keys. For instance, although the genotype of *Illinoia* may be separated from some other not closely related *Macrosiphum* by a certain character, no real dividing place can be definitely established when a large number of species of *Macrosiphum* are compared. Therefore we have considered such complexes as true synonyms or subgenera.

Although a great deal of effort has been spent in making this paper as complete as possible, a few species have undoubtedly escaped our notice. The presence of some of these in Illinois may be predicted because of their known geographical range and the presence of their host plants in the state. The suggested outlines of the distribution in Illinois of many of the species listed, based upon our field work, are far from complete, but with a reasonable understanding of the range of the host plants and habits of the species, a fair idea of their zoogeographical distribution in the state can be obtained by an analysis of the data presented.

The aphid specialist will soon discover that the larger classificatory units used in this paper do not agree in every respect with the groupings used by others. In some cases this is due to differences of opinion in regard to the relationship of certain genera and, hence, their inclusion in larger groups where they previously have not been placed. In most comprehensive classifications the aphids are keyed first to subfamilies, then to tribes, then to subtribes, and finally to genera. Such an arrangement has much in its favor, particularly to the special student of aphids interested in their phylogeny, but in this faunistic paper, where the ready and simple determination of species is one of the chief aims, we have felt that the inclusion of supertribal groupings only, between the subfamilies and genera, has been an advantage.

Frequent citations are given in the keys to figures which have been incorporated to aid in identification. In many cases the figures cited refer to the identical genus or species mentioned in the key. In other instances, as a measure of expediency, we have cited figures which are not the identical genus or species referred to in the key. In other words, then, the figures cited in the keys refer to a condition rather than always to the identical species. The illustrations cited in descriptions and the general text, however, are based upon actual specimens of the species under consideration. It should be stated that the illustrations are not all drawn to the same scale, and different illustrations are, therefore, comparable only in regard to structural characteristics.

ACKNOWLEDGMENTS

The writers wish to express their appreciation of the voluminous published contributions by past and present writers to our knowledge of the biology and classification of the plant lice. Without this background it would have been impossible to complete a faunistic study of the plant lice of Illinois in the short time allotted to this project. For the loan of material and assistance in a variety of ways we are greatly indebted to the following: Dr. C. R. Cutright, Ohio Agricultural Ex-

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In addition we are indebted to the following members of the staff of the Illinois State Natural History Survey or temporary assistants: Mr. W. P. Flint, for the preparation of the statement regarding control measures; Mr. C. O. Mohr and Mrs. K. H. Paul, for the preparation of drawings; Mr. L. R. Tehon, for assistance with the names of plants; Mr. O. E. Tauber, for miscellaneous services; Miss Alberta Dukes, for stenographic assistance; Mr. A. R. Park, Jr., for much assistance with the preparation of slide mounts, with field work, and a variety of services; and lastly we are under special obligation to Mr. H. H. Ross, who has assisted with every detail and phase of the laboratory and field work necessary for the progress of the investigation and the completion of this paper.

STRUCTURE

This is not the place for the presentation of a detailed description of the various features of the morphology of plant lice. It seems desirable, however, to include for the benefit of the general student a hypothetical figure of an aphid (Fig. 2), with the various parts labeled to correspond to the terminology used in the keys and descriptions, and a few drawings (Figs. 3 and 4), suggesting the possibilities of variation of color markings or patterns. It has been impossible in this paper to include color illustrations of the various species based upon live material, though the value of such illustrations cannot be denied (see Gillette and Palmer, 1924). The color descriptions, however, of most of the new species described in this paper have been made from live material.

For comprehensive discussions of the morphological characters presented by aphids, the reader is referred to papers by Baker (1915, 1917d, 1920), Jackson (1907), Patch (1909a), Sanborn (1904), Swain (1919), Theobald (1926), Thomas (1879), Vickery (1908), and others. It is highly probable that systematic studies in the future will make more use of certain obscure characters which are now almost entirely neglected in systematic writings.

In preparing our descriptions we have uniformly omitted the word millimeter, or its customary abbreviation, mm, when stating measurements regarding length of body, comparative lengths of antennae, width of head across eyes, and so on. We have found it advantageous to use both a compound binocular microscope with high magnifications and a wide-field binocular microscope with low magnifications. While the former brings out clearly the more minute characters, the latter is more useful in preparing color descriptions and in suggesting comparative and grosser differences which may be checked with higher magnifications.

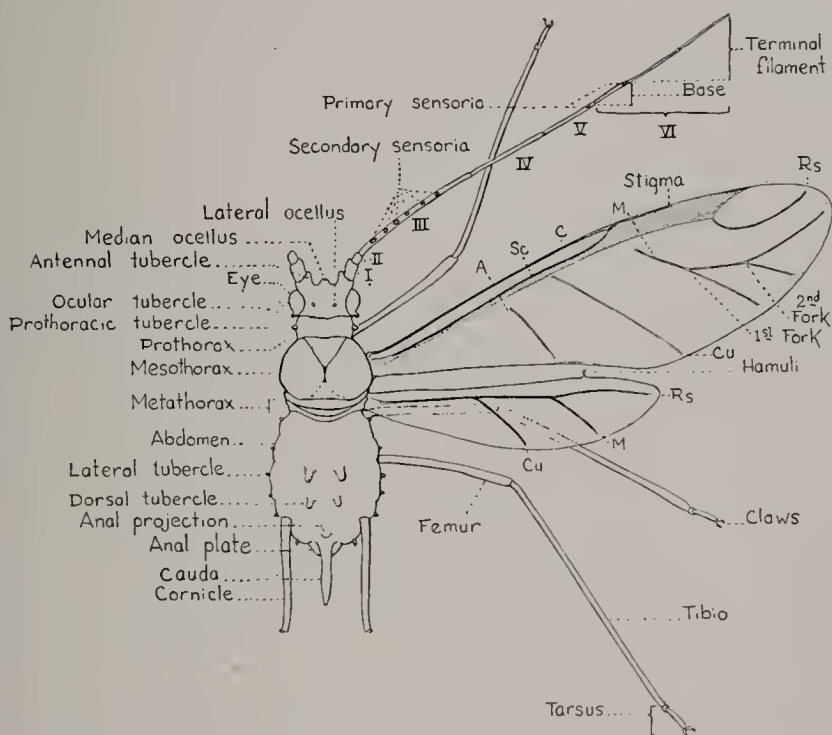


Fig. 2. Outline drawing of an imaginary plant louse, labeled to show anatomical structures used in describing and keying the various species.

In the fore wings of some aphids there is a kind of accessory thickening resembling a vein which runs somewhat parallel to the longitudinal radial vein. Since this structure has not been named in any of the previous works consulted and since it is often worthy of note in preparing descriptions, we have proposed for it the term of *accessory radial thickening*.

LIFE HISTORIES

Aphids have so many and varied ways of existence that no one generalized account can cover all of their interesting and often complicated life histories. Information about the life history of a species all too often begins and ends on a given host, leaving us in complete ignorance of the events transpiring between the time in the spring or early summer when the species leaves the host upon which it over-winters and the time when it returns to the same host again in the fall after a summer's sojourn upon some unknown host. Thus in the past, and even now perhaps, it has happened that a species of plant louse was known by one name when taken on its winter (primary) host and by another name when taken on its summer (secondary) host. This has been particularly true of those migratory species in which structural differences exist between the various forms of the same species, and it

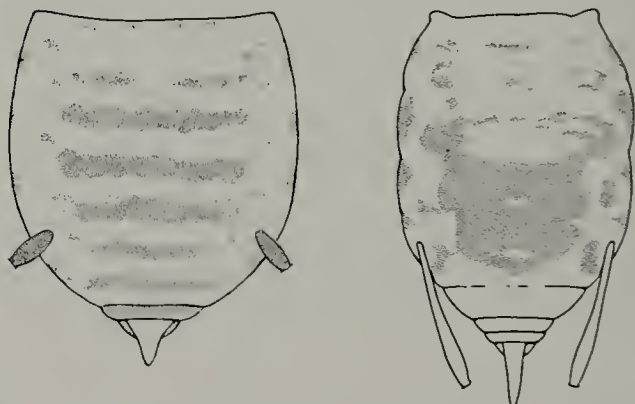


Fig. 3. (Left) Dorsal view of abdomen of the cabbage aphid, *Brevicoryne brassicae* (Linnaeus), showing pattern of dark markings.

Fig. 4. (Right) Dorsal view of abdomen of *Capitophorus gillettei* Theobald, showing pattern of dark markings.

is especially in such cases as these that biological studies are indispensable to a thorough and accurate picture of the relationships or classification of these insects. Dr. Edith M. Patch (1920) has admirably stated the difficulty: "To attempt to epitomize the life cycle of the aphid is like trying to draw an orderly sketch of Chaos. But after all, the confusion may be more seeming than real and certain rules, beset though they may be with exceptions, govern the life of even the aphid."

An aphid's behavior is governed very largely by its food preferences. A species that passes its entire life history on one host is said to be monophagous. If, however, a species requires two or more kinds of food, it may change its diet in early summer by migrating from the host on which it over-winters to a new host, called the summer or

secondary host, and such a species is said to be polyphagous. Some aphids, such as *Myzus persicae* (Sulzer), are practically omnivorous in that they accept as a secondary host almost any plant which offers sufficient nourishment and succulence for their ever-increasing numbers. Strangely enough, this ability to live on many different secondary hosts does not carry over to the sexual forms, for at the approach of cold weather in temperate and northern climates such plant lice return to their specific primary hosts like so many tourists returning to their homes from vacations spent in foreign places.

Generalized Life Cycles

In Illinois most aphids under natural conditions spend the winter in the egg stage. As a rule, the primary host upon which the eggs are laid is a tree or shrub (Figs. 8 and 9), the woody twigs and branches of which offer a greater degree of permanence for the preservation of the eggs than the more fragile, pithy stems of annual and herbaceous plants, which are often broken off at the ground and carried away by various agencies. The eggs, which are small, ovoid, and usually black, are laid either upon the twigs near the dormant buds, or upon the bark of the limbs, or in some cases even on the trunk. The hatching of the eggs in spring is usually correlated with the opening of the buds of the host.

If the species is a leaf-feeding form, the newly hatched aphids, which are called stem mothers, wander about on the twigs and branches until they reach the opening buds. Once they find these, they settle down and begin to feed. This feeding continues for about two weeks (the exact time depending largely on the temperature and species), and during this period the young aphids find it necessary to molt or shed their skins four times in order to provide for their rapidly increasing size. At the end of the fourth molt these first aphids to appear become full grown.

The stem mother is almost invariably apterous (wingless) and gives birth to living young parthenogenetically (without fertilization, there being no males at this time of the year). The production of living young is known as viviparous reproduction. A stem mother normally lives for about thirty days and gives birth to numerous young during this time. These progeny, when they become mature, closely resemble the stem mother and also give birth to living young parthenogenetically.

The third and fourth generations may or may not be apterous. Usually, however, especially if the species is migratory (polyphagous), a large proportion of the aphids are winged (alate) and are called spring migrants. If the species is not migratory, continuous generations of agamic females, either alate or apterous, are produced until the appearance of the sexual forms. The time of appearance of the sexual forms varies in accordance with the seasonal adjustments of the various species, but usually they are produced in the fall of the year.

If the species is migratory, the spring migrants fly to the secondary host of the species and there establish themselves and their progeny for the summer. Usually a migrating species entirely deserts its primary host for the summer, but occasionally the spirit of the wanderlust fails to develop in all individuals, so that some of them remain upon the

primary host throughout the year. On the secondary host several generations of alate and apterous females are produced during the remaining portion of the summer, each generation passing through the various stages of nymphal life before becoming mature. Summer generations usually require less time to mature than the stem mothers, and some individuals may become adults on the sixth or seventh day

LIFE CYCLE OF A MIGRATORY APHID

SEASON	FORMS ON PRIMARY HOST	FORMS ON SECONDARY HOST
WINTER	Egg ↓	None
EARLY SPRING	Stem Mother Apterous viviparous females ↓	None
LATE SPRING	Alate viviparous females ↓	Spring Migrants ↓
SUMMER	A few strays ↓	Alate and apterous viviparous females ↓
EARLY FALL	Fall Migrants ↓	Alate viviparous females sometimes alate males ↓
LATE FALL	Sexual forms: males and oviparous females ↓	Sometimes a few strays
WINTER	Egg	None

Fig. 5. Chart showing main sequence of events in the life cycle of a migratory aphid.

after birth. Each of them may produce from 60 to 100 progeny before dying at an age of 20 to 30 days. In the fall of the year alate females known as fall migrants, and occasionally alate males, are produced on the summer host. These alate females return to the primary host and there give birth to oviparous females (egg-laying females) and males in case the latter are not produced on the secondary host. The oviparous females, after mating, lay fertilized eggs as described above, and in this stage the species usually over-winter.

The short time that it takes these insects to mature, associated with their tremendous reproductive capacity (there may be ten or more generations a year even out of doors in temperate climates) led Huxley to calculate that the progeny of a single stem mother would in the fall of the year equal in weight the total weight of the population of China. This, fortunately, is purely hypothetical and never happens because enormous numbers of aphids are destroyed by other insects dependent upon them for food, by unfavorable weather conditions, and by many other means.

The cabbage aphid, *Brevicoryne brassicae* (Linn.), may be cited as a good example of a common and economic species with a rather generalized or orthodox life history. In Illinois this plant louse passes its entire life history, that is, from stem mothers in spring to sexual forms and eggs in autumn, on cabbage or related plants. There is no true or rhythmic migration from, or desertion of, the spring food plant, but simply a dispersion of individuals from time to time to other cruciferous plants.

Many other aphids, such as the various species of *Cinara* that feed on pine and certain species inhabiting oaks and birches, do not migrate from their primary food plants to secondary ones, but spend the entire life cycle upon a single host or at least upon very closely allied hosts. The alate forms of these monophagous aphids serve only to distribute the species, and not to satisfy a desire for a change in diet as do those of polyphagous species. Certain species, such as *Myzus cressi* Gillette and Palmer, living on columbine, and *Aphis rociadae* Cockerell, living on larkspur, find their hosts becoming unsuited for them very early in the summer, but instead of developing a migratory habit to more suitable hosts they meet this adversity by producing sexual forms, and laying eggs, at an early date.

A step further, but still a more or less generalized life cycle, is presented by the rusty plum aphid, *Hysteroneura setariae* (Thomas), shown in Fig. 30. This plant louse, which over-winters upon plum, migrates in early summer to various grasses upon which it spends the remainder of the summer. In fall certain alate viviparous females, the fall migrants, again return to plum in order that the life cycle may be completed on the primary host. Other examples of species with secondary hosts but still with more or less generalized life histories are: *Rhopalosiphum prunifoliae* (Fitch), which migrates between apple and cereal crops (Fig. 31); *Hyalopterus pruni* (Geoffroy), which migrates between plum and certain grasses; and *Aphis illinoensis* Shimer, which migrates between viburnums and grape (Fig. 22).

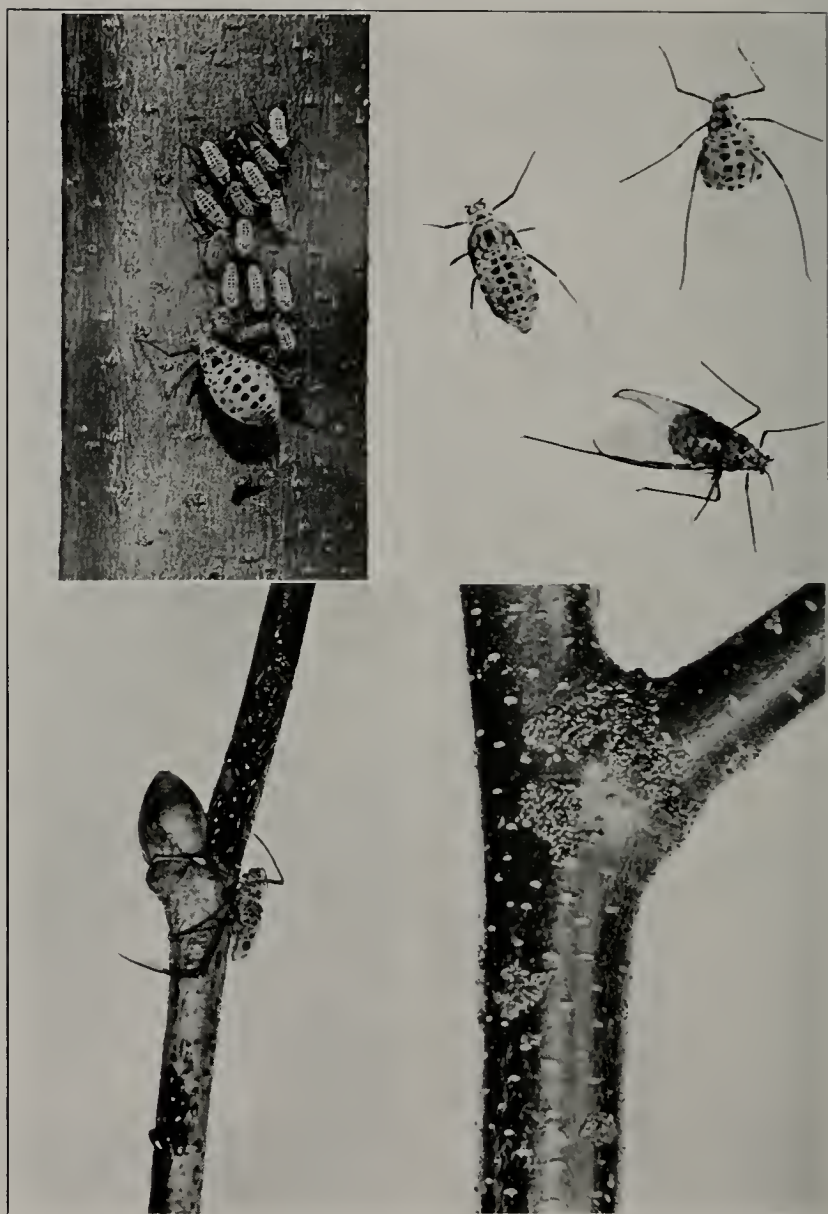


Fig. 6. (Upper left) Apterous viviparous female and young nymphs of *Longistigma caryae* (Harris) on the sycamore, *Platanus occidentalis*; Urbana, Oct. 14, 1929.

Fig. 7. (Upper right) Alate and apterous viviparous females and pupa of *Longistigma caryae* (Harris); Urbana, Oct. 9, 1929.

Fig. 8. (Lower left) Oviparous female and eggs of *Longistigma caryae* (Harris) on the basswood (*Tilia Americana*); Urbana, Oct. 15, 1929.

Fig. 9. (Lower right) Egg masses of *Calaphis betulaecolens* (Fitch) on low branches of the canoe birch (*Betula alba* var. *papyrifera*); Urbana, Oct. 15, 1929.

Specialized Life Cycles

Many plant lice have gone so far, in the development of generations living under difficult conditions, that the forms frequenting the secondary host have changed structurally and are markedly different from those produced on the primary host. For example, most of the plant lice producing true galls on the primary host plant (Figs. 40, 41, 47, 49) have very complicated life histories. Some of the common species producing galls in spring and early summer on poplars (*Pemphigus populi-transversus* Riley and *P. populicaulis* Fitch) migrate to the roots of various grasses for at least part of the summer. The alate females which return to the poplars in late fall or early spring are called sexuparae and give birth to odd-appearing sexual forms.

Very complicated life histories are exhibited also by several species in Illinois which migrate between very distantly related plants. Among these may be named *Hamamelistes spinosus* Shimer, *Hormaphis hamamelidis* (Fitch), and *Prociphilus tessellata* (Fitch), which is one of the few aphids known to hibernate in temperate climates as nymphs.

Hamamelistes spinosus Shimer hibernates on white birch in the form of greatly modified individuals (Fig. 40), resembling coccids more than they do aphids; descendants of these hibernating coccid-like aphids fly in early spring to witch-hazel, upon which the sexual forms are produced. The eggs are soon laid but do not hatch until May or June of the following year. Descendants of the individuals hatching from the over-wintering eggs on witch-hazel migrate to birch, where other generations soon modify themselves into the coccid-like individuals mentioned above. Thus this species spends the winter on both of its hosts but in two different ways.

Prociphilus tessellata (Fitch) migrates between maples and alders. The sexual forms are produced on maples by migrants leaving the alders in fall. The over-wintering eggs produce stem mothers in spring, which produce generations (*acerifolii* Riley) destined to return in summer to alders. Although interrupted on its probable original host, the maple, the life cycle may continue on alders until the colony is destroyed by accident, disease, death of the host plant, or attack by enemies.

In warm climates, and under greenhouse conditions in colder climates, the life histories of aphids may be so modified that they may go on indefinitely reproducing viviparously for years. Certain subterranean species, too, like *Gcoica squamosa* Hart, have become modified to an entirely subterranean type of life, so that the aerial forms have dropped out of existence, at least in certain geographical areas.

DISTRIBUTION

In many ways the plant lice offer much material for the student of zoogeographical distribution in temperate climates. They are large enough as a family to give us a group of closely related organisms surpassing in the number of species within the confines of our state such familiar, larger, and varied taxonomic groups as the trees, fishes, birds, or mammals. Two easily recognized factors, together with many others less tangible and apparent, have conspired to make the plant louse

fauna of Illinois an extensive one; namely, the fact that aphids as a group are preeminently at home in temperate climates and that the flora of Illinois upon which they directly depend for sustenance is a large and varied one, comprising components characteristic of the cypress swamps of the south, the tamarack swamps of the north, the prairie, the deciduous forests, and local biota of diverse composition.

It seems clear at the present time in Illinois that the zoogeographical distribution of our plant louse fauna is governed primarily by the distribution of their plant hosts, all other factors being secondary and

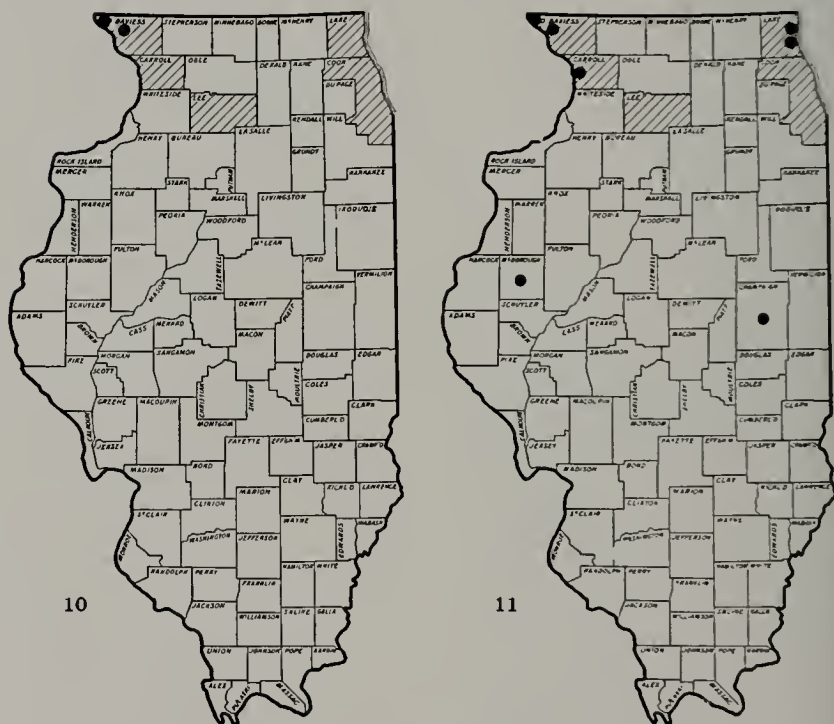


Fig. 10. (Left) Distribution of *Eucraphis betulae* (Koch) and its host, the canoe birch, *Betula alba* var. *papyrifera*.

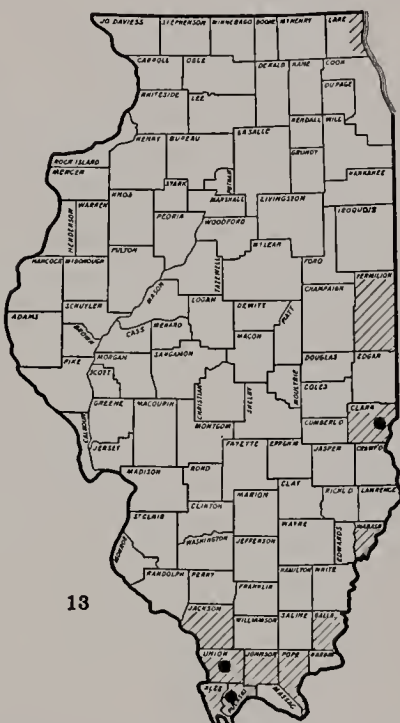
Fig. 11. (Right) Distribution of *Calaphis betulaccolens* (Fitch) and its host, the canoe birch, *Betula alba* var. *papyrifera*. Dots in the central portion of the state indicate occurrence on planted trees.

often of a fluctuating character. This generalization, obvious to the student of the aphids, is readily illustrated by the maps in our file showing the known distribution in our state of all species of aphids known to occur in Illinois with the distribution of their host plants. A few of these maps are reproduced here (Figs. 10-17). On each map the dots indicate localities in which the species has been collected and the cross-hatching indicates the counties in which its host has been recorded as native.

Of course, the physiological nature of the various species plays an important part in their distribution and abundance. It must not be forgotten, however, that the plant lice have developed after the plants and have had to fit into a floral pattern probably previously and certainly independently determined. The tamarack of our northern bogs would continue to live, conditions being favorable for its existence, without its aphid, *Cinara laricis* (Hartig) (Fig. 12), but since the aphid has become restricted to this one host it could not survive without the tamarack. Where the physiological make-up of a species of aphid in



12



13

Fig. 12. (Left) Distribution of *Cinara laricis* (Hartig) and its host, the tamarack, *Larix laricina*.

Fig. 13. (Right) Distribution of *Phyllaphis fagi* (L.) and its host, the beech, *Fagus grandifolia*.

Illinois has tightly tied it up with a single species of host plant, or several very closely related host plants, that aphid obviously exists only where its host is present. Many examples of the primary factor of host distribution governing the distribution of monophagous plant lice in Illinois could be cited (Figs. 10-13).

There is ample evidence to show that the physiological constitution of an aphid has limits, secondary to the presence of host plant or host plants, which regulate the outlines of a full and complete picture of

the distribution of any given species of aphid over North America or the world as a whole. The aphid, *Euceraaphis betulae* (Koch), naturally occurs in Illinois only where the canoe or paper birch (Fig.10) is native, but its physiological construction is such that it can live on specimen trees in various parts of the state. It would be a mistake to think of the present natural distribution of this plant louse as we find it in Illinois as being strictly in conformity with certain optima of temperatures, humidities, and other meteorological factors. The maximum extent of its distribution certainly can be limited or influenced by such factors,

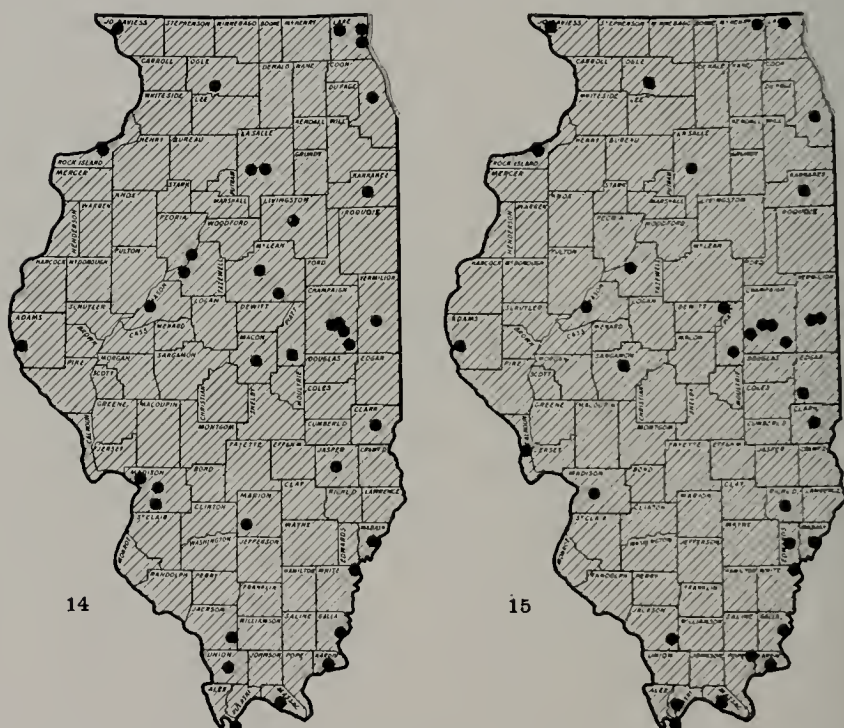


Fig. 14. (Left) Distribution of *Aphis pomi* DeGeer and one of its many hosts, the cultivated apple, *Pyrus Malus*.

Fig. 15. (Right) Distribution of *Macrosiphum pisi* (Kaltenbach) and one of its hosts, the red clover, *Trifolium pratense*.

but these limits cannot be determined solely by a glance at a distribution map of this aphid as we see it in Illinois where the natural range of its host is alone sufficient to be the decisive and the limiting factor.

There are, no doubt, species of plant lice in Illinois which, in spite of having a suitable host or combination of hosts in all parts of the state, exhibit a tendency of "southernness" or "northernness" of distribution because of limiting factors of a physiological nature. Our survey of the plant lice fauna, however, has not been thorough enough.

or quantitative enough, in all parts of the state, to bring such cases into bold relief. *Aphis feminea* Hottes is a conspicuous reddish brown and black species with a gregarious habit known only to occur on the wild black cherry so common in all parts of Illinois. We have taken it only once, in spite of diligent searching in apparently similar situations in many places throughout the state. (Fig. 17). Why have we not found it elsewhere? Perhaps it is a migratory form and the host combination essential for its existence rarely occurs; perhaps it is a recent or accidental introduction (only recorded in literature from

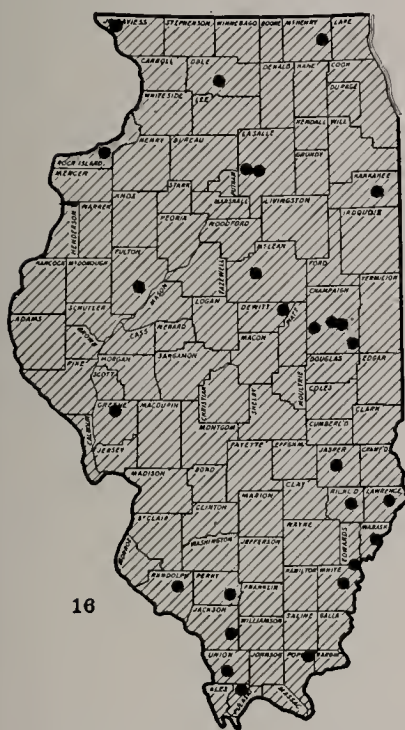


Fig. 16. (Left) Distribution of *Macrosiphum granarium* (Kirby) and its usual host, oats, *Avena sativa*.

Fig. 17. (Right) Distribution of *Aphis feminea* Hottes and its host, the wild black cherry, *Prunus serotina*.

Maine); perhaps it is such a rarity where it does occur that it is seldom seen; but perhaps the limiting factor is a physiological make-up which demands a certain combination of environmental factors which its host does not require. *Phyllaphis fagi* (Linnaeus) and *Prociphilus imbricator* (Fitch), both found as yet only on beech, are at present known only in Illinois from certain localities in the extreme southern part of the state (Fig. 13) where beech trees are closely associated and numerous. We have looked for these species in other parts of

Illinois (Fig. 13) where beech is native, but scarce, without finding them. This may be due to the physiological nature of these aphid species which ties up their distribution with large stands of beech—a tree of the climax forest in Illinois. The absence of records of *P. fagi* and *P. imbricator* from certain places in Illinois, however, may be due to the lack of a suitable combination of hosts, if these species have alternate hosts, or to error in collecting. Even though definite Illinois species of aphids are difficult to select as exhibiting examples of distribution limited by the physiological constitution of the aphid, there is ample evidence from a study of the world-wide distribution of plant lice, and from experimental studies, to show conclusively that physiological constitution is an important factor, however secondary, in a small geographical area as Illinois, it may now be to a present association with host due to close evolutionary development of aphids with certain plants.

If one wishes to study the influences of temperature, relative humidity, and other factors as determinants in the distribution of Illinois species of plant lice, the omnivorous species afford the best prospects. As stated elsewhere, however, our Illinois field work was not thorough or quantitative enough to bring into bold relief examples illustrating this correlation. Illinois appears to us to be located in the center of the aphid current—a group of insects ideally adjusted to temperate climates.

CYRUS THOMAS COLLECTION

Davis (1913), in an earlier article of the present bulletin series, reported upon the Aphidiidae in the Cyrus Thomas collection, belonging to the Survey, which at that time could be associated with data or recognized as types. In that article the types, or probable types, of twelve species were reported as recovered and notes given regarding their systematic status, insofar as their identification was possible by labels or bits of information associated with certain vials or slides.

At the time of the writing of the paper by Davis, it was not possible to report upon much of the original Thomas material because many vials or slides were associated only with a number, the key to which had been lost. In 1926, a letter written to Professor S. A. Forbes in April 21, 1884, by Mrs. Nettie Beattie (Miss Nettie Middleton), at one time an assistant of Thomas, was found by Frison in an old letter file while searching for data regarding the dates of publication of certain reports of the state entomologists of Illinois. This letter contained a list of numbers from 1 to 78 and gave data to be associated with certain numbered vials or slides of specimens in the Thomas collection. The fortunate finding of this letter has resulted in the recovery of the types of thirteen more of the Thomas species described in 1878-1879 and the confirmation of the true "type" status of almost all material previously reported as being "probable" types by Davis. It so happens that the real Thomas types previously found by Davis with one exception, were species described in the 1879 article and the types recently identified were described in the 1878 paper. The types of all but four of the eighteen species described as new in 1878 have now been found.

Notes concerning these recently recovered types are scattered throughout the text under the specific names of the species to which the various types must be referred. The finding of these types ends definitely the uncertainty in regard to the specific status of some of the species originally described by Thomas. For their better preservation, all of the specimens in the Thomas collection of plant lice in the Survey collection have been mounted on slides. For the convenience of workers located elsewhere, the following list of the species described by Thomas is given together with notes concerning their present placement, the slide numbers assigned to them, etc.

DESIGNATION OF TYPES

In the description of new species of aphids the authors have departed from past customs in definitely selecting, wherever possible, a slide mount of an alate viviparous female as the *holotype* and a complement of mounts designated as *allotypes*, *morphotypes*, and *paratypes*. The term *allotype* is applied to a slide mount of a specimen of the opposite sex from the type, either when included in the paratypic series of a new species or when described for the first time in this paper. It happens that all allotypes in this paper are males. The oviparous and apterous viviparous females have been designated as morphotypes, whether included in the paratypic series of a new species or described for the first time in this paper, except where a new species has been described from the apterous viviparous female on account of the lack of alate specimens. The employment of this terminology is in line with present procedure in other groups of insects, and it leads indirectly to the better preservation of the specimens upon which first descriptions are based—a boon to future students and revisional writers. It also directs attention to the descriptions of forms which should and will receive more study in the future.

Oftentimes but one specimen has been mounted on a slide with the end in view of making such a mount a holotypic, allotypic, or morphotypic slide. Where this was not possible, from lack of recognition of forms as new to science in proper time, certain specimens have been indicated by the well-known method of "ringing" them on the slide. Wherever possible, the sexual forms have been described from mating pairs or from sexual forms taken on the same host and at the same time and place.

In a few cases *lectotypic* slides have been designated to stand as holotypes from a series of cotypic slides. This has been done to help eliminate nomenclatorial problems resulting from the mixing of two species in a series of cotypic slides. Such selections are clearly noted in the text under the names of the species concerned. Certain slides in the Survey collection previously have been designated as lectotypes, or their typic status reported upon, by Frison (1927).

TABULATION OF SPECIES DESCRIBED BY CYRUS THOMAS AND RECORDS OF TYPES

<i>Name used by Thomas</i>	<i>Present assignment</i>	<i>Reported by Davis</i>	<i>Recently Recovered</i>	<i>Slide Numbers</i>
Aphis cephalanthi.....	Aphis cephalanthi.....	.....	.....	.....
Aphis diospyri.....	.....	.....	.....	.....
Aphis impatiensis.....	Aphis cephalanthi.....	.....	Yes	8778
Aphis middletonii.....	.....	.....	.....	.....
Aphis symphoricarpi.....	Thargelia symphoricarpi.....	.....	Yes	8776, 2792
Aphis vernoniae.....	Aphis vernoniae.....	.....	Yes	7704-7707
Callipterus quercifolii.....	Chaitophorus quercicola.....	Yes	.....	7658
Callipterus ulmicola.....	Tuberculatus ulmifolii.....	Yes	.....	7166
Chaitophorus negundinis.....	Periphyllus negundinus.....	.....	.....	2775
Chaitophorus populicola.....	Periphyllus populicola.....	Yes	Yes	8177
Megoura solani.....	Amphophora solani.....	Yes	.....	2772
Myzocallis hyperici (=hyperici).....	Hyalopterus hyperici.....	.....	Yes	2797
Pemphigus fraxinifolii.....	Pemphigus fraxinifolii.....	Yes	.....	2762, 7167
Pemphigus rubi.....	{ Probably Pemphigus populi—transversus.....	Yes	.....	2767, 2768
Phorodon scrophulariae.....	Myzus scrophulariae.....	.....	Yes	2798
Rhizobius eleusinis.....	Anoea querci.....	.....	Yes	8777
Rhizobius poae.....	.....	.....	.....	.....
Rhopalosiphum tulipae.....	Myzus persicae.....	Yes	.....	7657
Schizoneura panicola.....	Anoea querci.....	Yes	.....	2770
Schizoneura pinicola.....	Mindarus abietinus.....	Yes	.....	2774
Siphia rubifolii.....	Cerosiphia rubifolii.....	.....	.....	.....
Siphonophora acerifoliae.....	Drepanaphis acerifoliae.....	Yes	Yes	7168, 7169
Siphonophora ambrosiae.....	Macrosiphum ambrosiae.....	.....	Yes	8179-8181
Siphonophora coreopsidis.....	Aphis coreopsidis.....	.....	Yes	7716
Siphonophora eueurbitae.....	.....	.....	.....	.....
Siphonophora erigeronensis.....	Macrosiphum erigeronensis.....	.....	.....	.....
Siphonophora euphorbiae.....	Macrosiphum gel.....	.....	Yes	8771
Siphonophora euphorbicola.....	Macrosiphum gel.....	.....	Yes	8772, 8773
Siphonophora gerardiae.....	Aphis rumicis var. gerardiae.....	.....	.....	.....

<i>Name used by Thomas</i>	<i>Present assignment</i>	<i>Reported by Davis</i>	<i>Recently Recovered</i>	<i>Slide Numbers</i>
Siphonophora heucherae.....	Myzus heucherae.....	Yes	.....	{ 3174, 3175 } 7163-7165
Siphonophora salicicola.....	Aphis saliceti.....	.....	Yes	8178
Siphonophora setariae.....	Hysteroneura setariae.....	.....	Yes	7714, 7715
Siphonophora verbenae.....	.....	.....	.....	.....
Siphonophora viticola.....	Aphis illinoensis.....	.....	Yes	7698, 7699
Tychea erigeronensis.....	Prociphilus erigeronensis.....	Yes	.....	2769
Tychea panicl.....	.....	.....	.....	.....

COLLECTION AND PRESERVATION OF MATERIAL

Aphid material in the field was collected by brushing the plant lice off the host into a metal-capped vial partly filled with tissue paper to absorb moisture or by breaking off a small portion of the infested plant and placing it, together with the plant lice, in a similar vial. Specimens collected in this manner were usually mounted the same day or the next day, by the methods mentioned in following paragraphs. Almost all of the material collected on field trips was mounted on slides, and to do this it was necessary to carry a rather complete equipment with us in the field. The slide mounts thus made from live material, however, more than justified the carrying of the extra equipment and the spending of many hours at night making slides. It was found that three persons constituted an ideal aphid-collecting party, two doing the field work during the day while one made slide preparations, and all assisting with slide mounts at night. Without automobile facilities for rapidly transferring the field party and equipment, such intensive work on a group of insects within such a short time would not be possible.

Since plant lice are small, soft-bodied, delicate insects, they must be preserved in fluids in vials or mounted on slides. From the standpoint of maintaining a reference or study collection, and the ordinary determination of specimens, we are very partial to the preservation of all material on slide mounts. For certain morphological studies, however, plant lice may be best preserved in fluids, and an 80% alcohol solution has proved very satisfactory.

Aphids preserved in alcohol can be mounted very easily in "Euparal," a prepared mounting fluid. They are simply taken from the alcohol and mounted directly in "Euparal" on the slide. They clear in a day or two, depending upon their size, and the medium forms a yellowish, hard mount. This method of dealing with alcoholic material, especially when it is of considerable age, is more satisfactory than that of running the material through alcohol and xylol and mounting in balsam; for the treatment with the higher concentrations of alcohol, and especially with xylol, makes the legs and antennae of aphids so brittle that they break off when the cover glass is put over the insects on the slide.

For killing aphids and mounting them immediately, we have used the following method, which, besides being relatively fast, usually gives very good results. With a camel's hair brush the aphids are removed from their host to a beaker (50 cc), where they are killed by pouring hot water over them. The water is immediately drained off and replaced with hot 95% alcohol. The contents of the beaker are then poured into a Syracuse watch glass, in which the aphids can be handled more easily. Large or shrivelled aphids are punctured with a needle, to allow the infiltration of xylol and consequent clearing. Small, thin-skinned forms do not require puncturing. After standing until cool, the alcohol is drained from the aphids and xylol carefully poured over them. They are left in this until clear and then mounted in Damar balsam on 3"x1" glass slides, using as thin a cover-glass as can be handled with efficiency. This method of mounting gives particularly beautiful results with some of the light and highly-colored *Macrosiphea*.

preserving in a measure the natural colors which are enhanced by transparency.

Certain species of aphids are hard to clear, particularly some of the large, apterous, root-feeding forms. If they do not clear after being in xylol for fifteen or twenty minutes, drain off the xylol and add a little alcohol; then draw off this alcohol after a minute or two, and add a second lot of xylol. This will usually hasten the clearing, but the entire procedure may have to be repeated several times in order to give the desired transparency. This process, however, makes the aphids very brittle and should be avoided whenever possible. We believe that Damar balsam is very much superior to Canada balsam as a mounting medium, because it forms an almost unstained medium and hardens a little faster when the slides are first prepared.

Full data concerning host plant, time of year, etc., should be kept associated with all collections of plant lice, regardless of the method used in their preservation. Since the natural colors of aphids are liable to be lost by any method of preservation, it is highly desirable to keep detailed color notes made from living specimens.

APPLIED CONTROL*

Being soft-bodied, sucking insects, aphids are best controlled by the use of contact insecticides. The susceptibility to insecticides, however, varies greatly among different species of aphids. Many species can be killed by very mild preparations which will not affect other species. The most common materials now in use for combating aphids are soap solutions, oils, nicotine, pyrethrum, and derris. Only the more susceptible species may be killed with the soap solutions. These insecticides are applied in the form of dusts or sprays. In many cases spraying is more efficient and reliable than dusting. Because of their tremendous powers of reproduction, it is generally considered that any control measures used against aphids must kill at least 98% of them in order to be commercially successful.

The insecticides must be applied in such a way as to come into actual contact with the bodies of the aphids. Spraying or dusting the tops of leaves where aphids are working on the underside of the leaf is of no value. The problem of satisfactory control is made more difficult by the fact that many species of aphids cause curling of the foliage on which they are feeding. It is usually necessary to apply the dust or spray with considerable force in order to reach the aphids in curled foliage.

Dusts

Of the dust insecticides, nicotine is by far the most effective. Where the fumes from nicotine dust can be partly confined around the bodies of the aphids, a very good kill may be obtained. Nicotine dusts may be purchased ready to use or may be mixed at home by several methods. The advantages of home mixing, or "rolling your own," are a saving of nearly one-half of the cost of the prepared dust, a better guarantee of fresh material which is of a higher killing power.

* This section was prepared by W. P. Flint.

and immediate availability when needed without waiting for shipment from a distance. Good homemade nicotine dust can be prepared as follows:

For Mixing Small Quantities of Dust.—Place 6 pounds of hydrated lime, talc, dusting sulphur, or other dust to be used as a diluent, in a can, bucket, or small keg, which has a tight-fitting lid. Pour 5 ounces of 40% nicotine sulphate, or 40% free nicotine, over the dust in the container; add 10 to 15 small stones about the size of walnuts, close the lid tightly, and roll the container back and forth for ten minutes. Do not roll rapidly, as the dust will mix better at about 30 to 40 revolutions per minute. After the mixing has been completed and the stones removed, the dust should be allowed to stand for 24 hours in a closed container before being used. If it is to be stored, it should be placed in a tight container and kept in a dry, cool place.

For Mixing Larger Quantities of Dust.—Use a 50-gallon tight barrel, or large keg. Cut a door in the side of the barrel to make a 6"x8" opening. Attach the door so that it will fit tightly into the barrel, padding the edge with cloth or felt to prevent leakage of the dust, and fastening it on the outside so that it will be held tightly in place. Place the hydrated lime, dusting sulphur, or other dust in this container. Pour the desired amount of nicotine over the dust (see table of amounts), and add about 50 small stones from the size of a walnut to that of an egg. Close the door and roll the barrel back and forth over the ground for ten minutes. Remove the dust by pouring through a wire screen with meshes of $\frac{1}{4}$ or $\frac{1}{2}$ inch to catch the stones. Store in tight containers.

TABLE SHOWING AMOUNTS OF MATERIALS TO BE USED IN MIXING
NICOTINE DUSTS

Percentage desired	Pounds of 40% free nicotine or nicotine sulphate to be used	Pounds of hydrated lime or other dust to be used
1	1 $\frac{1}{4}$	49
2	2 $\frac{1}{2}$	48
3	3 $\frac{1}{4}$	47
4	5	45

As the materials for making the dust will keep much better than the prepared dust, it is advisable to mix only what is needed at one time rather than larger quantities to be stored for the season. The nicotine sulphate has a more lasting effect than the free nicotine, but does not give quite as high a kill of resistant insects for the same percentage of nicotine in the mixture.

Take care to avoid breathing the fumes when mixing nicotine dust. Especially avoid holding the head too close to the mixer when pouring out the dust, as the nicotine will be strong enough to cause headache or nausea if a sufficient quantity is breathed.

Sprays

A spray that is very effective against aphids can be made at home very easily and quickly by mixing one part of 40% nicotine sulphate with eight-hundred parts of water and four parts of "Penetrol," which is a commercial product recently developed as an activator for nicotine.

The "Penetrol" increases the killing power of the nicotine so that the spray can be relied upon to be 100% effective against all classes of plant lice if applied to their bodies.

A spray of nearly as high killing power may be made by using soap instead of Penetrol. In this case soft water should be used. The following formula will make an excellent aphid spray:

Nicotine sulphate	1 part
Water	800 parts
Soap	1/2 ounce to 1 gallon of water

A number of commercial preparations for the control of aphids are now on the market. Where these are used, they must be applied at strengths and under conditions recommended by the manufacturers.

NATURAL CONTROL AND INTERRELATIONS

Plant lice are often so completely held in check by natural control factors, such as parasitic and predaceous insects, fungus diseases, and unfavorable weather conditions, that applied or artificial control is not necessary. The writings on this subject would fill several volumes and it would be inadvisable in this paper to attempt to give a detailed account of them. The reader is referred, rather, to the numerous publications listed in the bibliography, many of which contain much information about this phase of the subject.

The chief insect enemies are the common lady bird beetles (Coccinellidae), the syrphid flies (Syrphidae), the lace wing flies (Chrysopidae), and certain minute wasp-like insects (Braconidae and Chalcididae). The first three of these groups of insects are predaceous, and only the last group are internal parasites. The chief fungus enemies belong mainly to the genus *Empusa*. Many birds, also, eat plant lice and their eggs and thus aid in their control.

The interrelations between ants and aphids have attracted the attention of scientists and others from the earliest to the present times, and again volumes have been written upon the subject. It suffices here simply to state that ants frequently care for aphids in return for a secretion commonly known as "honey-dew." In some cases this care on the part of the ants for the aphids is of a temporary nature, but in other cases the interrelationship has proceeded so far that certain species of plant lice are said to be absolutely dependent upon ants. The corn root aphid (*Aphis maidi-radici* Forbes) is a good example of a plant louse relying to a great extent upon ants. Forbes (1884) has shown that the eggs of this aphid are cared for by the ants during the winter. For a complete review of the interrelations between ants and aphids the reader is referred to a recent and excellent paper by Jones (1929).

PART II

FAMILY APHIIDAE

By the incorporation of information regarding the biology and phylogeny of aphids, along with certain structural characters, it is possible by the use of a few couplets to key the aphids into two, three, or four subfamilies, depending upon the classification adopted. In preparing a purely artificial key for the determination of the aphids for the use of persons not having esoteric information, it is impossible to key the subfamilies without resorting to the use of numerous couplets or expanding a few couplets to include numerous exceptions. In line with our policy of making keys to begin with an unknown and end with a known, without the injection of information concerning phylogeny or biology, we have been forced to use numerous couplets. This is rather indicative of the fact that the aphids can not be divided easily, concisely, or sharply into two, three, or four subfamilies comparable to the subfamilies of some other families of insects. It indicates, also, that the present classification has many points in it which are purely arbitrary and hence may be changed in the future.

It must also be kept in mind that this paper is not a revisional study in its broadest sense, and that the keys are prepared solely for the recognition of our Illinois fauna. Species not included in this paper may or may not key out correctly.

KEY TO SUBFAMILIES

(Based on alate viviparous females)

1. Antennae with pronounced annular or band-like sensoria almost completely encircling segment (Fig. 224).....2
- Antennae with circular (Fig. 283), transverse (Fig. 226) or elongate-oval (Fig. 227) sensoria, not almost completely encircling segment.....3
2. Anal plate indented, cauda knobbed (Fig. 222), both distinct; antennae of alate forms either three- or five-segmented, aleurodi-form or coccidiform generations (Fig. 332) developed, aerial forms, confined to birches and witch-hazel.....
.....**Hormaphidinae** (*Hormaphis*) p. 375
- Anal plate and cauda rounded, indistinct (Fig. 221); antennae of alate forms six-segmented [except *Mclaphis minutus* Baker which is five-segmented—not known from Illinois]; aleurodi-form or coccidiform generations not developed; aerial generations on various plants, especially elms and poplars, and subterranean generations on roots of various plants.....
.....**Eriosomatinae** (in part) p. 345
3. Radial vein of fore wing arising near base of stigma or where stigmal shading begins (Fig. 51).....**Mindarinae** (*Mindarus*) p. 374
- Radial vein of fore wing arising from body of stigma (Fig. 56) or at its apex (Fig. 67), always beyond base of stigma or where stigmal shading begins.....4

4. Terminal filament of sixth antennal segment longer than basal portion5
- Terminal filament of sixth antennal segment not longer than basal portion6
5. Terminal filament with distinct sensoria.....
-*Eriosomatinae* (*Mordwilkoja*, fundatrigenia) p. 345
- Terminal filament without distinct sensoria.....
-*Aphiinae* (in great part) p. 149
6. Terminal filament a mere stub (Fig. 241), in length about equal to greatest width of segment.....7
- Terminal filament distinct (Fig. 266), at least twice as long as greatest width of segment.....*Aphiinae* (in part) p. 149
7. Costa of hind wing nearly straight, branches not originating at same point and more or less parallel (Fig. 87).....8
- Costa of hind wing curving upwards near point of articulation with branches originating at or about the same point, therefore forming a somewhat three-fingered fork (Fig. 94).....
-*Eriosomatinae* (in part) p. 345
8. Cornicles conspicuous, cone-like or on prominent elevations (Fig. 130).....*Aphiinae* (in part) p. 149
- Cornicles lacking, or indistinct and mere rings, not on prominent elevations (Fig. 159).....9
9. Antennae five-segmented.....*Eriosomatinae* (*Forda* and *Geocica*) p. 345
- Antennae six-segmented.....10
10. Fore wings with medial veins not branched (Fig. 64).....
-*Eriosomatinae* (*Prociophilus* and *Trifidaphis*) p. 345
- Fore wings with medial veins branched (Fig. 69).....11
11. Sensoria narrow, transverse, many encircling at least half of segment.....*Eriosomatinae* (*Georgiaphis*) p. 345
- Sensoria circular or transverse-oval.....
- ...*Aphiinae* (*Tamalia*, *Phyllaphis*, *Eulachnus* and *Stegophylla*) p. 149

SUBFAMILY APHIINAE

KEY TO SUPERTRIBES

1. Terminal filament of sixth antennal segment shorter than base of segment (Fig. 231).....2
- Terminal filament of sixth antennal segment equal to (Fig. 234), or longer than (Fig. 248), base of segment.....4
2. Stigma of fore wings linear, very long and narrow (Figs. 52, 59, 67); epicranial suture on head distinct (Fig. 75).....
-*Lachnea* (*Cinara*, *Eulachnus*, *Longistigma*, and *Tuberculachnus*) p. 150
- Stigma of fore wings short, usually more bulbous in shape (Figs. 54, 56, 62, 66); head without epicranial suture (Fig. 79).....3
3. Antennae with numerous, long, hair-like setae (Fig. 231).....
-*Lachnea* (*Anoccia*) p. 150
- Antennae without such hair-like setae, at most with a few, scattered short setae (Fig. 235).....*Callipterea* (in part) p. 242
4. Body or appendages (exclusive of tibiae and tarsi), or both, with numerous, long, hair-like setae (Figs. 230, 324), the setae never enlarged or modified at tip.....*Chaitophorea* (in part) p. 160
- Body and appendages (exclusive of tibiae and tarsi) without long, hair-like setae, either with a few short, scattered setae (Fig. 285), or with setae enlarged at the tip and modified (Figs. 316, 317, 318, 320).....5

5. Anal plate either distinctly indented (Fig. 220) or bilobed (Figs. 168, 219) except in *Eucraphis*; cauda knob-like (Figs. 178, 219), with a constriction near the middle, the apical portion circular or transverse-oval; cornicles, if apparent, trapezoidal (Fig. 155), never long and cylindrical; secondary sensoria often elongate-oval (Fig. 236).....**Callipterea** (in part) p. 242
- Anal plate always with apex rounded (Fig. 214), never indented; cauda clavate (Fig. 187) or tapering (Figs. 185, 199), never knob-like; cornicles, if apparent, usually cylindrical (Fig. 135), often long (Fig. 120) or swollen (Figs. 145, 148, 149, 160), never trapezoidal; secondary sensoria round (Figs. 268, 274, 293) never elongate oval.....6
6. Cornicles either absent or much shorter than hind tarsi exclusive of claws.....7
- Cornicles subequal to, or longer than, length of hind tarsi exclusive of claws.....8
7. Anal plate wide V-shaped (Fig. 209), cauda subequal to anal plate in length, rounded; third antennal segment very long, almost twice width of head across eyes.**Chaitophorea** (in part) p. 160
- Anal plate semi-circular (Fig. 210), cauda tapering to more or less of a point, usually much longer than anal plate; third antennal segment (except in *Brevicoryne*) subequal to width of head across eyes.....**Aphiea** (in part) p. 175
8. Cornicles absent or minute.....
-**Aphiea** (*Asiphonaphis* and *Brachycolus*) p. 175
- Cornicles present and conspicuous.....9
9. Hind wings with one oblique vein (cubitus) lacking (Fig. 89) or only partially developed, or with both oblique veins (cubitus and media) lacking (Fig. 96).....10
- Hind wings with both oblique veins (cubitus and media) present (Fig. 91)12
10. Radial sector of fore wing deeply curved downward and either uniting with media to form a closed cell beneath stigma (Fig. 74) or almost uniting with media (Figs. 58, 66).....
-**Macrosiphea** (*Idiopterus* and *Pentalonia*) p. 273
- Radial sector of fore wing not deeply curved downward, no closed cell beneath stigma (Figs. 56, 62).....11
11. Hind wings without oblique veins (cubitus and media) (Fig. 96)**Macrosiphea** (*Microparsus*) p. 273
- Hind wings with one oblique vein (cubitus) lacking or only partially developed...**Aphiea** (*Alphitoaphis* and *Hysteroncra*) p. 175
12. Media of fore wings normally branched once (Fig. 70).....**Aphiea** (*Toxoptera*) p. 175
- Media of fore wings normally branched twice (Fig. 62).....13
13. Inner margins of antennal sockets considerably produced anteriorly (Figs. 82, 86).....**Macrosiphea** (in part) p. 273
- Inner margins of antennal sockets not produced anteriorly or only very slightly so (Fig. 80).....**Aphiea** (in part) p. 175

SUPERTRIBE LACHNEA

KEY TO GENERA

1. Fore wings (Fig. 59) with dark suffusion of stigmal region extending as a distinct band beyond stigma to tip of wings..... **Longistigma** p. 157
- Fore wings (Figs. 60, 67) with stigmal suffusion not extending as a distinct band to tip of wings.....2

2. Radial sector (Fig. 68) of fore wings bowed, arising from body of stigma; not feeding on conifers.....3
- Radial sector (Figs. 60, 67) of fore wings straight, arising from lower distal angle of stigma; feeding on conifers.....4
3. Dark stigmal suffusion of fore wings bulbous in shape (Fig. 68); hind tibiae little if any longer than antennae; without large tubercle on dorsum of abdomen; small species.....**Anoecia** p. 151
- Dark stigmal suffusion of fore wings elongate and more linear (Fig. 52); hind tibiae about twice as long as antennae; with large tubercle on middle of dorsum of abdomen (difficult to see on flat-mounted specimens on slides but conspicuous in live material); very large species.....**Tuberolachnus** p. 159
4. Cornicles on conspicuous cone-shaped areas (Fig. 153); ocular tubercles present but small; comparatively large robust forms; feeding on bark of stems and branches.....**Cinara** p. 153
- Cornicles pore-like, not on cone-shaped areas (Fig. 158); ocular tubercles absent; medium-sized elongate forms; feeders on needles **Eulachnus** p. 157

GENUS ANOECIA KOCH

*Key to Species of the Genus Anoecia**

1. Third antennal segment with about seven secondary sensoria, fourth and fifth antennal segments each with one or two secondary sensoria; dark forms.....**querci** (Fitch) p. 152
- Third, fourth, and fifth antennal segments rarely with secondary sensoria; light forms.....**oenotherae** Wilson p. 151

ANOECIA OENOTHERAE Wilson

Anoecia oenotherae Wilson, Canadian Entomologist, Vol. XLIII, No. 2, February, 1911, p. 63.

This subterranean aphid is recorded from Illinois for the first time. It is retained tentatively as a good species, but further investigations may reveal it to be a summer form of *Anoecia querci* (Fitch) as Baker (1916) has suggested. When Wilson described this plant louse he stated that the third segment has "three or four widely-separated sensoria, which are not as prominent as those in other species of *Anoecia*." Our alate viviparous females rarely have secondary sensoria on the third segment, and Miss M. A. Palmer reports that a cotype slide of *oenotherae* Wilson examined by her "contains two alate viviparae, one shows no sensoria on antennal joint III and the other example shows only one or two."

A. setariae Gillette and Palmer (1924) is very similar and, as stated in a letter from Miss Palmer, "may be identical." Biological investigations are needed to settle the question definitely.

Data associated with our specimens, collected on roots of *Oenothera*, are as follows: Muncie (May 5) and Oakwood (July 8), 1928; Oakwood (July 22), Oregon (July 11), Rock Island (July 7), Seymour (July 20), and Starved Rock State Park (July 6), 1929.

* The alate viviparous females keyed here as separate species may represent a summer (*oenotherae*) form and spring and fall (*querci*) forms of a single variable species.

ANOECIA QUERCII (FITCH)

FIG. 68

Eriosoma quercii Fitch, Fifth Report of the Noxious and other Insects of the State of New York, Transactions of the New York State Agricultural Society, Vol. XVIII, 1858 (printed 1859), p. 804.

What was presumably this species was first recorded from Illinois (near Rock Island) by Walsh (1862) as "*Eriosoma? cornicola* n. sp." It was again reported from Illinois by Thomas (1879) under the new specific name of "*Schizoneura panicola*." Davis (1910d) was the first to report this species from the state (northern Illinois) under the specific name of *quercii* Fitch.

Baker (1916c) has given the best account of the habits and characters of this species. In addition to placing *Rhizobius cleusinis* Thomas and *Schizoneura panicola* Thomas as synonyms of this species (Osborn had previously placed the latter as a synonym of *corni* in sense of previous authors), Baker suggests that *Anoccia oenotherae* Wilson is "only another of the root-feeding forms of *quercii*, which in this particular case was feeding upon *Oenothera*." Forbes and Hart (1895) have presented under the name of *Schizoneura panicola* Thomas much information regarding what are no doubt the summer or root forms of this species. Although they frequently found this form on roots of corn, they considered it as having little economic significance.

Both *cleusinis* Thomas and *panicola* Thomas, as shown by the cotypic material, belong to the genus *Anoccia*. Baker's (1916c) position in sinking *cleusinis* Thomas as a synonym, based upon rearings of Pergande, seems tenable to us, especially since the apterous cotypic material can not be separated from apterous forms of *quercii* (Fitch). The cotypic slide of *panicola* is in such poor condition, and our present knowledge of the genus is so limited, that a specific determination is opinionative. Maxson has stated in a letter to us that it "is different than any species of this genus (*Anoccia*) with which I am acquainted." We believe that Baker is probably correct in considering *panicola* Thomas as a synonym of *quercii*.

Since this species spends part of its life cycle as a summer form on the roots of grasses, etc., and has *Cornus* as its over-wintering host, the specific name of *quercii* appears to be a misnomer. "Drifts" of *quercii* Fitch from *Cornus* are frequently found on plants other than their hosts, as are many other species of migratory plant lice

Data associated with our specimens collected on various species of *Cornus* are as follows: Urbana (May 17), 1894; Catlin (Sept. 27), Danville (Sept. 18), Herod (Dec. 12), 1928; Decatur (Oct. 5), Kappa (Sept. 9, 22, Oct. 3), 1929; Humboldt (Nov. 12), 1930. Specimens of "drifts" or migrating specimens were collected as follows: Urbana (June 25), 1889; Urbana (Oct. 19), 1928; Homer Park (Oct. 23), Seymour (Oct. 30), 1929; Urbana (Sept. 28-Oct. 30), 1930. Data associated with apterous forms on roots of *Setaria*, *Zea*, *Erigeron* and undetermined grasses are as follows: Champaign (July 31), Polo (July 15), 1883; Urbana (May 20), 1887; Urbana (Oct. 10), 1890; Champaign (Oct. 17), 1894; Urbana (Sept. 27), 1930. Cotypic slide of *Rhizobius cleusinis* Thomas (Slide No. 8777) is from Carbondale, Illinois, on roots of *Eleusine indica*, September 3, 1877, and the cotypic slide of *Schizoneura panicola* Thomas (Slide No. 2770) is from St. Louis, Missouri, November, on roots of *Panicum glabrum*, collected by H. Pergande.

GENUS CINARA CURTIS

The life histories of the species in this genus are so uniformly similar that comments concerning them are not given under each species, as is the case in some of the more complex and migratory forms in other genera. Along with other closely related forms, the genus *Cinara* is considered to be among the most primitive of the living aphids.

The various species show strict fidelity to the pine family, or Pinaceae, upon which the entire non-migratory life cycle is spent. The aphids over-winter in the egg stage. The stem mothers produce apterous viviparous females, which in turn give rise to other apterous viviparous females, alate viviparous females, and finally alate or apterous males and oviparous females.

Key to Species of the Genus Cinara

1. First tarsal segment about one-fifth the length of the second segment exclusive of claws.....*pinicola* (Kaltenbach) p. 156
- First tarsal segment from about one-third to one-half the length of the second segment exclusive of claws.....2
2. Hind tibiae uniformly dark brownish.....3
- Hind tibiae with basal and apical portions dark brownish, area between yellowish brown, the two colors distinctly contrasting.....4
3. Third antennal segment approximately twice as long as hind tarsus exclusive of claws.....*strobi* (Fitch) p. 157
- Third antennal segment but slightly longer than hind tarsus exclusive of claws.....*difficilis* n. sp. p. 153
4. Hairs on antennae very short and spine-like, little if any longer than width of the antennal segments.....*laricis* (Hartig) p. 155
- Hairs on antennae longer, many of them at least twice the width of the antennal segments.....5
5. Tibiae of fore legs almost uniformly dark brownish; hair on hind tibiae not numerous, stout, rather spine-like, many erect particularly on basal half.....*pini* (Linnaeus) p. 156
- Tibiae of fore legs with basal and apical portions dark brownish, area between yellowish brown, the two colors distinctly contrasting; hairs on hind tibia numerous, rather fine and mostly reclinate*palmerae* (Gillette) p. 156

CINARA DIFFICILIS new species

FIG. 231

ALATE VIVIPAROUS FEMALE

Size and general color.—Length from vertex to tip of anal plate, 2.60.* Entire body dull with a fine waxy bloom easily seen under a microscope. Head and thorax dusky brown, the head with a conspicuous darker median line, the thorax with the tegulae, paraptera, and notal membranes reddish brown. Abdomen cinnamon brown with a slight pinkish cast; cornicles and the cone-shaped areas at the base of the cornicles, cauda, anal plate, and a transverse patch immediately anterior to the cauda are dark brown. There are four rows of small brownish spots longitudinally arranged on the dorsum of the abdomen. The first two antennal segments are concolorous with the head; the base of the third antennal segment is much lighter in color than the remaining portion of this segment which is a light chestnut brown; fourth, fifth, and sixth antennal segments uniformly light chestnut brown. Coxae and trochanters of all legs blackish brown; femora of all legs uniformly dark chestnut brown, except that the femora of the hind legs are

* All measurements in this paper are in millimeters.

slightly lighter at or near their base; tibiae dark chestnut brown with a slight tendency to be a shade or so lighter near the center of the segment, except for the tibiae of the hind legs which are uniformly brownish; tarsi dark chestnut brown. The last three apical segments of the beak are dark chestnut brown, the remaining segments are considerably lighter in color than the apical segments, and the apical portion of the long second segment is more or less spotted with dark brown areas from which arise hairs with a light colored base. Costal margin of wings deeply suffused with brown.

Head and appendages.—Average width of head across eyes, .69. Antennal segments with comparative lengths as follows: III—.29 to .39, average .35; IV—.10 to .16, average .14; V—.14 to .21, average .17; VI—.14 to .14, average .14 plus .03 to .04, average .03. The secondary sensoria are distributed as follows (Fig. 231): third antennal segment with six to nine sensoria, and with the exception of a single sensorium arranged in a straight row, the first sensorium being located about one-fifth of the length of the segment from the base; the fourth and fifth segments have a single, more or less centrally located, secondary sensorium in addition to the large primary sensorium. The ocular tubercles are present but are poorly developed. The beak almost reaches to the cornicles.

Thorax and appendages.—Fore wings with a prominent dark brownish suffusion along the costal margin; subcostal vein large and dark brown, interrupted or broken near stigmal area, therefore a clearly defined stigmal area lacking; median vein only once forked and feebly developed; radial sector, cubitus, and first anal veins strongly outlined; hind margin of wing slightly thickened at point of articulation with first anal and cubital veins. Tibiae of metathoracic legs slightly inwardly curved a short distance beyond the middle. Tarsi of metathoracic legs about one-fifth shorter than the length of the third antennal segment.

Abdomen.—The cornicles are situated on comparatively shallow cone-shaped areas which have their outer margin very irregular. The maximum dimensions of the cornicles plus the cone-shaped area are as follows: height, .16; width, .36. The cauda is one-third wider at the base than it is long; its sides are not rounded but arise to form an angle of slightly more than ninety degrees.

Hair.—Hair, wherever found, fine and not spine-like; on antennae almost twice as long as width of segment and quite erect for about one-half their length; on basal portion of hind tibiae quite erect and about one-fifth longer than width of segment, and on apical portion somewhat longer and more recumbent than those on the basal portion; on anal plate and cauda much longer than any other found on the body.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 2.71. Color, except for legs and a slight grayish-brown on the abdomen, identical with color characters as given for the alate viviparous female. The legs of this form are a dark chestnut brown except that one-half to one-third of the tibiae near their basal portions are light yellowish brown as are also the bases of the femora. Antennae colored as in the alate except in some specimens they are lighter in color as a whole.

Head and appendages.—Average width of head across eyes, .74. Antennal segments with comparative lengths as follows: III—.24 to .41, average .31; IV—.10 to .16, average .13; V—.14 to .19, average .17; VI—.10 to .14, average .12 plus .03 to .06, average .04. The secondary sensoria are confined wholly to the fifth antennal segment and range in number from one to two (two in only one case). The head is divided by a median line, the position of which is further emphasized by a median furrow which in some individuals makes the head appear bilobed or indented at its anterior margin. The beak is colored as in the alate viviparous female. The hind tibiae are shaped as the hind tibiae of the alate female; the hind tarsi exclusive of claws are subequal in length to the third antennal segment.

Abdomen.—Abdomen and structures similar to those described for the alate viviparous female. The cornicles vary from .31 to .43 and average .35. The cauda is broadly rounded.

Hair.—The hairs are similar to those described for the alate viviparous female except that those on the apical portions of the hind tibiae are slightly more upright.

Holotype.—Alate viviparous female; Herod, Illinois, June 28, 1931, on *Juniperus virginiana*, (Frison and Ross). The wings of the holotype are broken off a short distance from articulation with the thorax, a condition probably caused by the manipulation of attendant ants. On slide with two nymphs and one pupa. Slide No. 10598. *Morphotype*.—Apterous viviparous female; Herod, Illinois, June 16, 1930, on *Juniperus virginiana*, (Frison and Ross). Slide No. 10599. *Paratypes*.—Forty-two slides of alate viviparous females, apterous viviparous females, pupae and nymphs; all collected in Illinois on *Juniperus virginiana* by T. H. Frison, F. C. Hottes, and H. H. Ross. The localities and dates are as follows: Herod (June 21 and September 27), Anna (June 24), and Galena (June 10), 1929; Herod (June 16), 1930. Slides Nos. 10600-10625 and others unnumbered.

This species was discovered by investigating a covered runway in which an ant (*Crematogaster lincolata* Say) was seen to enter; the runway was located on a small woody branch of red cedar. In this protected situation a single alate viviparous female with mutilated wings was found. Examination of other and similar ant structures on the trunk and branches of the host tree revealed additional specimens. The specimens were usually in two's or three's but nearly one-hundred specimens were removed from one place where a branch had split away from the main trunk of the tree and then partially healed, the open and exposed crevice being walled over by the ants with mud and shreds of bark until it was effectively concealed. Specimens found at all three localities were associated with the same species of ant and cleverly concealed by the ant structures. The mutilated condition of the wings of all but one alate viviparous female may be due to the ants chewing off the wings.

The characters of the body of this species strongly suggest *Cinara rubicunda* (Wilson) described from *Juniperus communis* in Oregon. It may be separated from that species, however, by the venation. In this new species the median vein is but once-forked, whereas in *rubicundus* it is stated and illustrated as twice-forked. This species also comes close to *C. juniperi* DeGeer of Europe, but apparently may be separated from it on the basis of the longer beak.

Specimens of this species were submitted to Professor H. F. Wilson who kindly examined them and reported that these specimens "do not agree with any that I have." Other specimens were submitted to Miss M. A. Palmer, who reported that she did not know this form.

CINARA LARICIS (HARTIG)

Figs. 12, 75, 153, 213, 216

Laehnus laricis Hartig, Jahresberichte über die Fortschritte der Forstwissenschaft und forstlichen Naturkunde im Jahre 1836 und 1837. Berlin, 1839, p. 645.

Aphis laricis Walker, The Annals and Magazine of Natural History, Vol. II, second series, 1848, p. 102. *Homonym and synonym*.

This European as well as American species has not been previously recorded from Illinois. Although its host, the tamarack, *Larix laricina*, occurs as a specimen tree in numerous localities throughout the state, our material was taken only in the locality where the tamarack occurs as a native tree. Our determination of this species has been checked by Professor H. F. Wilson. Theobald (1929) and Wilson (1923) give good descriptions of the various forms except the oviparous female, which is described by Schouteden (1906). Patch (1912a) has presented descriptions and drawings, under the name of *Lachnus laricifex* Fitch, based upon specimens collected in Maine.

The placement of *laricis* Hartig (1837) in the genus *Lachnus* and its association with the larch (*Larix*) are sufficient to make this name valid according to Article 25a of the International Rules of Zoological Nomenclature.

Data associated with our viviparous specimens are as follows: Antioch, June 16, 1928.

CINARA PALMERAE (GILLETTE)

Lachnus palmerae Gillette, Annals of the Entomological Society of America, Vol. X, No. 2, June, 1917, p. 135.

This species is here recorded from Illinois for the first time. Our specimens were determined by Professor H. F. Wilson and at his suggestion sent to Professor C. P. Gillette and Miss M. A. Palmer for comparison with cotypic material. Such a comparison was made by Miss Palmer who found that our specimens checked with the types. The host of this species is spruce (*Picea* sp.). Gillette has described all forms of this species in detail.

Data associated with our specimens are as follows: Galena, July, 10, 1929.

CINARA PINI (LINNAEUS)

Aphis pini Linnaeus, Systema Naturae, Editio Decima, 1758, p. 453.

A widely distributed species not previously recorded from the state. It is a large species and feeds on the bark of pine (*Pinus* sp.). Theobald (1929) and Wilson (1923) give good descriptions and notes regarding this plant louse.

Data associated with our Illinois specimens are as follows: Decatur (Nov. 4), Havana (June 21), 1928; Chicago (June 8), 1930.

CINARA PINICOLA (KALTENBACH)

Lachnus pinicola Kaltenbach, Monographie der Familien der Pflanzenläuse, Aachen, 1843, p. 154.

This species, occurring in Europe as well as America, has not been previously recorded from Illinois. Good descriptions and notes regarding this plant louse are given by Theobald (1929) and Wilson (1923). We are indebted to Professor H. F. Wilson for checking our determination of this species.

Data associated with our specimens, all taken on *Picea* sp., are as follows: Champaign (June 7), 1886; Carbondale (June 4), Champaign (July 18), Galena (June 26), Herod (May 31), Kankakee (June 29), Oregon (June 27), Urbana (June 19), 1928; Galena (July 10), 1929.

CINARA STROBI (FITCH)

FIG. 67

Eriosoma strobis Fitch. Fourth Annual Report of the Regents of the University on the Condition of the State Cabinet of Natural History, State of New York, January 14, 1851, p. 69.

Our report of this species is the first actual record of its occurrence in Illinois. See Wilson (1923) for descriptions and notes regarding this aphid attacking white pines.

Data associated with our specimens, all taken on *Pinus strobus*, are as follows: Urbana (Nov. 1-5), 1928; Flora (June 18), Jerseyville (June 25), 1929.

GENUS EULACHNUS DEL GUERCIO

EULACHNUS RILEYI (WILLIAMS)

FIG. 60

Lachnus rileyi Williams, University Studies, University of Nebraska, Vol. X, No. 2, March, 1911, p. 24.

This species has been reported from Chicago, Morgan Park, and Urbana, by Davis (1914a). Following Williams and Davis we are considering it distinct from the European *Eulachnus agilis* (Kalt.), although the two forms are unquestionably very closely allied. The difference between *rileyi* and *agilis* is expressed by the presence in the latter of secondary sensoria on the third and sometimes fourth antennal segments and their lack, or rarity, in the former. Our records indicate that this elongate and active species, which spends its entire life upon pines, is widely distributed through the state. Good descriptions of all forms are given by Davis (1914).

Data associated with our specimens, all collected on *Pinus sylvestris*, *Pinus echinata*, *Pinus strobus*, or *Pinus* sp., are as follows: Urbana (Oct. 11, 12), 1889; Urbana (May 7), 1925; Antioch (June 15), Galena (June 26), Metropolis (June 1), Pekin (June 20), Quincy (June 6), Urbana (May 23, Sept. 26, Oct. 19), 1928; Macomb (May 4), Rock Island (July 7), 1929. Sexual forms taken at Urbana on October 19, 1928.

GENUS LONGISTIGMA WILSON

LONGISTIGMA CARYAE (HARRIS)

FIGS. 6, 7, 8, 18, 59

Aphis caryae Harris, A Report on the Insects of Massachusetts Injurious to Vegetation, Cambridge, 1841, p. 190.

This conspicuous and well-marked species is the largest aphid occurring in the United States. It was probably first recorded from



Fig. 18. A colony of apterous viviparous females and nymphs of *Longistigma caryae* (Harris) on the sycamore, *Platanus occidentalis*; Urbana, Oct. 14, 1929.

Illinois by Thomas (1879), who reported it as clustered on the underside of the limbs of the pig-nut hickory (*Carya porcina*) in summer. It is likely, too, that the specimens of this species studied and described by Walsh (1862) were from Illinois. Davis (1910) listed it as common throughout the state, and said that the sexual forms occurred during October in northern Illinois. Descriptions of the various forms, together with a short note on the biology of the species, were given by Weed (1891).

At various times this species occurs in such large numbers upon the boulevard trees (Fig. 18) in some cities that it becomes a considerable pest because of the dropping of honey-dew upon the sidewalks beneath. During the last few years in Illinois, however, we have never found it extremely abundant; in fact, have never been able to find it except in autumn. We have records of this species from sycamore (*Platanus occidentalis*), pecan (*Carya illinoensis*), and basswood (*Tilia americana*).

Data associated with our viviparous forms are as follows: Champaign (Sept. 6), 1886; Makanda (June 4), 1919; Urbana (Oct. 26), 1924; Marion (Dec. 5), 1927; Herod (Nov. 30), Homer Park (Oct. 23), Urbana (Oct. 5, 19, Nov. 6), 1928; Alton (Oct. 15), Urbana (Oct. 14), Woodstock (Aug. 6), 1929. Sexual forms have been taken at Decatur (Nov. 4), Herod (Nov. 29), Urbana (Oct. 19), 1928, Granite City (Nov.), and Urbana (Oct. 14), 1929.

GENUS TUBEROLACHNUS MORDEVILKO

TUBEROLACHNUS SALIGNA (GMELIN)

FIG. 52

Aphis saligna Gmelin, Caroli a Linné, Systema Naturae, 13th Ed., Lipsiae, Tom. 1, Pars. IV, 1790, p. 2209, No. 62.

LeBaron (1871) in the "Second Report on the Insects of Illinois" described this species as *Lachnus dentatus*, probably from Illinois specimens. It was reported under this latter name by Davis (1910d) as being a common species in northern Illinois, becoming very abundant in the fall, and a considerable nuisance on ornamental willows. This aphid is easily recognized because of its large size and prominent dorsal abdominal tubercle. It is restricted to willow (*Salix* sp.).

We are following Theobald (1929) in considering *saligna* as having priority over the specific name of *punctatus* (Burmeister) now in use in this country.

Data associated with our specimens are as follows: Decatur (Sept. 25), 1887; Elizabethtown (Oct. 12), Herod (Nov. 30), 1928; Edwardsville (Sept. 11), Urbana (Oct. 13, 14), 1929; Urbana (Aug. 26), Watson (Nov. 13), 1930.

SUPERTRIBE CHAITOPHOREA

KEY TO GENERA

1. Cornicles always present, varying from minute to large.....2
- Cornicles absent *Gypsoaphis* p. 167
2. Antennae with five segments (Fig. 232)..... *Sipha* p. 174
- Antennae with four segments (Fig. 230)..... *Paducia* new genus p. 167
- Antennae with six segments.....3
3. Cauda distinctly knobbed (Fig. 188)..... *Chaitophorus* p. 160
- Cauda rounded (Fig. 214).....4
4. Cornicles with apical portion swollen (Figs. 145, 146, 162) and wider than basal portion.....5
- Cornicles either cylindrical or with basal portion wider than apical portion (Fig. 152).....6
5. Cornicles without a distinct flange at apex (Fig. 162)..... *Plocamaphis* p. 172
- Cornicles with a distinct flange at apex (Fig. 145)..... *Clavigerus* p. 165
6. Cornicles cylindrical; third antennal segment long, twice or more as long as width of head through eyes.... *Amphicercidus* p. 160
- Cornicles with basal portion wider than apical portion, hence trapezoidal in shape (Fig. 152); third antennal segment shorter, much less than twice as long as width of head through eyes *Periphyllus* p. 170

GENUS AMPHICERCIDUS OESTLUND

AMPHICERCIDUS PULVERULENS (GILLETTE)

Figs. 141, 248

Aphis pulverulens Gillette, Journal of Economic Entomology, Vol. 4, No. 3, June, 1911, p. 324.

This species, originally described from Colorado, has not been previously recorded from Illinois. Our records indicate that it is a common species in the southern portion of the state. We have no records indicating its presence in the northern portion of the state, but since it occurs in Minnesota it should be present wherever its host occurs in Illinois. It shows a decided preference in Illinois for coral-berry growing in moist, somewhat shaded situations. This species produces a white flocculent secretion, is a bark feeder, and is never far removed from the ground. The sexual forms have been described by Gillette (1911).

Data associated with our apterous and alate viviparous female specimens, all collected on *Symphoricarpos orbiculatus*, are as follows: Elizabethtown (May 29), Golconda (May 31), Herod (May 29), Mattoon (June 10), Metropolis (May 31, June 1), Mt. Carmel (May 26), Quincy (June 6), Shawneetown (May 27), 1928; Flora (June 18), Hardin (June 25), Monticello (May 24), 1929.

GENUS CHAITOPHORUS Koch

The forms constituting this group of plant lice have presented us with one of our most baffling problems, and it is evident from the statements of various students of the Aphidiidae (Patch, 1913a,

and Davis, 1910d) that others have faced the same unsatisfactory situation. With the exception of one species (*quercicola*), which is readily separated in the alate forms because of its conspicuously marked wings and in apterous forms because of its spiny condition, no good differential structural characters have been found. Comparative lengths of antennal segments, number of sensoria, etc., are quite variable in a series of apparently the same species. In all parts of Illinois our captures are readily separated on the basis of habitus and host plants into the following five forms: the distinct *quercicola* with marked wings on oaks, a medium-sized green or blackish form on willows such as *Salix nigra*, a minute whitish pellucid form on *Salix amygdaloides*, and two light-colored forms (one large and one small) on various species of *Populus*. Biological studies including numerous transfer tests of forms from one host to another are badly needed to throw light upon our present dilemma. Meanwhile it seems the best policy to keep separate the forms involved, however weak may be our key for their differentiation.

Key to Species of the Genus Chaitophorus

1. Veins of wings margined with fuscous (Fig. 62); stout dark spines on dorsum of abdomen in apterous forms..... *quercicola* Monell p. 164
- Veins of wings not margined with fuscous (Fig. 70), no stout dark spines on dorsum of abdomen in apterous forms..... 2
2. Occurring on *Salix*..... 3
- Occurring on *Populus*..... 4
3. Species of minute size; abdomen partially pellucid or whitish; on *Salix amygdaloides*..... *pusillus* n. sp. p. 163
- Larger species; abdomen partially greenish or blackish; on various species of *Salix*..... *viminalis* Monell p. 165
4. Secondary sensoria on third antennal segment forming an irregular row (Fig. 250); transverse dark patches on dorsum of middle abdominal segments broad and rectangular in shape (Fig. 336) *populifoliae* Oestlund p. 163
- Secondary sensoria on third antennal segment forming almost a straight row (Fig. 253); transverse dark patches on dorsum of middle abdominal segments narrower with lateral ends tapering and clear intersegmental areas more prominent (Fig. 335) *neglectus* n. sp. p. 161

CHAITOPHORUS NEGLECTUS new species

Figs. 253, 335

ALATE VINIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.27. Head and thorax dusky brown. Abdomen (Fig. 335) light greenish-yellow, the dorsum marked with dusky-brown bars and spots, as follows: each segment anterior to cornicles typically with a transverse, elongate, diamond-shaped bar often extending almost the entire width of the segment, with a large lateral subquadrate spot, and with several small, variously shaped spots extending transversely between the lateral spots and forming a chain between the large transverse bands. Segments posterior to cornicles with dorsum, except for intersegmental areas, a solid dusky brown. Cornicles, cauda, and anal plate light dusky. First and second antennal segments concolorous with head, third antennal segment light brownish, usually

somewhat lighter at or near the base, remaining segments brownish with their apical portions darker. Femora usually yellowish basally and apically, middle portion light brownish, some specimens with the hind femora considerably darker than the others; tibiae uniformly yellowish; tarsi light brownish. Beak yellowish with apex brownish. Stigma and veins brown; posterior margin of wing in vicinity of anal vein brownish.

Head and appendages.—Average width of head across eyes, .39. Antennal segments with comparative lengths as follows: III—.30 to .39, average .33; IV—.14 to .21, average .17; V—.11 to .16, average .14; VI—.09 to .10, average .10 plus .27 to .40, average .34. Secondary sensoria (Fig. 253) usually confined to the third antennal segment, numbering from 7 to 13 and averaging 9, arranged in a straight row, sometimes fourth segment with a single sensorium. For a *Chaitophorus*, this species is remarkably constant in regard to numbers and arrangement of secondary sensoria. Primary sensorium on sixth antennal segment with a group of about 5 marginal sensoria at one side. Front of head with about six long hairs. Beak reaching about midway between first and second coxae.

Thorax and appendages.—Stigma of fore wings somewhat arched anteriorly, wing beyond apex of stigma distinctly narrower than at stigma. Second fork of media variable in position but always nearer to margin of wing than to the first fork or midway between them. All veins failing to reach the margin of the wing. Hairs on legs fine, long, and only slightly drooping.

Abdomen.—Cornicles about .06 long with closed reticulations at the apex, very little wider at base than at apex. Cauda .08 long, distinctly knobbed. Anal plate rounded.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.52. Head yellowish-brown, darkest on dorsum. Thorax brownish on dorsum with yellowish-green towards the lateral portions. Abdomen yellowish-green with two broad, longitudinal bands of brown on dorsum, bands confluent anteriorly with brown on thorax and on the segment posterior to the cornicles with each other. Brown marks on dorsum of entire body fashioned into a somewhat fork-shaped effect, outlined by the surrounding yellowish color of the body. Cornicles yellowish-green. Cauda and anal plate very light dusky brown. First two antennal segments concolorous with head, third antennal segment and basal half of fourth antennal segment yellowish, remaining portion of antennae brown. Legs and beak as in alate viviparous female.

Head and appendages.—Average width of head across eyes, .37. Antennal segments with the following proportions: III—.27 to .29, average .28; IV—.14 to .17, average .16; V—.13 to .14, average .14; VI—.09 to .11, average .10 plus .16 to .37, average .30. There are no secondary sensoria; primary sensorium on sixth antennal segment with about six marginal sensoria to one side. All antennal segments lightly imbricated. Beak reaching just to or but slightly beyond mesothoracic coxae.

Thorax and abdomen.—Similar to thorax and abdomen of alate viviparous female except that the anal plate has a very slight indentation near the center of the posterior margin.

Holotype.—Alate viviparous female; Starved Rock State Park, Illinois, August 14, 1929, on *Populus deltoides*, (Frison and Hottes). On slide with paratype apterous viviparous females and nymphs. Slide No. 10037. *Morphotype.*—Apterous viviparous female; some data as holotype. On slide with paratype alate and apterous viviparous females and nymphs. Slide No. 10038. *Paratypes.*—Fourteen slides containing alate and apterous viviparous females, pupae, and nymphs, all collected in 1929 on *Populus deltoides* and *P. grandidentata* by T. H. Frison and F. C. Hottes as follows: Beach (August 29) and Starved Rock State Park (August 14). Slides Nos. 10039-10049 and others unnumbered.

This species is extremely close to *C. cecigi* Gillette & Palmer and *C. populella* Gillette & Palmer, from which it differs in having a larger number of sensoria on the third antennal segment and in having distinct bands on the dorsum. Specimens tentatively determined as *Chaitophorus populella* G. & P. were submitted to Miss Palmer who pointed out the differences already mentioned and suggested that if the forms run constant it would be the safest procedure to describe them as new. At the same time she ventured the opinion that they are perhaps connecting links between *C. populella* and *C. cecigi*, which she says may sometime prove to be synonymous.

CHAITOPHORUS POPULIFOLIAE OESTLUND

FIGS. 250, 336

Chaitophorus populifoliae (Fitch) Oestlund, Geological and Natural History Survey of Minnesota, Bulletin No. 4, 1887, p. 38. *Misidentification.*

Chaitophorus populifoliae Oestlund proposed for *Chaitophorus populifoliae* (Fitch) Oestlund, Davis, Journal of Economic Entomology, Vol. III, No. 6, 1910, p. 489.

This species (Fig. 336) was redescribed by Davis (1910e), but credit for the specific name was given to Oestlund. Very little is known concerning the biology and distribution of this species.

Data associated with our specimens, all collected on leaves of *Populus deltoides* or *P. grandidentata*, are as follows: Cave-in-Rock (May 30), Elizabethtown (Oct. 12), Herod (Oct. 12), Starved Rock State Park (June 13), 1928; Elizabethtown (June 20), Farmer City (Sept. 22), Grayville (June 19), Oakwood (July 22), Starved Rock State Park (July 5, Aug. 14), 1929; Starved Rock State Park (May 13), 1930.

CHAITOPHORUS PUSILLUS new species

FIGS. 70, 151, 252

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, .95. Head and thorax light brown. Abdomen yellowish, almost whitish, with a large light-brownish or buff spot on the dorsum. Cornicles fuscous; cauda and anal plate yellowish. Legs variable in color, usually yellowish, with tarsi and sometimes portions of femora distinctly fuscous. Stigma fuscous, veins of wings light brown. Beak yellowish except for extreme tip, which is fuscous.

Head and appendages.—Average width of head across eyes, .31. Antennal segments with comparative lengths as follows: III—.20 to .29, average .24; IV—.09 to .16, average .11; V—.11 to .14, average .13; VI—.07 to .09, average .08 plus .20 to .29, average .26. Secondary sensoria (Fig. 252) on third antennal segment ranging in numbers from 4 to 7 and averaging six; fourth and fifth segments with sometimes one or two sensoria each; sensoria usually arranged in a straight row. Primary sensoria on sixth antennal segment with a group of marginal sensoria at one side. Hair on antennae sparse, but very long and fine, being two to three times as long as the width of the segment. Beak reaching midway between the pro- and mesothoracic coxae.

Thorax and appendages.—Costal margin of wing in vicinity of stigma very much curved, stigma comparatively narrow, short, and bluntly pointed; second fork of media variable in position, usually midway between first fork and margin of wing.

Abdomen.—Cornicles (Fig. 151) typical for genus in shape; averaging .95 in length, imbricated very faintly and reticulated at apex. Cauda typical for genus, rarely extending beyond tip of anal plate which is rounded and not indented.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.09. Head, thorax, abdomen, cornicles, cauda and anal plate a pellucid yellowish-white. Apical portion of fifth antennal segment, base of sixth and apical portion of terminal filament are fuscous. Eyes reddish-brown. Legs concolorous with body except that tarsi are often somewhat fuscous.

Head and appendages.—Average width of head across eyes, .33. Antennal segments with comparative lengths as follows: III—.16 to .24, average .19; IV—.07 to .11, average .10; V—.09 to .11, average .10; VI—.07 to .09, average .09 plus .17 to .29, average .25. There are no secondary sensoria. The beak reaches to the end of the mesothoracic coxae.

Abdomen.—The cornicles and cauda have the same average length as similar structures in the alate viviparous female. The body is sparsely covered with fine but unusually long hair, the hairs average .14 in length.

Holotype.—Alate viviparous female; Starved Rock State Park, Illinois, July 6, 1929, on *Salix amygdaloides*, (Frison and Hottes). Slide No. 10680.

Morphotype.—Apterous viviparous female; same data as for *holotype*. On slide with numerous apterous viviparous females and nymphs. Slide No. 10681. *Paratypes.*—Thirty slides of alate and apterous viviparous females and nymphs, all collected on *Salix amygdaloides* in Illinois, by T. H. Frison, F. C. Hottes, and H. H. Ross, with localities and data as follows: Galena (July 10), Oakwood (July 22), Rock Island (July 7), and Starved Rock State Park (July 6-August 14, and September 10), 1929; Oakwood (May 9), and Starved Rock State Park (May 13), 1930. Slides Nos. 10682-10704 and others unnumbered.

This species shows a preference for the terminal leaves of *Salix amygdaloides* and occurs on both the dorsal and ventral leaf surfaces. Its minute size, pellucid appearance, and host are a combination of characters which distinguish it from other described species of *Chaitophorus*. The lack of good structural characters for the separation of the forms now considered as species has already been mentioned in our remarks concerning the genus as a whole.

CHAITOPHORUS QUERCICOLA (MONELL)

FIG. 62

Callipterus? quercicola Monell, Bulletin of the United States Geological and Geographical Survey of the Territories, Vol. V, No. 1, January 22, 1879, Art. 1, p. 31. (Alate form described).

Chaitophorus quercicola Monell, *ibid.*, p. 32, (description of apterous form).

This species was originally described by Monell (1879) from specimens sent to him from Peoria, Illinois. Both Davis (1910d) and Baker (1911b) have placed *C. spinosus* Oestlund as a synonym of *quercicola*, and this placement seems to us to be correct, *spinosus* being described from apterous oviparous females. Davis (1910d) has also placed *Callipterus quercifolii* Thomas (1879) as a synonym of *quercicola* (Monell). The cotypic slide of *Callipterus quercifolii* Thomas in our collection (slide 7658) certainly is *C. quercicola* (Monell) as Davis has stated (1910d and 1913). This slide contains alate and apterous females in poor condition from Sauk City, Wisconsin, collected in June by Bundy on red oak leaves.

Data associated with our alate and apterous viviparous females, all collected on *Quercus macrocarpa*, are as follows: Antioch (June 16), Kankakee (June 29), Oregon (June 28), 1928. Davis reports the oviparous females from Kankakee, Oct. 13, 1908, and viviparous females from Heyworth, April 10, 1908.

CHAITOPHORUS VIMINALIS MONELL

FIG. 188

Chaitophorus viminalis Monell, Bulletin of the United States Geological and Geographical Survey of the Territories, Vol. V, No. 1, January 22, 1879, Art. 1, p. 31.

The material in our collection strongly indicates that *C. viminalis* Monell and *C. nigrae* Oestlund are the same species, the latter being a dark phase of the former. Baker (1917b) held that *viminalis* and *nigrae* were distinct, mainly upon the reticulated condition of the skin of the apterous forms. We are not able to separate our series of slides upon this basis. Comparative lengths of antennal segments and distribution of secondary sensoria intergrade, too, in specimens which on the basis of color might be regarded as two species. In all parts of Illinois we have found the dark and light forms closely associated and intermixed on the same leaves and stems. This is rather unusual if they are different species.

Data associated with our specimens, all collected on various species of *Salix*, are as follows: Antioch (June 16), Carbondale (June 4), Elizabethtown (Oct. 12), Galena (June 26), Havana (June 21), Kankakee (June 29), Mattoon (June 10), Metropolis (June 1), Muncie (May 12), Quincy (June 6), Starved Rock State Park (June 13), Urbana (July 10), 1928; Beach (July 13, Aug. 29), Cairo (June 22), Chebanse (Apr. 24), Elizabethtown (June 20), Galena (July 10), Hardin (June 25), Muncie (April 17), Oakwood (Oct. 13), Olney (June 18), Oregon (July 11), Rock Island (July 7), Starved Rock State Park (Aug. 14), 1929; Robinson (April 14), Snyder (April 14), 1930. Slide No. 3784 in the Survey collection was compared with a slide mount of cotypic specimens "8/86 Mpls 26" in the collection of Dr. Oestlund.

GENUS CLAVIGERUS SZEPLIGETI

Key to the Species of the Genus Clavigerus

1. Cornicles about twice as long as their greatest diameter (Fig. 145).....*smithiae* (Monell) p. 166
- . Cornicles three times or more as long as their greatest diameter (Fig. 146).....*populifoliae* (Fitch) p. 165

CLAVIGERUS POPULIFOLIAE (FITCH)

FIGS. 77, 146, 147

Aphis populifoliae Fitch, Fourth Annual Report of the Regents of the University on the Condition of the State Cabinet of Natural History, State of New York, January 14, 1851, p. 66.

This species is here reported for the first time from Illinois. Davis, in 1910c, used the specific name assigned to this species by Fitch in connection with another species for which Patch (1917) has proposed the name of *A. davisii*. All of our material has been collected on *Salix*. Descriptions of two heretofore undescribed forms are presented.

Data associated with our specimens are as follows: Elizabethtown (May 29, Oct. 12), Harrisburg (May 28), Oakwood (May 12, 23), Shawneetown (May 27), 1928; Elizabethtown (June 20), Galena (July 10), Oakwood (Nov. 7, Oct. 17), 1929; Calvin (April 15), Cobden (April 19), Oakwood (June 1), 1930.

ALATE MALE

Average length, 2.96. Color essentially similar to that of alate viviparous female. Average width of head across eyes, .64. Comparative lengths of antennal segments as follows: III—.59 to .61, average .60; IV—.39 to .43, average .40; V—.36; VI—.17 plus .26. Secondary sensoria on third, fourth, and fifth antennal segments, averaging as follows: III—35, IV—14, V—11, irregularly arranged, but confined to one side of the segment. Beak reaching to mesothoracic coxae. Prothorax with a large lateral tubercle. Cornicles .24 long, cauda .10, both structures similar in shape to those of alate viviparous female. Genitalia very dark brown.

APTEROUS OVIPAROUS FEMALE

Average length, 3.26. Color essentially similar to apterous viviparous female. Average width of head across eyes, .71. Comparative lengths of antennal segments as follows: III—.54 to .60, average .58; IV—.33 to .39, average .36; V—.30 to .36, average .34; VI—.16 to .17, average .17 plus .21. There are no secondary sensoria. Prothorax with lateral tubercles. Lateral tubercles on abdomen not constant but sometimes present. Cornicles .36 long, cauda .18 long, both similar in shape to those of apterous viviparous female. Sensoria on hind tibiae numbering between three and four hundred.

Allotype.—Alate male; Slide No. 8295, Oakwood, Illinois, October 7, 1929, on *Salix* sp., (T. H. Frison). On slide with male. *Morphotype*.—Apterous oviparous female; Slide No. 8294, same data as allotype. On slide with oviparous female.

CLAVIGERUS SMITHIAE (MONELL)

Fig. 145

Chaitophorus smithiae Monell, Bulletin of the United States Geological and Geographical Survey of the Territories, Vol. V, No. 1, January 22, 1879, Art. 1, p. 32.

Specimens from Peoria, Illinois, formed the cotypic material from which this species was described. This large aphid with its bright orange cornicles is quite common on *Salix*. Specimens have been collected, also, on *Populus grandidentata* and *Acer saccharinum*. Descriptions of the previously undescribed sexual forms are presented here.

Data associated with our specimens are as follows: Normal (Aug. 31, Sept. 24), 1883; Chicago (Oct. 9), 1897; Mansfield (Sept. 22), 1921; Campaign (Sept. 26), Decatur (Sept. 18, Oct. 4), Fisher (Nov. 11), Homer Park (Oct. 23), Kankakee (June 29), Mahomet (Oct. 2), Urbana (Sept. 26), 1928; Duncan Mills (May 4), Oakwood (Oct. 13, 17), Urbana (Oct. 21), 1929; Fox Lake (May 14), Joliet (April 23), 1930. Mating pairs were collected November 11, 1928.

ALATE MALE

Average length from vertex to tip of anal plate, 2.32. Color essentially similar to alate viviparous female. Average width of head across eyes, .66. Comparative lengths of antennal segments as follows: III—.53 to .64, average .58; IV—.33 to .51, average .41; V—.31 to .34, average .32; VI—.16 to .19, average .17 plus .19 to .21, average .20. Secondary sensoria present on third, fourth, and fifth antennal segments, irregularly arranged on all segments.

apparently on all sides of the third segment but confined largely to one side of the fourth and fifth segments; average distribution as follows: III—95, IV—63, V—12. Prothorax with lateral tubercles. Four abdominal segments anterior to cornicles as well as the segment posterior to cornicles with lateral tubercles. Beak reaching middle of metathoracic coxae. Cornicles .19 long, cauda .08 long, otherwise similar to those of alate viviparous female.

APTEROUS OVIPAROUS FEMALE

Average length from vertex to tip of anal plate, 3.39. Color essentially that of apterous viviparous female. Average width of head across eyes, .69. Comparative lengths of antennal segments as follows: III—.46 to .54, average .50; IV—.30 to .31, average .31; V—.23 to .29, average .26; VI—.11 to .16, average .13 plus .20. There are no secondary sensoria. Beak reaching to base of metathoracic coxae. Cornicles .29 long, cauda .14, both similar to those of the apterous viviparous female. Hind tibiae slightly swollen, with about 90 sensoria.

Allotype.—Alate male; Slide No. 7086, Homer Park, Illinois, October 23, 1928, on *Salix* sp., (Frison and Park). On slide with male, oviparous female, and nymph. *Morphotype*.—Apterous oviparous female; Slide No. 7019, Fisher, Illinois, November 11, 1928, on *Acer saccharinum*, (T. H. Frison).

GENUS GYPSOAPHIS OESTLUND

GYPSOAPHIS OESTLUNDI HOTTES

FIGS. 209, 314

Aphis loniceræ Monell, Bulletin of the United States Geological and Geographical Survey of the Territories, Vol. V, No. 1, January 22, 1879, Art. I, p. 26. *Name preoccupied.*

Gypsoaphis oestlundii Hottes, Proceedings of the Biological Society of Washington, Vol. 43, October 7, 1930, p. 181. *New name.*

This species was first recorded from Illinois by Davis (1910e) by the name given it in the original description. It is peculiar among the supertribe Chaitophorea of Illinois in that the cornicles are lacking. This plant louse is partial to the leaves and more terminal shoots of the red honeysuckle (*Lonicera* sp.)

Data associated with our records of this species are as follows: Antioch (June 15), Galena (June 26), Mt. Carroll (June 25), Oregon (June 28), Rock Island (June 24), 1928; Decatur (May 12), Urbana (May 26), 1929.

PADUCIA new genus

Antennae four-segmented (Fig. 230) and much shorter than the body. Antennae, legs, and body covered with numerous long hairs as in *Lachnus*. Head (Fig. 76) very broad and without antennal tubercles. Media of fore wings (Fig. 55) once-forked, hind wings with both media and cubitus present. Cornicles (Fig. 119) long and greatly swollen, constricted near base and before flange at apex. Cauda (Fig. 190) elongate, constricted in middle; tip rounded, almost knobbed. Anal plate very broad. Lateral margins of abdomen (Fig. 313) in alate viviparous female with large well-developed lateral tubercles; apterous oviparous females with lateral glands on the abdomen poorly developed.

Genotype, *Melanoxantherium antennatum* Patch, by original and present designation.

This genus has been placed in the supertribe Chaitophorea and probably is most closely related to the tribe Pterocommini, but it might be considered as representing a new tribe because of its four-segmented antennae and elongate constricted cauda.

PADUCIA ANTENNATA (PATCH)

Melanoxantherium antennatum Patch, Maine Agricultural Experiment Station, Bulletin 213, June, 1913, p. 87.

This unique and curious plant louse has not as yet been definitely associated with its host. Our first specimen, an alate viviparous female, was found resting on a fern leaf, and the oviparous females were first noticed on the surface of a small stream flowing into the Salt Fork River near Oakwood, Illinois. Subsequently a few specimens were found climbing over rocks protruding from the stream. The restriction of these oviparous females to an area of stream not exceeding forty feet in length and two to four feet in width is significant and indicates the host plant was somewhere in the immediate neighborhood. Although a thorough search failed to locate the host, some evidence was obtained to indicate that this aphid occurred on plant roots exposed by the erosive action of the stream. The type specimens described by Patch were collected "on and in a pump which stands beneath an old willow," indicating that willow is probably the host.

We are associating the alate and oviparous females on the basis of similar cornicles and numerous other peculiarities.

This species and the new genus to which it has been assigned have no near relatives and may be sharply and distinctly separated from all other Aphididae. The cornicles, cauda, and anal plate strongly suggest similar structures of *Amphorophora solani* Thomas, but the lack of antennal tubercles, the once-forked media, the lateral glands, and, most significant of all, the four-segmented antennae at once sever all attempts to associate the two species. Tentatively, we have considered this new form as most closely related to the tribe Pterocommini.

Since the alate viviparous female has not been previously described, and the oviparous female but briefly, we are presenting detailed descriptions of these two forms.

ALATE VIVIPAROUS FEMALE

Size and general color.—Length from vertex to tip of anal plate, 1.36. Head and thorax dark brown, boundaries of thoracic sclerites particularly darkly outlined. Abdomen mostly brown, lighter yellowish-brown areas on both sides and posterior to large, median, brownish spot, with lateral tubercles arising from brownish areas; cauda and anal plate dark brown; cornicles dark brown, darkest near base and posterior to widest portion of cornicles. First and second antennal segments brownish but lighter in color than head, second segment a little more yellow than first segment, third antennal segment dark brown except for extreme tip of segment which is yellowish, fourth segment essentially brownish becoming more yellowish-brown near base. Legs brown; femora lighter at base than elsewhere; tibiae almost uniformly brown, darkest at apices; tarsae somewhat lighter in color

than tibiae. Veins of fore wings brown; base of radius, cubitus, and anal veins more distinctly margined with brown than other veins. Beak brownish. Body and appendages with numerous long hairs.

Head and appendages.—Average width of head across eyes, .44. Antennal segments with comparative length as follows: I- .10; II- .10; III- .55; IV- .11 plus .41. Third antennal segment (Fig. 230) with nineteen to twenty-three secondary sensoria which are irregularly arranged but mostly confined to one side of the segment. The beak extends to the base of the coxae of the metathoracic pair of legs.

Thorax and appendages.—Prothorax with three pairs of lateral glands or tubercles. Stigma of fore wings (Fig. 55) narrow, distinctly pointed, and with a well-developed brownish accessory vein; media once-forked, hind wings with both medius and cubitus present.

Abdomen.—Four pairs of tubercles (Fig. 313) on lateral portion of abdomen anterior to cornicles, and a single pair of tubercles posterior to the cornicles, some of the tubercles appear to arise from low volcano shaped areas. The cornicles (Fig. 149) are about four times the length of the cauda and are weakly imbricated just before their apex. Cauda (Fig. 190) somewhat narrowed at base and distinctly constricted beyond middle, with two pairs of hairs on lateral margins. Anal plate wide and distinctly rounded.

APTEROUS OVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 2.02. Body and appendages clothed with numerous long hairs as in alate viviparous female. Head, thorax, and abdomen essentially dark chocolate brown shading to almost black in some places; area at base of cornicles more noticeably yellowish and contrasting with the cornicles, which are dark brown to almost black; cauda and anal plate dark brown to blackish. First, second, and third antennal segments mostly concolorous with head; fourth segment at base about concolorous with other segments but lighter beyond sensoria. Legs essentially concolorous with the body, somewhat darker at apices than at bases; tarsi lighter in color than the other segments. Beak brownish, with terminal segments darker.

Head and appendages.—Average width of head across eyes, .49. Antennal segments with comparative length as follows: III- .37 to .57, average .45; IV- .10 to .14, average .12 plus .31 to .39, average .35. There are no secondary sensoria. Head sometimes with two glands on dorsum but occasionally with only one or none. The beak reaches about to the metathoracic pair of legs and sometimes beyond.

Thorax and appendages.—Prothorax with three pair of lateral glands as in the alate viviparous female. Mesothorax on dorsum separated from metathorax by an almost continuous row of glandular structures. All femora with large oval sensoria. Hind tibiae with from eight to twenty exceedingly small sensoria, which are extremely difficult to distinguish from the light colored bases of the hairs.

Abdomen.—Four double rows of glandular structures on the lateral and mid-lateral surfaces anterior to the cornicles; lateral portion of abdomen posterior to cornicles always with two pairs of glandular structures and occasionally three pairs (possibly three is the normal number but the third and more dorsal pair is smaller than the others and more difficult to distinguish). The cornicles are shaped as in the alate viviparous female and are faintly imbricated at the constricted area near the apex; in some specimens these imbrications are indented all over the surface of the cornicle but are extremely faint. The tip of the abdomen always extends beyond the anal plate, and may even extend beyond the constriction of the cauda so that only the extreme tip of the cauda may be seen unobstructed. The tip of the cauda is very "bushy," the hairs, which are difficult to count, average about six pairs on a side. The abdomen of the oviparous female usually contains only two very large eggs.

Morphotype.—Alate viviparous female; Starved Rock State Park, Illinois, July 6, 1929 (Frison and Hottes). Host unknown.

Our material, in addition to the single, previously unknown alate viviparous female, consists of oviparous females, collected at Oakwood, Illinois, on November 7 and 10, 1929 (T. H. Frison) and November 9, 1929 (H. H. Ross). One of the specimens taken on November 7 is aberrant in that the cornicles are not as swollen as in typical specimens. Host in all cases unknown. Our oviparous females have been compared with a cotypic slide of this species kindly furnished by Dr. Patch.

GENUS PERIPHYLLUS VAN DER HOEVEN

(SUBGENERA PERIPHYLLUS VAN DER HOEVEN AND NEOTHOMASIA BAKER)

Key to the Species of the Genus *Periphyllus*

1. Veins of fore wings conspicuously margined with dark fuscous (Fig. 54) *populicola* (Thomas) p. 172
- Veins of fore wings not margined with fuscous.....²
2. Secondary sensoria of third antennal segment numerous, varying in number from fourteen to over twenty; dorsum of abdomen with brownish markings; sixth antennal segment with terminal filament at least three times as long as basal portion *lyropicetus* (Kessler) p. 170
- Secondary sensoria of third antennal segment few, varying in number from six to ten; dorsum of abdomen without brownish markings; sixth antennal segment with terminal filament less than three times as long as basal portion.....
..... *negundinis* (Thomas) p. 170

PERIPHYLLUS LYROPICETUS (KESSLER)

Chaitophorus lyropicetus Kessler, Nova acta Academie Caesareae Leopoldino-Carolinae Germanicae Naturae Curiosorum, Band LI, No. 2, 1886, p. 171.

This large species, which inhabits the under surface of the leaves of maples, has been previously reported from Chicago and the near vicinity by Gillette (1909d) and Davis (1910d) under the name of *Chaitophorus aceris* Linn. The entire life history is spent upon its host. No dimorphs, as in *P. negundinis*, have thus far been observed.

All of our specimens have been collected on hard maple, *Acer saccharum*. Data associated with our specimens are as follows: Decatur (Oct. 2, Nov. 22), 1928; Decatur (Oct. 21), Urbana (Oct. 29), Waukegan (July 13, Aug. 29), 1929; Urbana (May 20), 1930. Our earliest record for the alate and apterous viviparous females at Urbana is May 20. Males and oviparous females are found in Illinois in September and October. A mating pair was observed at Urbana on October 29, 1929.

PERIPHYLLUS NEGUNDINIS (THOMAS)

FIGS. 152, 331

Chaitophorus negundinis Thomas, Bulletin Illinois State Laboratory of Natural History, Vol. I, No. 2, June, 1878, p. 10.

This species is of special interest because of the production of the so-called "dimorphs," which are readily recognized by peculiar leaf-like flabellae protruding from the sides of the abdomen and head (Fig. 331). Our best information concerning these dimorphs is given in two

papers by Davis (1908b and 1910a). In the locality of Urbana, the dimorphs appear in June. Later in the season they are replaced by the normal forms. A related European species, *P. testudinatus* Thornton, has similar dimorphs.

At times this plant louse becomes so abundant on box elder in Illinois that it is exceedingly obnoxious, for the honey dew covers the



Fig. 19. Characteristic grouping of a colony of *Periphyllus populiicola* (Thomas) on upper side of a leaf of the cottonwood, *Populus deltoides*; Champaign, Sept. 9, 1929.

sidewalks beneath infested trees. Our records indicate it is common and widely distributed in all parts of the state. The best general account regarding it is given by Webster (1917).

The cotypic specimens from which the original description was made are mounted on Slide 2775 of the Survey collection. Data associated with this slide mount of alate and apterous viviparous females are as follows: Peoria, Illinois, June, collected by Miss Smith, on *Acer Negundo*.

Data associated with our specimens, all collected on *Acer Negundo* are as follows: Normal (Sept. 24), 1883; Normal (May 12, 14), 1884; Antioch (June 15), Carbondale (June 4), Champaign (May 17, 21), Galena (June 26), Havana (June 21), Kankakee (June 29), LeRoy (June 20), Mattoon (June 10), Metropolis (May 31), Mt. Carmel (May 26), Mt. Carroll (June 25), Oregon (June 27), Pekin (June 20), Quincy (June 6), Shawneetown (May 27), Starved Rock State Park (June 12, 13), Urbana (May 24, June 7, Oct. 1), 1928; Collinsville (Sept. 11), Effingham (June 18), Macomb (May 4), Rantoul (April 24), Rock Island (July 7), Springfield (May 2), 1929.

PERIPHYLLUS POPULICOLA (THOMAS)

FIGS. 19, 54

Chaitophorus populicola Thomas, Bulletin Illinois State Laboratory of Natural History, Vol. 1, No. 2, June, 1878, p. 10.

This dark-colored aphid (Fig. 19), with wing veins bordered with fuscous (Fig. 54), is one of the most common aphids on poplar in Illinois. Dimorphic forms, such as are produced in summer by *P. negundinis* (Thomas), are not produced by this species. It is partial to water-sprouts or new and succulent growth. Since the description by Thomas, based on Illinois material, it has been recorded from the state by Davis (1910d). Wilson (1910b) made this species the type of a new genus called *Thomasia*. Finding that *Thomasia* Wilson had been used previously for another genus of insects, Baker (1920) proposed the generic name of *Neothomasia* for the same insect. We are considering *Neothomasia* as a subgeneric complex.

Cotypic specimens of this species were found among the recently discovered Thomas types in our collection. These cotypic alate and apterous specimens, in poor condition but easily recognizable as this species, are mounted in damar balsam on Slide No. 8177. They were collected at Carbondale, Illinois, July 19, 1877, on sprouts of *Populus*.

Data associated with our alate and apterous specimens, all collected on *Populus* sp., are as follows: Pekin (Aug. 8), 1882; Champaign (July 15, 27), Danville (Sept. 18), Elizabethtown (Oct. 12), Galena (June 25), Havana (June 20), Metropolis (June 1), Morton (July 22), Muncie (Aug. 8), Oakwood (July 18), Oregon (June 27, 28), Pekin (July 22), Quincy (June 6), Urbana (July 27), 1928; Cairo (June 22), East St. Louis (June 24), Edwardsville (Aug. 11), Eldorado (June 9), Elizabethtown (June 20), Galena (July 10), Grayville (June 19), Hillsboro (Sept. 10), Kansas (June 17), Oakwood (Oct. 13, 17, Nov. 10), Richmond (July 12), Rock Island (July 7), Starved Rock State Park (July 5), 1929; Oakwood (Oct. 22), Starved Rock State Park (May 13), 1930. We have taken the sexual forms at Oakwood, Illinois, on October 13, 17, and November 10, 1929, and October 22, 1930.

GENUS PLOCAMAPHIS OESTLUND

Key to Species of the Genus *Plocamaphis*

1. Body flocculent in living specimens, cornicles distinctly swollen and well developed (Fig. 162), secondary sensoria on third antennal segment averaging about twenty... *flocculosa* (Weed) p. 173
- Body not flocculent in living specimens, cornicles not distinctly swollen and weakly developed (Fig. 161), secondary sensoria on third antennal segment averaging about thirteen..... *terricola* n. sp. p. 173

PLOCAMAPHIS FLOCCULOSA (WEED)

Melanoxanthus flocculosum Weed, Insect Life, Vol. III, No. 6, March, 1891, p. 291.

This species has not previously been reported from Illinois. It is a bark feeder. Because of its body being very flocculent it is quite conspicuous on the bare and leafless branches of its host. The sexual forms have been described by Weed.

Data associated with our specimens, all taken on *Salix* sp., are as follows: Elizabethtown (Oct. 12), Herod (Nov. 30), 1928; Kankakee (July 25), Mounds (June 21), Oakwood (Oct. 17, Nov. 10), Oregon (July 11), 1929. We have taken the oviparous females in October and November. Eggs were being deposited on willows at Herod, Illinois, on November 30, 1928.

PLOCAMAPHIS TERRICOLA new species

FIGS. 161, 214, 256

ALATE VIVIPAROUS FEMALE

Size and general color.—Length from vertex to tip of anal plate, 2.46. Head and thorax dusky cinnamon brown; abdomen light cinnamon brown with darker brown on outer margin of cauda; anal plate slightly darker than the abdomen and reddish tinge less in evidence. First antennal segment concolorous with the head, second segment and basal portion of third segment light brown, remainder of antennae a dusky brown. Coxae, trochanters, and basal portion of femora light brown; remainder of femora, tibiae, and tarsi dark brown, particularly apical ends of tibiae and tarsi. The beak is mostly light brownish shading to dark brown at its apex. Wings with the stigma and the base of wings slightly suffused, the veins are well defined and light brown in color.

Head and appendages.—Average width of head across eyes, .66. Antennal segments with comparative lengths as follows: III- .46 to .50, average .49; IV- .36 to .36, average .36; V- .31 to .36, average .33; VI- .17 to .20, average .18 plus .31 to .43, average .39. The secondary sensoria are limited to the third antennal segment (Fig 256) and with the exception of one or two are arranged in a straight row; in number they average about 13; the terminal filament is more blunt than usual; hairs on antennae fine and fairly numerous, those on the third antennal segment from subequal to one and one-half times as long as width of segment. The beak is unusually long, always extending to the tip of the anal plate and often beyond.

Thorax and appendages.—Fore wings with the second fork of media variable in relation to the first fork and margin of the wing, either closer to first fork or midway between first fork and margin of the wing; and in one specimen M_2 is entirely lacking. The second segment of the hind tarsi, exclusive of claws, is about as long as the cornicles but in several examples it is slightly longer. The prothorax has a pair of large, well-developed lateral tubercles.

Abdomen.—At least three abdominal segments with well-developed lateral tubercles anterior to the cornicles. The cornicles (Fig. 161) are feebly developed and without a flange, are but slightly swollen and difficult to locate because of being lighter in color than the abdomen and not protruding beyond it; their length varies from .13 to .17 and averages .15. The cauda (Fig. 214) is much shorter than the anal plate and varies in length from .10 to .15 and averages .13. The anal plate (Fig. 214) is unusually well developed, often having its sides almost parallel and its posterior margin only slightly rounded.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 3.08. General color about as described for the alate viviparous female; differs in that the antennae and legs are darker in color. The dorsum and lateral portions of thorax and certain small areas in the abdomen are distinctly dusky brown.

Head and appendages.—Average width of head across eyes, .73. Antennal segments with average comparative length as follows: III-.40; IV-.30; V-.30; VI-.17 plus .36. The secondary sensoria are restricted to the third antennal segment and vary in number from one to four. The beak is similar to that of the alate viviparous female but usually extends only to the base of the cornicles.

Abdomen.—Lateral tubercles, cauda, anal plate, and cornicles as in the alate viviparous female.

Holotype.—Alate viviparous female; Beach, Illinois, July 13, 1929, on *Salix* sp., (Frison and Hottes). Slide No. 10659. *Morphotype.*—Apterous viviparous female; Beach, Illinois, July 13, 1929, on *Salix* sp., (Frison and Hottes). Slide No. 10660. *Paratypes.*—Thirty-four slides of alate and apterous viviparous females, pupae and nymphs; all collected at Beach, Illinois, July 13 and August 29, 1929, on *Salix* sp., (Frison and Hottes). Slides Nos. 10661-10679 and others unnumbered.

This species was found on the roots and near the crown of a species of *Salix* growing in the sand not far from the shore line of Lake Michigan. It may be separated from *Plocamaphis flocculosum* (Weed) by not being flocculent and terrestrial as well as by morphological characters, the most noticeable of which is the fact that the cornicles are much shorter and distinctly less swollen. In spite of the fact that the median vein has two forks instead of one, this species is perhaps most closely allied to *Plocamaphis braggi* Gillette and Palmer. In addition to venational characters it may be separated from this latter species by its larger cornicles and difference in comparative lengths of antennal segments.

GENUS SIPHA PASSERINI

SIPHA FLAVA (FORBES)

Chaitophorus flavus Forbes, Thirteenth Report of the State Entomologist of the State of Illinois, May 31, 1884, p. 42.

Although the sorghum aphid was described from Illinois by Forbes in 1884, its life history was mainly unknown until the studies of Davis (1909a) were published. The general details of the life history are similar to most other non-migratory species, except that some evidence was obtained by Davis to lead him to believe that the stem mothers are winged. The sorghum aphid is sometimes abundant enough to cause serious damage to broom corn and sorghum in Illinois. In Porto Rico it has frequently been a serious pest of young sugar cane.

Data associated with material in our collection are as follows: Heyworth (Aug. 11), 1883; Champaign (May 7), 1886; Urbana (Sept. 11), 1888; Havana (June 26), 1907; Carbondale (June 4), Decatur (Nov. 4), Mt. Carmel (May 26), 1928; Mitchell (June 25), 1929.

Lectotypic slide, No. 3152, selected by Frison (1927), contains an alate viviparous female collected at Champaign, Illinois, July 25, 1883, on sorghum by S. A. Forbes. Paratype slides, Nos. 3151, 3153-3156, are associated with the same data as the lectotype slide.

SUPERTRIBE APHIEA

KEY TO GENERA

1. Cornicles absent or minute.....2
- Cornicles present and conspicuous.....3
2. Abdomen with lateral tubercles (Fig. 312); cornicles absent;
body not elongate; basal portion of sixth antennal segment
much shorter than fifth segment.....*Asiphonaphis* p. 225
- Abdomen without lateral tubercles; cornicles present but min-
ute; body elongate; fifth and basal portion of sixth antennal
segments about equal in length.....*Brachycolus* p. 228
3. With a caudal projection (supra-anal process) situated above
cauda (Fig. 206).....*Cavariella* p. 229
- Without a caudal projection above cauda.....4
4. Antennae five-segmented (Fig. 232).....*Cerosipha* p. 229
- Antennae six-segmented (Fig. 266).....5
5. Media of fore wings normally branched once (Fig. 70).....
.....*Toxoptera* p. 241
- Media of fore wings normally branched twice (Fig. 57).....6
6. Hind wings with cubitus lacking (Fig. 89) or only partially de-
veloped (Fig. 93).....7
- Hind wings with cubitus well developed (Fig. 91).....8
7. Cornicles without a flange (Fig. 136); secondary sensoria num-
erous on third, fourth and fifth segments; hind tibiae between
four and five times as long as cornicles.....*Alphitoaphis* p. 175
- Cornicles with flange (Fig. 135); secondary sensoria few or lack-
ing on fourth and fifth segments; hind tibiae about three times
as long as cornicles.....*Hysteroneura* p. 232
8. Cornicles cylindrical or tapering (Fig. 131).....*Aphis* p. 176
- Cornicles more or less swollen (Fig. 160) with distinct constrict-
ion before apical flange.....9
9. Cornicles about as long as basal portion of sixth antennal seg-
ment10
- Cornicles much longer than basal portion of sixth antennal seg-
ment*Rhopalosiphum* p. 234
10. Cauda short, width at base about equal to length (Fig. 204).....
.....*Brevicoryne* p. 228
- Cauda elongate, much longer than width at base (Fig. 199).....
.....*Hyalopterus* p. 231

GENUS ALPHITOAPHIS HOTTES

ALPHITOAPHIS LONICERICOLA (WILLIAMS)

FIGS. 79, 93, 136

Aphis lonicericola Williams, University Studies, University of Nebraska,
Vol. X, No. 2, March, 1911, p. 45.

This comparatively rare aphid is here recorded for the first time from Illinois. It causes the terminal leaves of its host, the red honey-suckle, to curl. A complete account of the life history of this non-migratory species, giving descriptions of all the various forms, has never been published.

Data associated with our specimens, all collected on *Lonicera* sp., are as follows: Antioch (June 15), Galena (June 26), Mt. Carroll (June 25), Oregon (June 28), 1928; Oakwood (June 1), 1929.

GENUS APHIS LINNAEUS

(SUBGENERA APHIS LINNAEUS AND ANURAPHIS DEL GUERCIO)

Key to the Species of the Genus Aphis¹

1. Dorsum of abdomen with a large dark patch or saddle-like area super-imposed on a lighter ground color (Fig. 4).....2
- Dorsum of abdomen of a uniform light or dark color, or at the most with lateral dark spots, narrow median, entire or interrupted, transverse bars, or dark areas around or posterior to the bases of the cornicles (Fig. 23).....8
2. Cauda and anal plate or both brown, decidedly darker than venter of abdomen; cornicles dark brown or blackish, sometimes lighter towards apex.....3
- Cauda and anal plate red, concolorous with venter of abdomen (both appearing yellow in cleared specimens), cornicles pale, sometimes slightly dusky near apex.....*rociadae* Cockerell p. 214
3. Cornicles either without imbrications, or with them only indistinctly developed, the sides of the cornicles appearing practically smooth.....4
- Cornicles with distinct, fine, close imbrications, giving the sides of the cornicles a minutely serrate appearance.....6
4. Cornicles less than twice length of cauda; cornicles practically without imbrications.....*padi* Linnaeus p. 209
- Cornicles distinctly longer than twice length of cauda; cornicles with feeble imbrications.....5
5. Fourth antennal segment with more than 15 sensoria; on apple.....*rosea* Baker p. 214
- Fourth antennal segment with less than 10 sensoria; on thistle.....*cardui* Linnaeus p. 185
6. Third antennal segment with more than 25 sensoria.....*tulipae* Fonscolombe² p. 222
- Third antennal segment with less than 25 sensoria.....7
7. Cornicles and cauda subequal in length; migrating between apple and clover.....*bakeri* Cowen p. 181
- Cornicles two or three times length of cauda; making a leaf-curl on *Viburnum* (Fig. 28).....*viburnicola* Gillette p. 223
8. Abdomen bright yellow with a very large black spot at the base of each cornicle.....*nerii* Fonscolombe p. 206
- Abdomen either not a bright yellow or without such a very large spot at the base of the cornicles.....9
9. Cornicles subequal to only one-half length of cauda.....10
- Cornicles subequal to, or greater than, entire length of cauda.....11
10. Fourth antennal segment with secondary sensoria (4-5); third antennal segment with more than 10 sensoria.....*debilicornis* Gillette and Palmer p. 191
- Fourth antennal segment normally without sensoria, rarely with one or two; third antennal segment with less than 10 sensoria.....*spiraephila* Patch p. 222
11. Cornicles smooth, entirely without imbrications; species forming a tight leaf-fold on *Solidago* (Fig. 27).....*solidaginifoliae* Williams p. 220

¹ The preparation of a key for the recognition of the Illinois species of plant lice belonging to the genus *Aphis* has proved to be a difficult and highly unsatisfactory undertaking. This key is submitted with the realization that it is imperfect and that it demands a partial knowledge of the colors of living aphids as well as the structures revealed by slide preparations. The key has been made by a study of many individuals of each species and an effort has been made to take into consideration reasonable variation. The inability to easily separate in a key certain forms at present considered as separate species reflects the need for pains-taking morphological and biological studies within the genus, studies of a character not possible for us to carry to completion at this time.

² We have not examined alate viviparous females of this species but have placed it in the key on the basis of the description of Theobald (1927).

- Cornicles with imbrications, usually distinct, especially on basal portion, but only weakly developed in the case of *persicae-niger*.....12
- 12. Antennae with numerous conspicuous setae as long as, or longer than, the width of the segments of the antennae; on *Populus*.....*maculatae* Oestlund p. 201
- Antennae with only inconspicuous, translucent setae, usually difficult to find; not on *Populus*.....13
- 13. Sensoria on third antennal segment arranged in a more or less straight and regular row.....36
- Sensoria on third antennal segment not arranged in a straight row, being scattered more indiscriminately over the surface of the segment.....14
- 14. Cauda elongate, constricted near the middle (Fig. 197), always two or three times its width at the middle.....23
- Cauda shorter, conical (Fig. 194), spatulate (Fig. 193), or broadly rounded (Fig. 191), not constricted near middle.....15
- 15. Cornicles subequal to cauda in length.....16
- Cornicles longer than cauda.....17
- 16. Fourth antennal segment with more than 10 sensoria; on *Physocarpus*.....*neilliae* Oestlund p. 205
- Fourth antennal segment normally lacking sensoria; on *Cornus*.....*caliginosa* Hottes and Frison p. 182
- 17. Terminal filament of sixth antennal segment less than twice length of cornicles.....19
- Terminal filament of sixth antennal segment twice or more than twice length of cornicles.....18
- 18. Cornicles subequal to or only slightly greater than length of base of sixth antennal segment.....*crataegifoliae* Fitch p. 190
- Cornicles at least twice as long as base of sixth antennal segment.....*persicae-niger* Smith p. 209
- 19. Abdomen a very dark green, appearing almost bluish or black; hind tibiae usually pallid with the apex darker; on *Sambucus*.....*sambucifoliae* Fitch p. 218
- Abdomen red or yellow with darker lateral or caudal patches; hind tibiae entirely black or blackish brown, sometimes with a central lighter area.....20
- 20. Abdomen with four pairs of large lateral tubercles anterior to cornicles.....*feminea* Hottes p. 193
- Abdomen with only one or two pairs of large lateral tubercles anterior to cornicles.....21
- 21. Sixth antennal segment with terminal filament not more than twice the length of the base; a subterranean or semi-subterranean species on the roots and crowns of dandelion (*Taraxacum* sp.).....*knowltoni* Hottes and Frison p. 199
- Sixth antennal segment with terminal filament more than twice length of base, often three times or more; not subterranean, inhabiting leaves and stems.....22
- 22. Color of abdomen distinctly reddish brown; distance from second fork of media to closest edge of wing four-fifths or more times the distance from second fork to first fork of media; fourth antennal segment with 2 to 4 sensoria.....*viburniphila* Patch p. 224
- Color of abdomen yellow; distance from second fork of media to closest edge of wing less than two-thirds of the distance between first and second forks of media; fourth antennal segment with 7 to 13 sensoria.....*luridis* Hottes and Frison p. 200
- 23. Abdomen black, brown, or reddish, not green or yellow.....24
- Abdomen green or yellow or some shade of these two colors.....27
- 24. Terminal filament subequal to length of third antennal segment, always much longer than one-half of the third segment.....25
- Terminal filament subequal to one-half length of third antennal segment.....27

25. Cornicles almost equal to, or longer than, twice length of hind tarsi exclusive of claws; color bluish or black or greenish black. 26
- Cornicles shorter, at most scarcely more, than one and one-half times length of hind tarsi exclusive of claws; color of abdomen pruinose reddish brown. *cephalanthi* Thomas p. 185
26. Fourth antennal segment with 3 to 16 sensoria; on *Gerardia*.
- Fourth antennal segment with less than 8 sensoria, usually 1 to 3; on a great variety of plants. *rumicis* var. *gerardiae* (Thomas) p. 217
- Fourth antennal segment with less than 8 sensoria, usually 1 to 3; on a great variety of plants. *rumicis* Linnaeus p. 215
27. Third antennal segment with 20 or more sensoria. 28
- Third antennal segment with less than 20 sensoria. 32
28. Fourth antennal segment with more than 5 sensoria. 29
- Fourth antennal segment with less than 4 sensoria. 31
29. Terminal filament of sixth antennal segment about twice as long as fifth antennal segment, ground color of abdomen golden yellow. *luridis* Hottes and Frison p. 200
- Terminal filament of sixth antennal segment only slightly longer than fifth antennal segment, ground color of abdomen yellow or greenish. 30
30. Secondary sensoria conspicuously large, those on fourth antennal segment mostly larger than primary sensorium on fifth; abdomen essentially dark brown or almost black; on *Senecio*.
- Secondary sensoria mostly small, those on fourth usually distinctly smaller than primary sensorium of fifth; abdomen essentially dark green; on *Zizia* and other umbelliferous plants. *nyctalis* Hottes and Frison p. 206
31. On *Asclepias* and *Apocynum* sp.; abdomen yellow with lateral and caudal black spots; third antennal segment with 10-20 sensoria, fourth without sensoria; cornicles not more than $1\frac{1}{2}$ times length of cauda and subequal to, or longer than, fourth antennal segment; sixth antennal segment with terminal filament 2 or 3 times length of base. *asclepiadis* Fitch p. 181
- On *Circium*; abdomen essentially moderately dark green; with lateral and caudal blackish spots; third antennal segment with 15-25 sensoria, fourth without; cornicles subequal to, or considerably more than, $1\frac{1}{2}$ times cauda, and slightly longer than fourth antennal segment; sixth antennal segment with terminal filament about twice length of base. *carduella* Walsh p. 183
- On *Pastinaca*; abdomen yellow with large lateral blackish patches; third antennal segment with 35-50 sensoria, fourth usually without sensoria but occasionally with one or two; cornicles always distinctly longer than $1\frac{1}{2}$ times length of cauda, and always longer than fourth antennal segment; sixth antennal segment with terminal filament about three times base. *decepta* Hottes and Frison p. 192
- On *Cornus* or *Helianthus*; abdomen dark green with dark brown lateral and caudal patches; third antennal segment with 25-35 sensoria, fourth normally without sensoria, rarely with one or two; cornicles subequal to, or longer than, $1\frac{1}{2}$ times length of cauda and much longer than fourth antennal segment; sixth antennal segment with terminal filament about twice length of base. *helianthi* Monell p. 196
32. Hind tarsi entirely dark brown or black; on corn. *maidis* Fitch p. 205
- Hind tarsi pallid or yellow with the apices dark brown and contrasting with the basal portion; not on corn. 33
33. Fourth antennal segment usually with three or more sensoria, rare specimens without sensoria on fourth. 34
- Fourth antennal segment normally without sensoria, rarely with one or two sensoria. 35
34. On gooseberry and currant (*Ribes*). *sanborni* Patch p. 218
- On *Rhamnus* and a large variety of summer hosts.
- On *Rhamnus* and a large variety of summer hosts. *ramni* Fonscolombe p. 214

35. Abdomen yellowish green; on *Asclepias* and *Apocynum* sp.
 *asclepiadis* Fitch p. 181
- Abdomen pea green; on *Circium* *carduella* Walsh p. 183
36. Hind tibiae pallid or yellowish with apex brown, contrasting with
 basal portion44
- Hind tibiae entirely black or blackish brown, or with the basal
 half and the apex dark brown and the middle portion lighter.....37
37. Ground color of abdomen yellow or green.....38
- Ground color of abdomen red, purplish, or reddish brown.....40
38. Terminal filament of sixth antennal segment four or more times
 the length of basal portion of segment.....
 *ageratoidis* Oestlund p. 181
 and
 *coreopsidis* (Thomas) p. 188
- Terminal filament much less than three times the length of basal
 portion of segment, usually about twice as long.....39
39. Cauda short and conical (Fig. 201), not constricted near middle;
 on roots and crowns of corn and other plants.....
 *maidiradicis* Forbes p. 202
- Cauda longer (Fig. 197), constricted near middle; on leaves and
 stalks of corn and other plants..... *maidis* Fitch p. 205
40. Cauda short, not constricted near middle (Figs. 192, 201).....41
- Cauda longer, distinctly constricted near middle (Fig. 197).....43
41. Abdomen with four pairs of large prominent lateral tubercles
 anterior to cornicles; fourth and fifth antennal segments with
 secondary sensoria, usually 3 to 5 on each.... *feminea* Hottes p. 193
- Abdomen at the most with only one or two pairs of large lateral
 tubercles anterior to cornicles; fourth and fifth antennal seg-
 ments normally without secondary sensoria.....42
42. Cornicles longer than terminal filament of sixth antennal seg-
 ment; on *Prunus*..... *chetansapa* Hottes and Frison p. 186
- Cornicles very much shorter than terminal filament of sixth an-
 tennial segment, subequal to half its length; on *Pseodera*.....
 *falsomii* Davis p. 193
43. Cornicles subequal in length to terminal filament of sixth anten-
 nal segment; on grape..... *illinoisensis* Shimer p. 198
- Cornicles very much shorter than terminal filament of sixth an-
 tennial segment, subequal to half its length; on *Cephalanthus*
 and *Impatiens*..... *cephalanthi* Thomas p. 185
44. Abdomen blue, blackish, brown or reddish-brown.....45
- Abdomen green or yellow.....51
45. Cornicles very much shorter than third antennal segment.....46
- Cornicles subequal to, or longer than, third antennal segment.....49
46. Cauda short, broad, and rounded (Fig. 202), not constricted near
 middle; on *Cornus*.....47
- Cauda longer and more slender (Fig. 200), slightly constricted
 near middle48
47. Cornicles slightly shorter than cauda; abdomen with three single
 pairs and one double pair of large lateral tubercles anterior to
 cornicles (Fig. 309)..... *caliginosa* Hottes and Frison p. 182
- Cornicles longer than cauda; abdomen with less than five pairs
 of lateral tubercles anterior to cornicles..... *cornifoliae* Fitch p. 189
48. Fourth antennal segment usually with one to four sensoria; a
 pruinose reddish-brown species on *Cephalanthus* or *Impatiens*.
 *cephalanthi* Thomas p. 185
- Fourth antennal segment without sensoria; a pulverulent bluish-
 green species on *Euphorbia*..... *pulchella* Hottes and Frison p. 212
49. Distance between first and second fork of media less than twice
 distance between second fork and edge of wing measured
 along vein media 1.....50
- Distance between first and second fork of media more than twice
 distance between second fork and edge of wing measured
 along vein media 1..... *forbesi* Weed p. 194

50. Sixth antennal segment (base plus filament) longer than cornicles: species on *Liatris*.....*funesta* Hottes and Frison p. 194
 —. Sixth antennal segment subequal to cornicles; species on *Laburnum* and other legumes.....*laburni* Kaltenbach p. 199
51. Base of sixth antennal segment shorter than fifth, and also fourth, antennal segment.....53
 —. Base of sixth antennal segment subequal to, or slightly longer than, fifth, and usually also fourth, antennal segment.....52
52. Cornicle nearly twice or more than twice, length of cauda; species on leaves and stems of *Eupatorium* and allied Compositae.....*vernoniae* Thomas p. 222
 —. Cornicle distinctly less than twice as long as cauda; species on roots and crowns of corn and other plants.....*maidi-radiciis* Forbes p. 202
53. Cornicles longer than cauda.....55
 —. Cornicles equal to or slightly shorter than cauda.....54
54. Fourth antennal segment with secondary sensoria, usually numbering 3-5; on gooseberry.....*sanborni* Patch p. 218
 —. Fourth antennal segment lacking secondary sensoria; on *Liatris*.....*zilora* Hottes and Frison p. 224
55. Cornicle subequal to, or greater than, twice length of fourth antennal segment.....56
 —. Cornicle distinctly shorter than twice length of fourth antennal segment.....57
56. Cauda (Fig. 194) triangular in outline, not markedly constricted near middle; small species with a bright yellowish green abdomen; on *Eupatorium* and *Vernonia*.....*vernoniae* Thomas p. 222
 —. Cauda (Fig. 197) markedly constricted near middle; species with a green abdomen; on *Salix*.....*saliceti* Kaltenbach p. 217
57. Fourth antennal segment usually with sensoria numbering from one to six, occasionally without, in which case the third segment usually has 8 or more sensoria.....58
 —. Fourth antennal segment normally without sensoria, a rare specimen with one or two; third antennal segment usually with less than 7 sensoria.....61
58. On gooseberry and currant (*Ribes*): cornicles shorter than third antennal segment; third antennal segment with 6-10 sensoria, often not in a straight row; fourth with 2-6 sensoria, either in a row or grouped.....*sanborni* Patch p. 218
 —. On *Monarda*; cornicles shorter than third antennal segment; third antennal segment with 4-6 sensoria, always in a row; fourth with 1-3, usually 2; cauda with portion beyond constriction relatively short and broad (Fig. 190).....*monardae* Oestlund p. 205
 —. On hosts other than *Ribes* or *Monarda*.....59
59. Cornicles usually as long as third antennal segment, only rarely distinctly shorter; third antennal segment with 6-10 sensoria, fourth with 1-4, but usually 2.....60
 —. Cornicles always shorter than third antennal segment; third antennal segment with 6-16 sensoria, fourth with 0-8, fifth with 0-4; overwintering on *Rhamnus* and migrating to many and varied summer hosts.....*rhamni* Fonscolombe p. 214
60. On apple and related species (*Pyrus* or *Crataegus*): hind tibiae of oviparous females slender, with few sensoria; males apterous.....*pomi* DeGeer p. 210
 —. On *Spiraea* and many other summer hosts; hind tibiae of oviparous females swollen, thickly studded with sensoria; males alate.....*spiraecola* Patch p. 220
61. Cauda spatulate (Fig. 193) or triangular in outline (Fig. 194), not constricted near middle.....62
 —. Cauda constricted near middle (Fig. 197).....63

62. Cauda spatulate (Fig. 193), apex rounded; third antennal segment subequal in length to terminal filament, small species curling leaves of blackberry.....*rubicola* Oestlund p. 215
- Cauda triangular (Fig. 194), apex pointed; third antennal segment distinctly shorter than terminal filament, a medium-sized species curling leaves of chokecherry.....*cerasifoliae* Fitch p. 186
63. On *Oenothera*.....*oestlundi* Gillette p. 208
- On cotton, cucurbits, and many other plants.....*gossypii* Glover p. 195

APHIS AGERATOIDIS OESTLUND

Aphis ageratoidis Oestlund, Fourteenth Annual Report of the State Geologist of Minnesota, March, 1886, p. 38.

This species is recorded now from Illinois for the first time. When Oestlund described this species he commented on its being very closely allied to *Aphis frondosae* Oestlund. The latter has since been made a synonym of *Aphis coreopsidis* (Thomas). Although recognizing the difficulty of separating *Aphis ageratoidis* from *A. coreopsidis*, we prefer for the present to recognize the two forms as distinct. The sexual forms have not been described.

Data associated with our viviparous specimens placed as this species are as follows: Catlin (Sept. 27, Oct. 6), East Dubuque (June 26), Havana (June 21), Herod (May 29), Mt. Carroll (June 25), Oakwood (Sept. 17), Oregon (June 28), Urbana (May 16, July 10), 1928; Kappa (Sept. 9), Oakwood (Oct. 17), 1929; Oakwood (Oct. 22), 1930. Collected on *Blephilia hirsuta*, *Brickellia* sp., *Eupatorium urticaefolium*, *Eupatorium* sp., *Nepeta cataria*, and *Vernonia* sp.

APHIS ASCLEPIADIS FITCH

Aphis asclepiadis Fitch, Fourth Annual Report of the Regents of the University on the Condition of the State Cabinet of Natural History, State of New York, January 14, 1851, p. 65.

The species which we are considering under the above name has been previously reported from Illinois by Gillette (1910) and by Davis (1910a). The *Aphis apocynii* Koch listed by Thomas (1879) from Wisconsin, as shown by a slide (2765), of Thomas, is undoubtedly this species. It is quite generally distributed in Illinois on milkweed.

Data associated with our alate and apterous viviparous specimens, all collected on *Asclepias* sp. or *Apocynum* sp., are as follows: Galena (June 25), Kankakee (June 29), 1928; Beach (July 13), Bloomington (July 5), Edwardsville (Sept. 11), Jerseyville (June 25), Rock Island (July 7), Seymour (June 13), 1929.

APHIS BAKERI COWEN

FIG. 99

Aphis bakeri Cowen, Agricultural Experiment Station of Colorado State Agricultural College, Bulletin No. 31, Technical Series No. 1, May, 1895, p. 118.

The short-beaked clover aphid was first reported as occurring in Illinois by Davis (1908c) who reported it as a common species throughout the state on red clover. This species has been shown by Gillette

and Taylor (1908) to spend the winter in the egg stage chiefly upon apple, pear, *Crataegus*, etc., and the summer upon clover. Gillette (1908b) has given detailed descriptions of all the various forms. In Colorado *A. bakeri* is sometimes a pest on apples.

Data associated with our alate and apterous viviparous specimens, all collected on *Trifolium pratense*, are as follows: Normal (May 14), 1884; Champaign (Nov.), 1885; Bement (June 17), Cairo (June 2), East Peoria (July 22), Galena (June 25), LeRoy (June 20), Morgan County (June 19), Muncie (Oct. 6), Oakwood (July 18), Oregon (June 28), St. Anne (July 15), 1928; Cairo (June 22), Edwardsville (Sept. 11), 1929.

APHIS CALIGINOSA new species

FIGS. 140, 202, 284, 309

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.60. Head, thorax, and cornicles black. Abdomen with base and apex blackish, intermediate area somewhat light brown. First and second antennal segments concolorous with head; apex of fifth and all of sixth segments blackish; remainder of antennae light brownish. Eyes black. Coxae and trochanters concolorous with venter of body; fore femora yellowish brown, middle and hind femora blackish except for extreme brownish bases; tibiae of all legs essentially yellowish brown with apices black for a distance about equal to length of tarsi; tarsi of all legs black. Beak brown, with extreme tip blackish. Costal margin of front wing yellowish brown near base; remainder of veins dark brown.

Head and appendages.—Average width of head across eyes, .39. Antennal segments with comparative lengths as follows: III—.20 to .29, average .25; IV—.13 to .16, average .15; V—.11 to .16, average .13; VI—.07 to .11, average .09 plus .14 to .23, average .18. Secondary sensoria (Fig. 284) limited to the third segment, numbering from 5 to 9, averaging 6, arranged in a more or less straight row, or in two sub-parallel rows. Sensoria usually closer together towards apex of segment, leaving the basal third of the segment free from sensoria. Primary sensorium of the sixth antennal segment subequal to that of fifth, with a group of marginal sensoria. All antennal segments beyond second distinctly imbricated. Beak varying in length, reaching either not quite to, or a little beyond, the mesothoracic coxae.

Thorax and appendages.—Prothorax with a pair of large, flat cone-shaped, lateral tubercles with unusually large bases. Fore wings with stigma rather bluntly pointed at apex. Cell R₁ shallow, not much, if any, wider than stigma. Second fork of media closer to margin of the wing than to the first fork, although not constant in position; in some cases entirely absent. Middle and hind femora with from three to four sensoria near their base. Hairs on tibiae fine and about as long as the width of the segment.

Abdomen.—Abdomen (Fig. 309) with five pairs of lateral tubercles anterior to the cornicles, the first segment apparently bearing two pairs. The posterior three pairs are small, usually difficult to find. Segment posterior to cornicles with a pair of unusually large lateral tubercles, which are approximately the same size and shape as those on prothorax. Cornicles (Fig. 140) averaging .10 in length, shorter than cauda, straight, without an apical flange, imbricated throughout, and very slightly constricted at, or just before, apex. Cauda (Fig. 202) averaging .12 in length, not constricted, larger than cornicles, with from 7 to 8 pairs of lateral hairs, in addition to a dense covering of small spine-like setae. Anal plate well developed, a little longer than usual, and clothed with short spine-like setae in addition to fringe of numerous long hairs.

PUPA

Color.—Head and thorax more greenish than alate form; dorsum of abdomen with two longitudinal pruinose areas and a transverse pruinose patch posterior to cornicles.

APTEROUS VIVIPAROUS FEMALE (VIRGOGENIA)

Size and general color.—Average length from vertex to tip of anal plate, .127. Color as in alate viviparous female, except that abdomen is mottled, due to green embryos showing through integument, and the fore legs are darker in color.

Head and appendages.—Average width of head across eyes, .39. Antennal segments with comparative lengths as follows: III—.17 to .19, average .18; IV—.09 to .11, average .10; V—.09 to .11, average .10; VI—.09 to .10, average .09 plus .10 to .17, average .14. Secondary sensoria absent. Antennae imbricated and with scattered, short, fine hairs. Beak extending to, or slightly beyond, metathoracic coxae.

Thorax and appendages.—Surface of thorax reticulate. Prothorax with large lateral tubercles.

Abdomen.—Surface of abdomen imbricated or imperfectly reticulate. Lateral tubercles similar in number and position to those of alate viviparous female, but smaller, the anterior pair on the first segment being small and pointed, much smaller than those of the second, third, and four segments. Tubercles on segment posterior to cornicles, the same shape and size as those of alate viviparous female. Cornicles .10 in length, in shape similar to those of the alate viviparous female. Cauda .12 in length, similar to that of the alate viviparous female.

APTEROUS VIVIPAROUS FEMALE (FUNDATRIX)

Similar in size, color and structure to virgogenia, but differing in the following details. Average width of head across eyes, .39. Antennae five-segmented, the comparative lengths being as follows: III—.21 to .26, average .24; IV—.10 to .11, average .10; V—.09 to .10, average .09 plus .09 to .11, average .10. Lateral tubercles of prothorax and abdomen slightly smaller, those of second, third, and fourth abdominal segments being especially small and flat.

Holotype.—Alate viviparous female; Starved Rock State Park, Illinois, June 13, 1928, on *Cornus* sp., (Frison and Hottes). On slide with paratype specimens of alate and apterous viviparous females, pupae and nymphs. Slide No. 3966. *Morphotype.*—Apterous viviparous female (virgogenia); same data as holotype. Slide No. 3968. *Morphotype.*—Apterous viviparous female (fundatrix); Starved Rock State Park, Illinois, May 13, 1930, on *Cornus* sp., (Frison and Ross). Slide No. 10481. *Paratypes.*—Seventy-one slides, containing alate and apterous viviparous females, pupae and nymphs, collected in Illinois on species of *Cornus*, by T. H. Frison, F. C. Hottes, H. H. Ross and Marten. The dates and localities are as follows: Urbana (May 1, 12 and 15) (Acc. Nos. 19944, 19945, and 19946), 1894; Herod (May 29) and Starved Rock State Park (June 13), 1928; Hardin (June 25), Herod (June 21) and Macomb (May 4), 1929; and Starved Rock State Park (May 13), 1930. Slides Nos. 3964-3965, 3967, 3969-3970, 3984-3986, 10482-10524 and others unnumbered.

This species may be collected on the more terminal branches of its host. In at least one case it was attended by the ant, *Crematogaster lincolata* Say, which had constructed an aphid shed over the aphids. This species is closely allied to *Aphis maidi-radici* Forbes from which it may be separated by its brownish color, and the much more strongly developed lateral tubercles posterior to the cornicles.

APHIS CARDUELLA WALSH

FIGS. 132, 195, 279

Aphis carduella Walsh, Proceedings of the Entomological Society of Philadelphia, Vol. 1, December, 1862, p. 300.

Although this species seems to be common in Illinois on *Cirsium lanceolatum*, Oestlund (1887) is the only writer known to us who has

noted its occurrence anywhere since the original description was published. Our specimens agree well with the meagre original description except for minor details and statement regarding color. We are of the opinion that in this last mentioned respect Walsh was misled by dead material. We are informed by Oestlund that his description of this species is based upon a male, thus accounting for the difficulty at first encountered in connecting our material with his description and our interpretation of the species described by Walsh. Specimens identified as *carduella* by Oestlund are similar to those we are considering as this species. The oviparous female has not been described.

Since the original description is very meagre and the types are lost, Slide No. 9461 in the Survey collection has been selected as the *neotypic* slide and redescriptions are given of the alate and apterous viviparous females.

Data associated with this neotypic slide are as follows: Alate viviparous female; Sparta, Illinois, June 24, 1929, on *Cirsium lanccolatum*. (Frison and Hottes). On slide with alate viviparous female.

All of our Illinois material has been collected on *Cirsium lanccolatum*. Our data are as follows: Bloomington (July 5), Farmer City (July 5), Mitchell (June 25), Nameoki (June 25), Rock Island (July 7), St. Clair County (June 24), St. Joseph (June 29), Sparta (June 24), Urbana (August 27), and Woodford (July 5), 1929.

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.31. Head and thorax dark greenish brown. Abdomen green with five lateral brown spots, those posterior to the cornicles being the largest. Cornicles, cauda, and anal plate dark brown. Antennae concolorous with, or slightly lighter than, head. Legs with coxae dark brown, trochanters luteous; femora luteous at base with apical two-thirds brown, middle and hind femora dark brown; tibiae luteous with enlarged apical portion dark brown; tarsi dark brown. Forewings with stigma brownish, veins light brown, posterior margin of wing in vicinity of anal vein brownish. Beak brownish, its apical portion darkest.

Head and appendages.—Average width of head across eyes, .38. Antennal segments with comparative lengths as follows: III—.17 to .29, average .24; IV—.11 to .16, average .14; V—.10 to .14, average .12; VI—.07 to .10, average .09 plus .17 to .23, average .18. Secondary sensoria (Fig. 279) typically limited to third antennal segment, numbering from 18 to 25, averaging 20, mostly confined to one side of segment, very irregularly arranged and varying greatly in size; some specimens differ in having from 1 to 4 secondary sensoria on fourth antennal segment. Primary sensorium on sixth antennal segment with a group of small marginal sensoria to one side of it. Antennae imbricated and with a few short hairs. Beak extending to middle of metathoracic coxae.

Thorax and appendages.—Prothorax with a pair of small lateral tubercles. Second fork of media closer to margin of wing than to first fork. Stigma rather bluntly pointed.

Abdomen.—First abdominal segment and segment posterior to cornicles with a pair of small lateral tubercles. Cornicles (Fig. 132) straight, averaging .19 in length, without a distinct flange at apex, and imbricated. Cauda (Fig. 195) averaging .12 in length, constricted at middle, with from five to six pairs of lateral hairs, the terminal pairs incurved.

APTEROUS VIVIPAROUS FEMALE (VIRGOGENIA)

Size and general color.—Average length from vertex to tip of anal plate, 1.35. Body (head, thorax, and abdomen) with anterior part brownish green shading posteriorly to dark green. Cornicles, cauda, anal plate, and patches

posterior to cornicles, brown. Basal half of antennae concolorous with head, extreme apex of third segment, apical third of fourth and fifth, and sixth almost entirely, brown or brownish infusate. Legs patterned as in alate viviparous female, but lighter in color. Beak as in alate viviparous female.

Head and appendages.—Average width of head across eyes, .40. Antennal segments with comparative lengths as follows: III—.21 to .29, average .25; IV—.09 to .16, average .13; V—.09 to .14, average .11; VI—.06 to .09, average .07 plus .16 to .21, average .18. Secondary sensoria absent, antennae imbricated, and bearing a few fine hairs. Beak extending to middle of metathoracic coxae.

Thorax and appendages.—Prothorax with a pair of lateral tubercles.

Abdomen.—First abdominal segment and segment posterior to cornicles with a pair of lateral tubercles. Cornicles averaging .20 in length, shaped as in the alate viviparous female. Cauda averaging .15 in length, constricted near the middle, and with from five to six pairs of lateral hairs.

Morphotype.—Apterous viviparous female; Urbana, Illinois, August 27, 1929, on *Cirsium lanceolatum*, (H. H. Ross). Slide No. 9462.

This species differs from *Aphis rumicis* Linn. by its color and by the distribution of secondary sensoria. Two other species of this genus, *rumicis* Linn. and *cardui* Linn., have so far been found on *Cirsium* in Illinois in addition to this species. For other distinguishing characters see the key to species belonging to this genus.

APHIS CARDUI LINNAEUS

Aphis cardui Linnaeus, Systema Naturae, Editio Decima, 1758, p. 452.

This species has not been recorded from Illinois under this name, but probably the record of *A. prunifoliae* Fitch from Niles Center, Illinois, by Davis (1910e) and the indefinite record of *A. pruni* Koch by Thomas (1879) refer to this species. Thistles attacked by this species in summer are usually heavily infested, but according to our experiences infested plants are scarce. Patch (1914b) calls attention to the fact that in Europe this species migrates between plum and thistle.

Data associated with our viviparous specimens, all collected on *Cirsium* sp., are as follows: Galena (June 25), Morton (July 22), Rossville (July 15), 1928; Oakwood (Nov. 9), Oregon (July 9), 1929.

APHIS CEPHALANTHI THOMAS

Aphis cephalanthi Thomas, Bulletin Illinois State Laboratory of Natural History, Vol. I, No. 2, June, 1878, p. 11.

Aphis impatientis Thomas, Bulletin Illinois State Laboratory of Natural History, Vol. 1, No. 2, June, 1878, p. 12. *New synonymy.*

This species was described as new from specimens collected at Carbondale, Illinois, and was again reported from the state by Davis (1910e). Although the typic specimens of *A. cephalanthi* have not been recovered, there is no doubt regarding the aphid that Thomas described under this name. *A. impatientis* Thomas was described at the same time as *cephalanthi*, but the latter has page priority. Typic specimens of *impatientis* prove that this species is a synonym of *cephalanthi*. Our field collecting shows that this species has the buttonbush as its overwintering host and the touch-me-not as its summer host. On button-

bush this species is found on the terminal twigs and leaves and on touch-me-not on the under sides of the leaves.

Data associated with our viviparous specimens, all collected on *Cephalanthus occidentalis* or *Impatiens* sp., are as follows: Herod (Oct. 12), 1928; Cairo (June 21), Collinsville (Sept. 11), Herod (Sept. 27), Mahomet (Aug. 17), Starved Rock State Park (Aug. 14), 1929; Homer Park (June 17), 1930.

Neotypic slide.—Since this species was originally described from Carbondale, Illinois, by Thomas, and the types are lost, a slide in the Survey collection is selected as the *neotype*. The data associated with the neotypic slide are as follows: Cairo, Illinois, June 21, 1929, on *Cephalanthus* sp., collected by T. H. Frison and F. C. Hottes. Slide 6373.

Data associated with the cotypic slide (8778) of *Aphis impatientis* Thomas are as follows: Carbondale, Illinois, August, on *Impatiens fulva*.

APHIS CERASIFOLIAE FITCH

Aphis cerasifoliae Fitch, Transactions of the New York State Agricultural Society, Vol. XIV, 1854 (printed 1855), p. 835.

The choke cherry aphid was first reported from Illinois by Davis (1910e). This species curls the leaves of the choke cherry, and certain other species of *Prunus* used in landscaping, so badly that it often disfigures them. We have no record of this species occurring south of the central portion of the state. The alate and apterous forms have been described in full by Patch (1914b) and Swain (1919). The sexual forms have apparently not been described.

Our viviparous specimens in the Survey collection, all collected on *Prunus virginiana* or *Prunus* sp., bear the following data: Normal (May 27), 1886; Galena (July 10), Macomb (May 3, 4), Richmond (July 12), Waukegan (July 13), 1929.

APHIS CHETANSAPA new species

FIGS. 142, 193, 280

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.10. Head and thorax dark blackish brown; abdomen purple-lake with six pairs of lateral black patches anterior to cornicles, with large black patches near base of, and between, cornicles, which in many specimens connect and form a transverse black band; and posterior to this band, with two other transverse bands in some specimens, successively narrower, making a total of three. Cauda and anal plate black, cornicles dark brown. Eyes reddish-brown. Antennae concolorous with the head or only slightly lighter. Legs black, except front femora which are yellowish-brown, slightly darker at apex. Beak at base concolorous with head, apex black, intermediate portion yellowish. Wings hyaline, with the following parts greyish-brown: stigma, costa, apical half of subcosta, veins, and the posterior margin of the wing in the vicinity of the anal vein; veins with a suggestion of a border.

Head and appendages.—Average width of head across eyes, .37. Antennal segments with the following comparative lengths: III—.23 to .29, average .25; IV—.14 to .17, average .16; V—.13 to .17, average .14; VI—.10 to .13, average .11 plus .16 to .19, average .17. Secondary sensoria (Fig. 280) confined to the third antennal segment, arranged in a straight row, numbering from 4 to 8, averaging 6. Primary sensorium of sixth antennal segment small, slightly smaller than that on fifth, the marginal sensoria grouped to one side of it. All segments of flagellum distinctly imbricated.

Beak variable in length, usually extending only to mesothoracic coxae, but sometimes extending past the metathoracic coxae.

Thorax and appendages.—Prothorax with a large lateral tubercle on each side. Second fork of media usually present and very close to margin of wing, in one or two cases entirely lacking. Femora with moderately numerous, erect, fine hairs. Tibiae clothed with long, declinate hairs, increasing in length and numbers from base to apex, thickest on hind tarsi; bases of hairs transparent yellow, giving the tarsi a minute speckled appearance.

Abdomen.—Cornicles (Fig. 142), straight, without flange, imbricated, length averaging .22. First segment with a pair of small, tooth-like, lateral tubercles. Segment posterior to cornicles with a pair of large lateral tubercles. Cauda (Fig. 193), averaging .08 in length, with about five hairs on each side, the terminal hairs strongly incurved. Anal plate normal in shape.

APTEROUS VIVIPAROUS FEMALE (VIRGOGENIA)

Size and general color.—Average length from vertex to tip of anal plate, 1.22. Head yellowish-brown to reddish-brown, thorax and abdomen lighter, yellowish-brown to yellowish-red. Antennae with the two basal segments concolorous with head, base of flagellum much lighter but gradually becoming darker towards apex. Prothorax, lateral pleural areas of thorax, coxae, legs except front femora and base of middle and hind femora, small patches on dorsum posterior to cornicle, anal plate, and cauda, light or dark reddish-brown; front femora sometimes concolorous with rest of legs, sometimes light yellowish-brown; middle and hind femora with base yellowish-brown. Cornicles blackish-brown. Beak as in alate viviparous female.

Head and appendages.—Average width of head across eyes, .34. Antennal segments with comparative lengths as follows: III—.24 to .43, average .32; IV—.10 to .26, average .17; V—.14 to .17, average .16; VI—.09 to .13, average .11 plus .14 to .20, average .16. Secondary sensoria absent; antennae imbricated. Primary sensorium present on fifth and sixth antennal segments, that on sixth small, with six marginal sensoria grouped to one side of it.

Thorax and appendages.—Prothorax with a large, tooth-like, lateral tubercle on each side. Legs similar to legs of alate viviparous female in structure.

Abdomen.—First segment and segment posterior to the cornicles each with a pair of lateral tubercles subequal to or smaller than those on prothorax. Cornicles similar to those of alate viviparous female, .31' long. Cauda not constricted, .11 long, with 4 or 5 pairs of lateral hairs.

APTEROUS VIVIPAROUS FEMALE (FUNDATRIX)

Size and general color.—Length from vertex to tip of anal plate, 1.34. Head, thorax, antennae, legs, cornicles, and cauda, black. Abdomen and posterior portion of thorax pinkish brown.

Head and appendages.—Average width of head across eyes, .43. Antennae five segmented, comparative lengths as follows: III—.36 to .40, average .38; IV—.11 to .13, average .12; V—.11 to .13, average .11 plus .09 to .11, average .10.

Otherwise similar to virgogenia.

Holotype.—Alate viviparous female; Oregon, Illinois, June 28, 1928, on *Pyrus* sp., (Frison, Hottes, and Ross). On slide with alate viviparous female, apterous viviparous females and nymphs. Slide No. 10530. *Morphotype.*—Apterous viviparous female (virgogenia); same data as holotype. On slide with alate and apterous viviparous females and nymphs. Slide No. 10531. *Morphotype.*—Apterous viviparous female (fundatrix); Oregon, Illinois, May 15, 1930, on *Prunus* sp., (Frison and Ross). Slide No. 10532. *Paratypes.*—Eighty-five slides of alate and apterous viviparous females, pupae and nymphs, collected in Illinois by T. H. Frison, F. C. Hottes, and H. H. Ross on *Pyrus* and *Prunus* sp. The localities and dates are: Galena (June 26), and Oregon (June 28), 1928; Oregon (July 11) and Oakwood (July 22), 1929; and Oregon (May 15), 1930. Slides Nos. 10533-10569, 10579-10597 and others unnumbered.

This species causes the terminal leaves of the host to curl very tightly. In life it does not suggest in habit or form any other *Aphis*. Mounted specimens resemble *Aphis feminea* in color, but the alate viviparous females differ from *feminea* in having no sensoria on the fourth and fifth antennal segments and in having fewer sensoria on the third antennal segment.

APHIS COREOPSIDIS (THOMAS)

Siphonophora coreopsidis Thomas, Bulletin Illinois State Laboratory of Natural History, Vol. 1, No. 2, June, 1878, p. 4, 5 figures.

This species is quite generally distributed over Illinois and has been recorded from the state by Davis (1910e) in addition to being described on the basis of Illinois material. The discovery of the sexual forms in fall on black gum indicates that this may be the over-wintering host of this species in southern Illinois. From its primary host it migrates in early summer to *Eupatorium* and *Bidens*. On black gum it shows a decided preference for the stems and leaves of new shoots, often completely encircling the apical portions of the stems for several inches. It occurs on the undersides of the leaves and the flower stalks of its summer hosts. Descriptions of the previously undescribed sexual forms are here presented.

Cotypes of this species were found preserved in vials of the Thomas Collection. These have been mounted in damar balsam on Slide No. 7716. Data associated with this slide are: St. Louis, Missouri, October on *Coreopsis aristosa*, collected by T. Pergande. Dr. Oestlund has determined slides of this species as *A. frondosae* Oestlund, and Davis (1910) has definitely placed this name in the synonymy of *coreopsidis*.

Data associated with our viviparous specimens are as follows: Carbonale (June 4), Elizabethtown (Oct. 12), Herod (May 29), Metropolis (May 31, June 31), Muncie (Oct. 6), 1928; Decatur (Sept. 21), Fern Cliff (Sept. 27), Grayville (June 19), Herod (Sept. 27), Kappa (Sept. 22), Oakwood (Oct. 13, 17), Waukegan (Aug. 29), 1929; Fairmount (Sept. 28), 1930. Collected on *Eupatorium urticacifolium*, *Bidens vulgata*, and *Nyssa sylvatica*. Sexual forms taken only on the latter host at Fern Cliff on September 27, 1929.

ALATE MALE

Length, 1.00. Head and thorax dark greenish brown, abdomen dark green; cornicles and cauda brownish, antennae brown. Legs greenish brown with apical portions of femora and tibiae darker; fore legs lightest in color. Stigma greenish brown, veins brown. Average width of head across eyes, .41. Comparative lengths of antennal segments as follows: III—.23; IV—.27; V—.21; VI—.09 plus .46. Secondary sensoria on third and fourth antennal segments scattered, on fifth arranged in an irregular row; numbering as follows: III—18; IV—18; V—6. Beak reaching beyond mesothoracic coxae. Second fork of media distinctly closer to margin of wing than to first fork. Cornicles .21 long, straight, entire surface imbricated. Cauda .11 long, with about 5 hairs on a side.

APTEROUS OVIPAROUS FEMALE

Length, 1.16. Color yellowish or yellowish green, with flagellum of antennae except base brown; apices of cornicles and more or less of tibiae and tarsi, infusate with brown. Average width of head across eyes, .29. Comparative lengths of antennal segments as follows: III—.26; IV—.24; V—.26; VI—.10 plus .50. All segments imbricated. Cornicles .30 long. Cauda about .10 long with about 5 lateral hairs. Hind tibiae decidedly swollen, with about 95 sensoria.

Allotype.—Alate male; Slide No. 8325, Fern Cliff, Illinois, September 27, 1929, on *Nyssa sylvatica*, (Frison and Hottes). On slide with alate viviparous female. *Morphotype*.—Apterous oviparous female; Slide No. 8324, same data as allotype. On slide with alate viviparous females.

APHIS CORNIFOLIAE FITCH

FIGS. 133, 271

Aphis cornifoliae Fitch, Fourth Annual Report of the Regents of the University on the Condition of the State Cabinet of Natural History, January 14, 1851, p. 65.

Slides of our specimens have been compared with two slides of *A. cornifoliae*, which are undoubtedly the types, kindly loaned to us by the U. S. National Museum. According to Mason, these slides are associated with notes No. 846 and 9020 of Pergande which indicate the specimens were originally mounted by Fitch on card points and then remounted on slides. The number assigned to this species in the original description is 846. Since this species has never been adequately described, or even authentically recorded, since the brief original description of the apterous females, a more detailed description of the apterous form is given here as well as a description of the previously undescribed alate viviparous female.

Aphis cornifoliae Fitch has been mentioned twice in literature by Oestlund (1885, 1887), and the name again appears in an article by Davis (1910e), who does not, however, record it from Illinois but refers certain references to *helianthi* Monell. In 1910, also, Gillette records this species, figures it, and gives notes on its life history. All of these records refer to the true *helianthi* of Monell. Oestlund's description was based upon a male.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.02. Color throughout almost identical with color of alate viviparous female, except that sometimes the thorax may be greenish, and the legs and antennae may be lighter.

Head and appendages.—Average width of head across eyes, .36. Antennal segments with the following comparative lengths: III—.24 to .33, average .27; IV—.13 to .17, average .15; V—.10 to .16, average .13; VI—.09 to .11, average .10 plus .23 to .31, average .28. Antennae without secondary sensoria or hair, flagellum imbricated.

Thorax and abdomen.—Dorsal surface of thorax and abdomen imbricated or reticulated. Lateral tubercles as in alate viviparous female. Cornicles averaging .21 in length, similar to, but more strongly outwardly curved than, the cornicles of the alate viviparous form. Cauda and anal plate as in the alate viviparous female.

The abdomens of the apterous viviparous females appear to be free from embryos, and this, together with the extremely small size of these specimens, suggests that they may be dimorphic forms.

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.08. Head, thorax and abdomen uniform dark brown or brownish-black. Cornicles, cauda, and anal plate dark brown, extreme base of cauda lighter. First and second antennal segments concolorous with head, remaining segments brownish, sometimes slightly darker towards apex. Femora brown except for yellowish-brown areas near the base, the posterior pair darkest;

tibia light yellowish-brown, darker at the apex; tarsi brown. Stigma and veins dusky brown, posterior margin and wing in vicinity of anal vein dusky. Beak dark brown.

Head and appendages.—Average width of head across eyes .36. Antennal segments with comparative lengths as follows: III—.24 to .29, average .28; IV—.14 to .17, average .16; V—.13 to .14, average .14; VI—.09 to .11, average .10 plus .23 to .34, average .29. Secondary sensoria (Fig. 271) confined to third and fourth antennal segments, sensoria on the third arranged in an irregular row, usually numbering from five to eight, average seven, one apparently aberrant specimen with fifteen sensoria; fourth segment with from 0 to three sensoria, usually two; sensoria very difficult to distinguish, due to dark color of antennae. Beak barely reaching to mesothoracic coxae. Primary sensorium on sixth antennal segment small, marginal sensoria grouped to one side of it.

Thorax and appendages.—Prothorax with a pair of lateral tubercles. Stigma of fore wings comparatively narrow, and sharply pointed at apex; radial sector little bowed; second fork of media closer to margin of wing than to the first fork.

Abdomen.—A pair of lateral tubercles on first abdominal segment, and on segment posterior to cornicles. Cornicles (Fig. 133) longer than cauda, length .16; imbricated, with narrow flange at the apex, of almost uniform width throughout, except sometimes very slightly swollen near apex and somewhat outwardly curved. Cauda not constricted, length .11, bluntly rounded at apex, with four pairs of lateral hairs. Anal plate normal in shape. Body sparsely covered with fine hairs.

Morphotype.—Alate viviparous female; Pekin, Illinois, June 20, 1928, on *Cornus* sp., (Frison, Hottes, and Ross). On Slide 9750 with alate viviparous females and nymphs.

Data with our other slides, containing alate and apterous viviparous females and nymphs, collected on *Cornus stolonifera* and *Cornus* sp., are as follows: East Peoria (July 22), Oregon (June 28) and Pekin (June 20), 1928; Lyle (July 14), 1929.

This species differs from the other members of the genus by characters given in the key. It is most closely allied to *caliginosa* n. sp., another dark-brown species occurring on *Cornus* in Illinois. *Aphis cornifoliae* is found on both the lower and upper surfaces of the leaves, whereas the other species recorded from *Cornus* in Illinois occur only on the lower surfaces of leaves and on the stems.

APHIS CRATAEGIFOLIAE FITCH

FIG. 90

Aphis crataegifoliae Fitch, Fourth Annual Report of the Regents of the University, on the Condition of the State Cabinet of Natural History, State of New York, January 14, 1851, p. 66.

This species was first reported from Illinois by Thomas (1879) and it was again recorded from this state by Davis (1910e) under the name of *Aphis brevis* Sanderson. Our records show it to be common and quite generally distributed over Illinois. It over-winters on apple and hawthorn, from the leaves of which it migrates in summer to the stems and crowns of red clover and certain other plants (Sanderson, 1902, and Patch, 1915a).

Data associated with our specimens, all collected on hawthorn (*Crataegus*) or red clover (*Trifolium pratense*), are as follows: Normal (June 21), 1883; Decatur (Sept. 29), Galena (June 26), Metropolis (June 1), Oakwood (Sept. 17), Urbana (May 19, 21, Sept. 26, Oct. 1, Dec. 19), 1928; Edwards-

ville (Sept. 11), Muncie (Sept. 22), Urbana (Oct. 11), 1929; Urbana (Oct. 20), 1930. Sexual forms were taken on *Crataegus* at Urbana on October 11, 1929.

APHIS DEBILICORNIS (GILLETTE & PALMER)

FIG. 20

Anuraphis debilicornis Gillette and Palmer, Annals of the Entomological Society of America, Vol. XX11, No. 1, March, 1929, p. 10.

Aphis helianthi Oestlund (not Monell), Geological and Natural History Survey of Minnesota, Bulletin No. 4, 1887, p. 52 ♂. *New synonymy.*



Fig. 20. Curling of leaves of wild sunflower, *Helianthus* sp., caused by *Aphis debilicornis* (Gillette and Palmer); Oakwood, July 22, 1929.

This species is here recorded from Illinois for the first time. Our records show that it is quite generally distributed throughout the state. The terminal leaves of its host curl tightly and twist (Fig. 20) when attacked by this aphid. It differs markedly from *Aphis helianthi* Monell, with which it has been confused. Descriptions of all forms are given by Gillette and Palmer (1929). No mention is made by these writers that it causes the leaves of its host to curl, but in answer

to our query Professor Palmer writes that "we are of the impression that they do curl leaves but can find no written record as to this point." We have taken this species every month from May to October, except August, on its host, *Helianthus* sp., and believe it is not a true migratory form.

Professor Palmer has checked slides of our material with typical specimens of *debilicornis* and reports that they agree.

Data associated with our specimens are as follows: Antioch (July 15), East Peoria (July 22), Muncie (Oct. 6), Oakwood (July 18), Shawneetown (May 27), 1928; Batchtown (June 25), Edwardsville (Sept. 11), Jonesboro (June 23), Oakwood (June 29), Urbana (July 19, Oct. 7), 1929; Oakwood (June 1), 1930. Sexual forms have been taken at Muncie (Oct. 6), 1928, and Urbana (Oct. 7), 1929.

APHIS DECEPTA new species

FIGS. 130, 281

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.45. Head and thorax dark chestnut brown. Abdomen deep golden yellow with a tinge of brown, except as follows: lateral portions of abdomen with large segmentally arranged brownish patches, these becoming confluent in the vicinity of the cornicles, so that abdomen posterior to cornicles, and a small connected patch near the anterior base of cornicles, as well as cornicles, cauda, and anal plate, are distinctly brownish. Antennae very uniform in color and essentially concolorous with the head. Femora chiefly brownish, fore legs usually lightest and hind legs dark, basal portion usually yellowish-brown; tibiae of all legs yellowish, except apices which are brownish for a distance equal to the length of the tarsi; tarsi brown. Beak brownish, somewhat darker towards apex. Stigma of fore wings only very faintly dusky; veins fine, fuscous, hind margin of wing near junction with anal vein distinctly fuscous.

Head and appendages.—Average width of head across eyes, .46. Antennal segments with comparative lengths as follows: III—.34 to .49, average .42; IV—.23 to .24, average .24; V—.19 to .21, average .20; VI—.10 to .13, average .11 plus .36 to .40, average .38. Secondary sensoria (Fig. 281) essentially confined to the third antennal segment, but some specimens have a few sensoria on the fourth segment; usually large, with wide rims, completely covering the surface of the third segment and giving it a very tuberculate appearance; ranging from 37 to 48 on the third segment and none to four on the fourth segment, strongly imbricated. Beak reaching to coxae of the metathoracic pair of legs.

Thorax and appendages.—The prothorax has a pair of large, well-developed lateral tubercles. Fore wing with the second fork of the media usually much closer to the margin of the wing than it is to the first fork.

Abdomen.—First abdominal segment and the segment posterior to the cornicles each with a pair of large lateral tubercles. The cornicles (Fig. 130) slightly tapering from base to apex, strongly imbricated and with a flange at the apex; about twice the length of the cauda or one and one-half times the length of the fifth antennal segment, varying from .24 to .31 and averaging .28. Cauda with from five to seven hairs on a side, all of which are strongly bent inwardly; distinctly constricted at the middle. Anal plate reaching to middle of the cauda.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.57. Color yellow except as follows: a slight brownish cast on head; lateral portions of thorax in some specimens and small patches on abdomen immediately posterior to the cornicles dark brown; cauda and anal plate

brownish but not as dark as the cornicles. Legs essentially yellowish except dark brown apices of tibiae and all of tarsi. Basal segments of antennae usually concolorous with head, sometimes lighter, gradually shading to brownish about the middle of the fifth antennal segment and continuing this color to apex. Beak yellowish, except for brownish apex.

Head and appendages.—Average width of head across eyes, .47. Antennal segments with comparative lengths as follows: III—.39 to .43, average .41; IV—.21 to .24, average .23; V—.17 to .20, average .19; VI—.10 to .11, average .11 plus .29 to .36, average .32. Antennae without secondary sensoria, faintly imbricated. Beak reaching to the coxae of the metathoracic pair of legs.

Thorax and appendages.—The prothorax with a pair of large lateral tubercles.

Abdomen.—First and the segment posterior to the cornicles each with a pair of lateral tubercles. Cornicles similar to those of the alate viviparous female; about twice the length of the fifth antennal segment, averaging about .37. Cauda a little shorter than fifth antennal segment, with from six to seven hairs on a side and bent inwardly at apex.

Holotype.—Alate viviparous female; Urbana, Illinois, July 10, 1928, on *Pastinaca sativa*, (Frison and Hottes). On slide with morphotype (No. 4374). *Morphotype*.—Apterous viviparous female; same date as for holotype. On slide with holotype (No. 4374). *Paratypes*.—Twenty-nine slides of alate and apterous viviparous females, pupae and nymphs; Same data as for holotype. Slides Nos. 4372-4373, 10441-10458 and others unnumbered.

This species structurally suggests a close relationship with *Aphis luridis* new species, described in this paper, but may be separated from it by the fact that the fifth antennal segment never has secondary sensoria and the fourth segment has few, if any. This species occurs on the lower sides of the leaves.

APHIS FEMINEA HOTTES

FIG. 17

Aphis tuberculata Patch, Maine Agricultural Experiment Station, Bulletin 233, November, 1914, p. 261. *Name preoccupied*.

Aphis feminea Hottes, Proceedings of the Biological Society of Washington, Vol. 43, October 7, 1930, p. 183. *New name*.

This is the first time that this aphid has been recorded from Illinois. The red and black cherry aphid, as it has been styled by Patch, is a beautifully colored species. It completely incrusts the twigs and small branches of the black cherry and occasionally is found on leaves adjacent to a bark infestation. The sexual forms have not been described. Dr. Patch has kindly checked our determination of this species by comparison with typic specimens. This species was diligently searched for all over Illinois but was never located outside of Decatur, and we do not believe it has been reported previously except from Maine.

All our alate and apterous viviparous females were collected on *Prunus serotina* at Decatur, May 12, June 12 and 27, 1929.

APHIS FOLSOMII DAVIS

FIG. 201

Aphis folsomii Davis, Entomological News, Vol. XIX, No. 4, April, 1908, p. 145, pl. VII.

This species, originally described from Urbana, Illinois, by Davis, is widely distributed throughout the state. It is never abundant enough,

however, to be conspicuous and is not likely to become of economic importance. It occurs along the stems of the new growth and tendrils of Virginia creeper and Boston ivy. Davis has described the sexual as well as the viviparous forms.

Data associated with our viviparous specimens, all collected on *Parthenocissus tricuspidata* or *Parthenocissus* sp., are as follows: Muncie (Oct. 6), Oregon (June 27), Pekin (June 20), Urbana (June 7), 1928; Batchtown (June 25), Carbondale (June 21), Elizabethtown (June 20), Galena (July 10), Grayville (June 19), Olney (June 18), Ullin (June 21), Urbana (May 31, June 3), 1929.

APHIS FORBESI WEED

Aphis forbesi Weed, Bulletin of the Ohio Agricultural Experiment Station, Vol. 11, No. 6 (Second Series, No. 13), September, 1889, p. 148.

This species, named in honor of the late Professor S. A. Forbes, was first reported as occurring in Illinois by him. Davis (1910e) reports it as common throughout the state. It is a small dark bluish-green aphid normally occurring on the undersides of the leaves and stems, especially near the crown, of strawberry. It is also found frequently on the roots, to which it is carried by ants from the leaves and stems. It is a troublesome pest of strawberries, particularly of plants growing in sandy or light soils. The apterous sexual forms have been briefly described by Sanderson (1900).

Data associated with our viviparous specimens, all collected on *Fragaria*, are as follows: Kankakee (June 29), Oregon (June 28), 1928; Bement (May 24), Seymour (May 24), Urbana (May 22), 1929; Woodyard (April 14), 1930.

APHIS FUNESTA new species

FIG. 131, 203, 282

ALATE VIVIPAROUS FEMALE

Size and general color.—Length from vertex to tip of anal plate, 1.28. Head, thorax, and abdomen dark brown, shining. Lateral and posterior regions of abdomen sometimes mottled with lighter brown. Cornicles, cauda, and anal plate dark brown. Antennae with first and second segments colorous with head; either flagellum entirely dark brownish or third and fourth antennal segments and basal half of fifth segment light yellowish brown, with remaining portion of fifth segment and all of sixth dusky brown. Femora mostly dark brown, yellowish near base, metathoracic femora darkest, prothoracic femora lightest; tibiae conspicuously light yellowish with apical band equal to length of tarsi, dark brown, tarsi dark brown. Beak dark brown. Stigma of fore wings light yellowish brown, darker posteriorly, veins brown, posterior margin of wing in vicinity of anal vein brownish.

Head and appendages.—Average width of head across eyes, .39. Comparative lengths of antennal segments as follows: III—.20 to .26, average .23; IV—.19 to .24, average .21; V—.14 to .21, average .19; VI—.09 to .13, average .11 plus .20 to .27, average .24. Secondary sensoria (Fig. 282) confined to third antennal segment, usually arranged in a straight row, numbering from 4 to 7 and averaging 5. Primary sensorium on sixth antennal segment with a group of exceedingly small marginal sensoria at one side. All antennal segments imbricated. Beak reaching just beyond the middle of the mesothoracic coxae.

Thorax and appendages.—Prothorax with a pair of small peg-like lateral tubercles. Stigma of fore wings more or less shallow and sharply pointed. Second fork of media closer to margin of wing than to first fork.

Abdomen.—Cornicles (Fig. 131) .26 long, straight, imbricated throughout their length, and with the flange at apex very poorly developed. Cauda .15 in length (Fig. 203), distinctly constricted beyond middle, with the portion beyond constriction thin and more or less sharply pointed; with two or three hairs on each side, all strongly inwardly curved, besides numerous short spine-like setae. First and third abdominal segments and segment posterior to cornicles with small lateral tubercles. Anal plate normal.

APTEROUS VIVIPAROUS FEMALE. (VIRGOGENIA)

Size and general color.—Average length from vertex to tip of anal plate, 1.43. Color essentially the same as in the alate viviparous female, except that the third, fourth, fifth, and base of sixth antennal segments are light yellowish, and the femora are a lighter shade of brown.

Head and appendages.—Average width of head across eyes, .43. Comparative lengths of antennal segments as follows: III—.24 to .36, average .29; IV—.17 to .24, average .20; V—.14 to .23, average .19; VI—.09 to .13, average .10 plus .14 to .23, average .20. Secondary sensoria absent. All antennal segments finely imbricated. Primary sensorium on sixth segment with a group of very small marginal sensoria at one side. Beak similar in length to that of alate viviparous female.

Thorax and appendages.—Prothorax with a pair of lateral tubercles.

Abdomen.—Cornicles about .36 long, otherwise similar to those of alate viviparous female. Cauda about .17 long, considerably more robust than the cauda of the alate viviparous female, constricted, and with two or three hairs on each side in addition to a dense covering of short spine-like setae. Anal plate normal. Lateral tubercles as in alate viviparous female.

Holotype.—Alate viviparous female; Beach, Illinois, August 29, 1929, on *Liatris* sp., (Frison and Hottes). On slide with paratypic apterous viviparous female and pupae. Slide No. 10386. *Morphotype*.—Apterous viviparous female; same data as holotype. On slide with paratypic alate and apterous viviparous female and nymph. Slide No. 10387. *Paratypes*.—Ten slides, containing alate and apterous viviparous females and pupae; same data as holotype. Slides Nos. 10388-10395 and others unnumbered.

This species was collected on the flowering stems of blazing star (*Liatris* sp.). Mounted material most resembles *A. laburni* Kalt., but differs in having the sixth antennal segment much longer than the cornicles. In life the difference is very marked, *A. laburni* being black and *A. funesta* mahogany red.

APHIS GOSSYPHII GLOVER

Aphis gossypii Glover, Report of the Commissioner of Agriculture of the Operations of the Department for the year 1876, (Government Printing Office, Washington, 1877), p. 36.

The cotton, or melon, aphid was first reported from Illinois by Forbes (1883) as a new species under the name of *Aphis cucumeris*. It is widely distributed throughout the world. In choice of food plants it is more cosmopolitan than most species of aphids and has been taken in Illinois on a large variety of plants including cotton—the host from which it was originally described. It is a serious pest of melons and cucumbers. In greenhouses it is apt to become a serious pest on a large variety of plants. Economic literature is full of articles dealing with the destruction caused by this plant louse, its bionomics, methods for control, and so on. In spite of all the attention paid to this insect by entomologists and others, nothing was known concerning the overwintering host, or hosts, of this species until the appearance of the

paper by Patch (1925) in which orpine, or live-forever, was shown to be a primary food plant in Maine. The sexual forms, both apterous, have been briefly described by Patch.

Data associated with our viviparous specimens are as follows: Normal (July 19, 1882; Chicago (June 14), Herod (May 29, Oct. 29), Rock Island (June 24), Urbana (May 9, Aug. 6, Oct. 5, 8, 18), 1928; Cairo (June 21, 22), Collinsville (Sept. 11), Oakwood (Oct. 13), Urbana (July 24, Aug. 19, 31, Oct. 6, 8, 9, 15, 16), 1929; Cerro Gordo (Oct. 15), Starved Rock State Park (May 13), Urbana (Oct. 20), 1930. Sexual forms and mating pairs were collected on *Oenothera* at Oakwood on October 22, 1930.

We have taken this species in Illinois on the following plants: *Achillea Millefolium*, *Anchusa myosotidiflora*, *Apium* sp., *Arabis Drummondii*, *Capsicum dulce*, *Coccoloba flendana*, *Coccoloba laurifolia*, *Crocus* sp., *Cucumis melo*, *Cucumis sativus*, *Cucurbita maxima*, *Diervilla* sp., *Gossypium* sp., *Helenium* sp., *Lagenaria vulgaris*, *Malva* sp., *Portulaca oleracea* sp., *Saxifraga splendens*, *Sedum reflexum*, *Spinacia oleracea*.

The typic slide of *Aphis cucumeris* Forbes is No. 1557 in the Survey collection.

APHIS HELIANTHI MONELL

FIG. 21

Aphis helianthi Monell, Bulletin of the United States Geological and Geographical Survey of the Territories, Vol. V, No. 1, January 22, 1879, Art. 1, p. 26.

This species was first reported from Illinois, and the sexual forms described, by Weed (1888) under the name of *Aphis cornifoliae* Fitch, a species with which it has been often confused. Since then it has been again reported from Illinois under its right name by Davis (1910e).

Aphis helianthi over-winters in the egg stage on dogwood, and in the spring it often causes very serious damage to ornamental plantings by twisting and curling the leaves (Fig. 21). In early summer it migrates to sunflower upon which host it may be collected all summer. Gillette (1910) has given a brief account of the biology of this species and the work of Bragg in demonstrating migratory habits of this species between dogwood and sunflower.

There has been much confusion in literature regarding the names used in connection with species of *Aphis* attacking *Cornus* and *Helianthus*. According to our collecting in Illinois, we have four species of *Aphis* on dogwood: the true *helianthi*, alternating between *Cornus* and *Helianthus*; *caliginosus* new species and *cornifoliae* Fitch, both of which thus far have been found only on *Cornus*; and *spiraeicola*, which occurs on a large variety of plants, including *Cornus*. We have three species of *Aphis* attacking sunflower: *helianthi*, alternating between *Cornus* and *Helianthus* as already mentioned; *debilicornis*, which badly twists the terminal leaves (Fig. 20) and produces all forms on this host; and occasionally the omnivorous *A. ruminis*.

Our use of the name *helianthi* Monell is based upon a checking of a cotypic slide of this species kindly loaned by Professor J. J. Davis. Our use of the name *cornifoliae* Fitch is based upon an examination of typic specimens kindly loaned by Mr. P. W. Mason of the U. S. National Museum. It should be mentioned that we are informed by Pro-

fessor Oestlund that his description of *helianthi* Monell (1887) is based upon a male and accordingly is not to be compared with descriptions based upon alate viviparous females; and judging from his statements about the curling of leaves and subsequent collections of material, his reference is to what we are calling *debilicornis*.

Data associated with our viviparous specimens, all collected on *Cornus stolonifera*, *Cornus mas*, *Cornus* sp., or *Helianthus* sp., are as follows: Danville (Sept. 18), Herod (Oct. 12), Urbana (May 16), 1928; Beach (Aug. 29), East St. Louis (June 25), Galena (July 10), Macomb (May 3), Riverside (July 14), Rock Island (July 9), Springfield (May 2), Urbana (April 17, 22, 26, May 1, June 17, Aug. 16, 19), 1929.



Fig. 21. Curling of leaves of the dogwood, *Cornus mas*, caused by *Aphis helianthi* Monell; Urbana, June 22, 1929. Normal foliage on right and infested foliage on left.

APHIS ILLINOISENSIS SHIMER

FIG. 198

Aphis illinoensis Shimer, *Prairie Farmer*, Vol. 18, No. 20, November 17, 1866, p. 316.

The grapevine aphid has been shown by Baker (1917c) to overwinter on *Viburnum* and to migrate to wild and cultivated grapes in spring. Detailed descriptions of all forms are given by the same writer. This aphid is often destructive to cultivated varieties and is rarely absent from some of the succulent stems, leaves, tendrils, and



Fig. 22. Tendrils and leaves of the grape, *Vitis labrusca*, covered with the grape-vine aphid, *Aphis illinoensis* Shimer.

leaf petioles (Fig. 22) of such plantings. We have taken this species in twenty-three localities in all parts of Illinois, and it is safe to assume that it occurs in every county in the state.

Among the recently recovered types of plant lice described from Illinois by Thomas (1878) are those of *Siphonophora viticola*. These specimens agree with the species now going by the name of *illinoensis*

Shimer, and hence *viticola* Thomas can be definitely placed as a synonym of it as Davis (1910e) thought. Undoubtedly the Illinois records of "*A. vitis?* Scopoli" of Walsh (1862) refer to this species. The cotypes of *viticola* Thomas have been mounted in damar balsam on two slides. Slide No. 7698 has been designated as the *lectotypic* slide and Slide No. 7699 as a paratypic slide. Both contain specimens of alate and apterous viviparous females and nymphs. The original vial containing these typic specimens was assigned the number 33 by Thomas. The data associated with the typic slides are as follows: Irvington, Illinois, June 29, 1877, on grape.

Neotypic slide.—Since this species was originally described from Illinois by Dr. Shimer and there is no record of a type having been preserved, a slide (4098) in the Survey collection is selected as the neotype. The data associated with the neotypic slide are as follows: Oakwood, Illinois, on grape, July 18, 1928 (Coll. Frison and Hottes).

Our records for viviparous specimens of this species are as follows: Morris (July) and Villa Ridge (July 11), 1883; Cairo (June 2), Champaign (June 10-19), Havana (June 21), Jacksonville (June 18), LeRoy (June 20), Mattoon (June 10), Metropolis (June 1), Neoga (June 10), Oakwood (July 8-18), Pekin (June 20), Quincy (June 6), St. Joseph (June 17), Urbana (July 7-10), 1928; Beach (July 13), Cairo (June 22), Champaign (June 10), Effingham (June 18), Elizabethtown (June 20), Galena (July 10), Homer (June 29), Kansas (June 17), Oregon (July 12), Starved Rock State Park (July 6), 1929. Found on the young stems, leaves, tendrils, and leaf petioles of both cultivated and wild grapes (*Vitis*).

APHIS KNOWLTONI new name

Chaitophoroides middletonii (Thomas) Knowlton, Pan-Pacific Entomologist, Vol. VI, No. 1, July, 1929, p. 34.

In working over material belonging to the *maidi-radicis* or *middletonii* complex, we have studied specimens upon which the records and descriptions of *Chaitophoroides middletonii* of Knowlton (1929b) were based. The species he is calling *middletonii* Thomas does not come within the concept of *maidi-radicis* Forbes or *middletonii* Thomas as used by other writers, and since it represents an apparently new species we are proposing the new name of *knowltoni* for it. Knowlton has described and figured in detail the alate and apterous viviparous females and the apterous oviparous female, and his slides should be considered as the cotypic material. The two cotypic slides we studied of Knowlton's material bear the following data: Logan, Utah Sept. 4-7, 1926, on roots and crown of dandelion, collected by G. K. Knowlton. By courtesy of Mr. Knowlton these two slides have been assigned the numbers 8957 and 10865 and deposited in the Survey collection.

We have collected apterous viviparous specimens of this species at Urbana on two occasions, September 22, 1928, and May 22, 1929, each time on the roots of *Taraxacum officinale*.

APHIS LABURNI KALTENBACH

Aphis laburni Kaltenbach, Monographie der Familien der Pflanzenläuse, Aachen, 1843, p. 85.

This species was first reported from Chicago, Illinois, by Davis (1910e) under the name of *Aphis medicaginis* Koch. Thomas (1879)

mentions both *laburni*, as a synonym of *Aphis rumicis* L., and *medicaginis*. He did not, however, claim to know the species, and his references are not to be construed as Illinois records. Davis reports it as an important enemy of the black locust in the Chicago parks. We ourselves have taken this species only once, on the tender terminal shoots of young black locust.

Our viviparous specimens were collected on *Robinia Pseudo-Acacia* at Union Grove, Illinois, September 8, 1928, by Mr. C. C. Compton, and at McCusky, Illinois, June 26, 1931, by Frison and Ross.

APHIS LURIDIS new species

FIG. 268

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate. 1.79. Head and thorax dark chestnut-brown. Dorsum and venter of abdomen golden yellow, with brownish, segmentally arranged, lateral patches which tend to become confluent a short distance posterior to the base of the cornicles; cornicles, cauda, and anal plate dark brown. Antennae essentially concolorous with head except extreme base of third segment, which is lighter. Legs brownish, fore pair lightest and hind pair darkest, femora usually paler near base, tibiae usually darker at apical portion; tarsi concolorous with apices of tibiae. Fore wings with stigma smoky, veins light brown and only moderately well developed, posterior margin of wing brownish near junction with anal vein. Beak almost uniformly brownish.

Head and appendages.—Average width of head across eyes, .43. Antennal segments with comparative lengths as follows: III—.37 to .49, average .44; IV—.16 to .21, average .19; V—.14 to .17, average .16; VI—.10 to .11, average .11 plus .26 to .31, average .28. Secondary sensoria (Fig. 268) are found on the third, fourth and fifth segments and are distributed as follows: III—28 to 40, average 35; IV—7 to 13, average 10; V—2 to 7, average 5. Secondary sensoria well developed, with wide rims, and very tuberculate; on the third antennal segment they appear to be quite equally distributed over its entire surface, except for a short free area near the base which is less in length than second segment and a tendency in some specimens towards a concentration near apex; on fourth and fifth segments confined mostly to one side of the segment; those on fourth segment scattered and those on fifth segment in a more regular row. All segments of the antennae, except where sensoria interfere, strongly imbricated. The beak is quite variable in length, in some specimens not quite reaching the coxae of the mesothoracic pair of legs and in others reaching the coxae of the metathoracic pair.

Thorax and appendages.—Prothorax with a pair of large, unusually well developed, lateral tubercles; mesothorax with a pair of wax glands on the ventro-lateral surface which are rather difficult to distinguish. Fore wing with second fork of the media variable in relation to margin of wing and first fork. Second joint of the tarsus, exclusive of claws, subequal to the base of sixth antennal segment.

Abdomen.—First abdominal segment and segment posterior to cornicles each with a pair of large, well-developed, lateral tubercles. Cornicles but slightly tapering from base to apex, a little less than twice the length of the fifth antennal segment, or about twice the length of the cauda, and averaging about .25 in length, strongly imbricated throughout and with a poorly developed flange at the tip. Cauda distinctly narrowed beyond middle, with from four to five hairs on a side, the four terminal hairs strongly bent inwardly, averaging about .15 in length. Anal plate rather deep and rounded.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate. 1.52. Head yellowish brown; thorax and abdomen golden yellow, except for a small brownish patch near posterior base of each cornicle. Cornicles

dark brown. Cauda and anal plate considerably lighter in color than similar structures of the alate viviparous female but still somewhat brownish or dusky. First and second antennal segments concolorous with the head; remaining segments almost uniformly dark brown, except basal half of third segment which is lighter in color than the apical half. Femora varying in color from almost uniform brown to basal half yellowish and apical half brownish, fore femora usually lightest; tibiae yellowish-brown with the exception of apical portions, which are darker brown; tarsi brownish. Beak brownish.

Head and appendages.—Average width of head across eyes, .41. Antennal segments with comparative lengths as follows: III—.33 to .37, average .36; IV—.16 to .19, average .17; V—.13 to .14, average .14; VI—.09 to .11, average .10 plus .17 to .21, average .20. Secondary sensoria usually present on third, fourth and fifth antennal segments; not very constant and varying considerably in size; on the third antennal segment they are confined to the apical one-third of the segment and they number from one to nine; scattered on the fourth and fifth antennal segments, on fourth segment varying in number from five to seven and on fifth segment from two to three; all segments strongly imbricated. The beak usually extends to the middle of the coxae of the metathoracic pair of legs.

Thorax and appendages.—Prothorax with a pair of large, well-developed, lateral tubercles.

Abdomen.—First abdominal segment and the segment posterior to the cornicles each provided with a pair of large, well-developed, lateral tubercles. Cornicles about three times the length of the base of the sixth antennal segment and averaging about .28 in length, tapering a trifle towards the apex, strongly imbricated, the flange poorly developed. Cauda about one-half the length of the cornicles, averaging about .16 in length; in shape it is similar to that of the alate viviparous female; with from five to six pairs of lateral hairs, the two terminal pairs strongly bend inwardly. Anal plate similar to that of the alate viviparous female.

Holotype.—Alate viviparous female; Carbondale, Illinois, June 4, 1928, on *Zizia* sp., (Frison and Hottes). Slide No. 10459. *Morphotype.*—Apterous viviparous female; Channel Lake, Antioch, Illinois, June 15, 1928, on *Zizia aurea*, (Frison and Hottes). On slide with alate viviparous female. Slide No. 10460. *Paratypes.*—Twenty-five slides of alate and apterous viviparous females, pupae and nymphs; all collected in Illinois by T. H. Frison, F. C. Hottes, and H. H. Ross from *Zizia aurea* or *Zizia* sp. The localities and dates are as follows: Beach (July 13, 1929); Carbondale (June 4, 1928); Channel Lake, Antioch (June 15, 1928); Metropolis (May 31, 1928); and Starved Rock State Park (June 13, 1928). Slides Nos. 10461-10480 and others unnumbered.

This species is very closely allied to *Aphis signatis*, a new species described in this paper. It may be distinguished by its color, the longer cornicles, and the fact that the apterous viviparous female has secondary sensoria on the third, fourth, and fifth antennal segments. It may be separated from both *A. nyctalis* and *A. signatis* by characters given in the key.

Specimens of this new species are found both in folded leaves and along the main flower stalks, particularly the latter.

APHIS MACULATAE OESTLUND

Aphis maculatae Oestlund, Geological and Natural History Survey of Minnesota, Bulletin No. 4, 1887, p. 61.

Aphis davisii Patch, Journal of Economic Entomology, Vol. 10, No. 4, August 1917, p. 419. *New synonymy.*

This species was first reported by Davis (1910e) from northern Illinois. *A. maculatae* Oestlund has been considered a synonym of

populifoliae Fitch, but Baker (1916a) has shown that the typic specimens of the latter belong to the genus *Clavigerus*, and hence *maculatae* is the first name available for this species. The original description of *A. populifoliae* Fitch is very unsatisfactory and there are some points upon which the description better fits this species than that of the species with which the name is associated on the basis of the existence of typic specimens.

Davis (1910e) and Patch (1913a) have referred to this species as *A. populifoliae* Fitch. Later, as a result of Baker's (1916a) work, showing *populifoliae* belongs in a different genus, Patch (1917) proposed the name *davisi*. Oestlund's (1887) *maculatae*, however, refers to this same species and hence has priority over the name proposed by Patch.

Patch (1913a) and Knowlton (1929b—under name of *populifoliae* Fitch)—have given good descriptions of the viviparous forms and the male. As far as known, the entire life cycle of this large, handsome species is spent upon the poplar or aspen. It occurs on the undersides of leaves and on succulent shoots.

Some recent writers have placed this species in the genus *Chaitophoroides* Mordvilko (1909), but we have not seen fit here to recognize this genus.

We have taken this species only once, upon *Populus tremuloides* at Oregon, Illinois, June 27, 1928.

APHIS MAIDI-RADICIS FORBES

FIGS. 23, 24

Aphis maidi-radicis Forbes, Seventeenth Report of the State Entomologist on the Noxious and Beneficial Insects of the State of Illinois. Sixth Report of S. A. Forbes for the years 1889 and 1890, 1891, p. 64.

The corn root louse (Figs. 23, 24) was first reported from Illinois by Walsh (1862) under the name of "*Aphis maidis*," Fitch." Since then, because of its economic importance, it has attracted the attention of many workers, so that the literature referring to it is very extensive. Forbes has published numerous papers concerning this insect, among which his articles of 1891 and 1895 are most important. In the 1891 paper, a new specific name was proposed, based upon experiments demonstrating that the aerial aphid on corn was not the same as the subterranean aphid on corn; both formerly going under the name of *maidis* Fitch.

The life history of this root louse in Illinois may be briefly summarized as follows: the eggs are cared for by common field ants during the winter; in spring the first young nymphs are placed by ants upon the rootlets of various plants such as smartweed; later the plant lice are transferred to certain plants including corn where the sexual forms are produced in late fall. The corn root aphid is one of the few aphids that seem to be almost, if not entirely, dependent upon ants. A more detailed but still comparatively short account of the corn root louse and suggested methods for control is given by Davis (1917).

Previous to the separation of *maidi-radicis* from *maidis* Fitch, Thomas (1879) named an *Aphis* found in Illinois on the roots of various plants, as *middletonii*. The close, if not co-specific, relationship of the latter to *maidi-radicis* appears never to have been suspected by Forbes. Now, however, there exists considerable doubt whether there are two or but one species involved; if the latter ever becomes demonstrated, the name of Thomas will have priority.

After a careful study of a large series of slides belonging to the Survey collection, and an equally large number kindly loaned to us by various individuals from Maine to California, we are still in a quandary whether we are dealing with one variable or two species in this state, though inclined to the view that only one species is involved. Since the name of *maidi-radicis* Forbes is so well estab-



Fig. 23. Alate and apterous viviparous females of the corn root aphid, *Aphis maidi-radicis* Forbes. (After Forbes: Ill. Ent. Rep. 18.)

lished in economic literature, we are not definitely considering it as a synonym of *middletonii* Thomas. The name *maidi-radicis* is associated by some students of aphids mostly with material collected on roots of corn, and the name of *middletonii* applied to a very similar appearing root louse found on such plants as *Erigeron*, *Solidago*, and *Aster*. The former is considered, too, as having on the average fewer secondary sensoria than the latter. We believe that only careful biological investigations can solve the problem of whether we are dealing with one, two, or perhaps three species. Such an investigation should study variation in color patterns shown by different generations on the same and different hosts, as well as variation in antennal structures, and should include transfer tests.

We are recording under one name (*maidi-radicis*) almost all of our Illinois material of this complex, because of general uniformity in structural and color characters. A few slides of viviparous specimens which approach most closely the present concept (Vickery, 1910) of *middletonii*, are left as undetermined.

Data associated with our specimens are as follows: Champaign (July 31), Normal (July 27), 1883; Freeport (July 16), 1884; Champaign (May 14, July 2, 5), Urbana (May 21, Aug. 7), 1886; Champaign (May 26, Oct. 18), Urbana (June 9), 1887; Urbana (June 19), 1888; Urbana (Oct. 3, 14),



Fig. 24. *Aphis maidi-radiceis* Forbes on roots of *Erigeron philadelphicus*; Seymour, July 19, 1929.

1889; Urbana (June 26, 29, Oct. 6), 1891; Urbana (Aug. 5), 1893; Champaign (Oct. 17), Urbana (May 21), 1894; Buda (May 29), Bureau (May 30), Knoxville (May 25), 1901; Arnold (June 19), Urbana (June 14), 1928; Allerton (June 17), Clayton (June 21), Edwardsville (Sept. 11), Oakwood

(June 29), Seymour (July 19, Aug. 6) Starved Rock State Park (July 5), 1929; Beardstown (Nov. 7), Fairmount (Sept. 28), Humboldt (Nov. 12), Oakwood (Oct. 22), Vandalia (Nov. 14), 1930. Sexual forms taken in 1930 in October and November at Beardstown, Humboldt, Oakwood, and Vandalia. Mating pair taken at Oakwood on October 22 on corn roots.

Host plants are as follows: *Avena sativa*, *Erigeron*, *Plantago*, *Polygonum* sp., *Portulaca oleracea*, and *Zea Mays*.

APHIS MAIDIS FITCH

Aphis maidis Fitch, Transactions of the New York State Agricultural Society, Vol. XV, 1855 (Printed 1856), p. 550.

Walsh reported *Aphis maidis* Fitch as questionably occurring in Illinois. As he was dealing with a root-feeding form, the species referred to by him was unquestionably *Aphis maidi-radicis* Forbes and not the corn leaf aphid. The record of Thomas for *maidis* in Illinois undoubtedly covers both this species and *maidi-radicis*. The complete life history of this species, at least in the north-central states, is not known. It appears in corn fields in Illinois about mid-summer and remains there until late fall, rarely becoming of serious importance as a pest. The sexual forms are unknown, and the late appearance of *maidis* in Illinois is suggestive either that the corn leaf aphid has an alternate host or that it migrates each season from the south, where it is present during the winter months. Davis (1909a) gives a good account of the known biology and descriptions of this species.

Data associated with our viviparous specimens are as follows: Cedar Lake (Oct. 17), Normal (Oct. 25), Pekin (Aug. 8), Waterman (Aug. 25-26), 1882; Champaign (July 31), Heyworth (Aug. 11), 1883; Anna (Sept. 5), Champaign (Aug. 2-4), Normal (Aug. 11, Oct. 30, Nov. 8), 1884; Champaign (Sept. 1-14), Urbana (Sept. 3, Oct. 27), 1885; Centralia (Sept. 23), Champaign (Aug. 10, 21-23), Urbana (July 31, Aug. 1-9, Sept. 1), 1886; Urbana (July 31), 1888; Urbana (Sept. 2-23, Oct. 3-5), 1889; Champaign (July 23-31, Aug. 3), Farina (Sept. 19), Havana (June 13), 1894; Urbana (July 9-17), 1897; Aetna (July 11), 1905; Decatur (Nov. 4), 1928; Kappa (Aug. 14, Sept. 9), Mattoon (Sept. 10), Seymour (Oct. 30), Urbana (Sept. 8), 1929. Taken on corn, sorghum, broom corn, and grass.

APHIS MONARDAE OESTLUND

Aphis monardae Oestlund, Geological and Natural History Survey of Minnesota, Bulletin No. 4, 1887, p. 58.

Aphis monardae is here recorded from Illinois for the first time. It may be collected on the undersides of the leaves of horse mint, which it causes to curl.

Data associated with our viviparous specimens, collected on *Monarda* sp., are as follows: Carbondale (June 4), Champaign (July 15), Galena (June 26), Herod (May 29), Kankakee (June 29), Marshall (May 25), Oakwood (May 21, July 18), 1928; Flora (June 18), Urbana (June 1), 1929.

APHIS NEILLIAE OESTLUND

Aphis neilliae Oestlund, Geological and Natural History Survey of Minnesota, Bulletin No. 4, 1887, p. 59.

This species was first reported from Oak Park, Illinois, by Davis (1910e) who mentions appearance of apterous sexual forms in October.

Our observations at Urbana indicate that this species is at times extremely abundant on the undersides of the leaves and terminal portions of the new growth of nine-bark used in ornamental plantings.

Data associated with our viviparous specimens, all collected on *Physocarpus opulifolius*, are as follows: Galena (June 26), Urbana (July 26), 1928; Macomb (May 4), Urbana (April 13), 1929; Urbana (June 20, 30), 1930.

APHIS NERII FONSCOLOMBE

Aphis nerii Fonscolombe, Annales de la Société entomologique de France, Tome X, 1841, p. 179.

Aphis lutescens Monell, Bulletin of the United States Geological and Geographical Survey of the Territories, Vol. V, No. 1, January 22, 1879, Article 1, p. 23. *New synonymy*.

This species was first reported, presumably from Illinois, by Thomas (1879) as "*Aphis nerii?* Fonscol." It was later reported from the vicinity of Chicago, Illinois, by Davis (1910e) as *Aphis lutescens* Monell. The bright golden yellow abdomen and the black head, antennae, cornicles, and cauda make this one of the most conspicuous of Illinois aphids. Good descriptions and illustrations of the viviparous forms are given by Essig (1911a, b).

An examination of cotypic slides loaned to us by Professor Davis convinces us that *lutescens* Monell is the same as *Aphis nerii*.

Data associated with our viviparous specimens are as follows: Elizabethtown (Oct. 12), Pekin (June 20), 1928; Cairo (June 22), Carbondale (Sept. 28), Centralia (Sept. 28), Collinsville (Sept. 11), Elizabethtown (Sept. 27), Forsyth (Oct. 27), Jonesboro (Sept. 28), Metropolis (Sept. 27), Oakwood (Oct. 13), Urbana (Oct. 3, 29, Nov. 10), 1929. Up to the present time we have taken this form only on its summer hosts: *Gonolobus laevis*, *Asclepias curassavica*, and *Convolvulus sepium*.

APHIS NYCTALIS new species

FIGS. 137, 197, 266, 267

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.94. Head, thorax, and abdomen in live specimens essentially dark brown or almost black. In mounted specimens the colors are as follows: Head and thorax mainly dark dusky brown. Abdomen yellowish to dark brown, the lighter areas with a distinct greenish tinge; lateral portions of abdomen with segmentally arranged fuscous spots which vary in size, shape, and intensity of color; lateral patches in the vicinity of the base of the cornicles extend only around the posterior side of the cornicles; a large blotch of the same color as the lateral spots just anterior to the anal plate. Cornicles black; cauda black except for mid-dorsal region anterior to constriction; anal plate concolorous with abdomen at base, darker towards outer margin. The antennae are but slightly lighter in color than the head and are practically uniformly colored throughout, except that often extreme base of third antennal segment is lighter in color than the remaining portion of segment. The femora of the prothoracic pair of legs are yellowish at their base and ventrally for almost one-half their length, remaining portions dark brown; meso- and metathoracic legs yellowish at extreme base, and remainder dark brown; tibiae uniformly dark brown; tarsi dark brown but sometimes lighter in color than tibiae. Stigma of fore wings brownish; the veins, and posterior margin of wing where it meets anal vein, light brown; the anal vein lightly bordered with brown. The beak with basal half yellowish, apical half dusky brown.

Head and appendages.—Average width of head across eyes, .46. Antennal segments with comparative lengths as follows: III—.34 to .46, average .40; IV—.23 to .31, average .29; V—.17 to .23, average .20; VI—.07 to .14, average .11 plus .14 to .29, average .22. Secondary sensoria (Fig. 266) found on third, fourth and fifth antennal segments; sensoria on third segment appear to be about equally distributed over the entire surface of the segment, varying in number from 25 to 37 and averaging 32; fourth segment with sensoria about equally distributed throughout length but in some specimens there is a slight tendency for a grouping on one side of the segment varying in number from 12 to 20 and averaging 16; sensoria on fifth segment in a straight row, varying in number from 1 to 3; sensoria on third and fourth segments varying in size, the larger ones being unusually large; all sensoria have wide rims. The beak extending about to the coxae of the metathoracic pair of legs.

Thorax and appendages.—Prothorax with a pair of well developed lateral tubercles. Stigma of fore wings sharply pointed at apex. Position of second fork of media somewhat variable, but always nearer to the apex of the wing than to the first fork. Hind tarsi, exclusive of claws, about one-half the length of the cornicles.

Abdomen.—The first segment of the abdomen and the segment posterior to the cornicles have lateral tubercles, which may be easily overlooked because they are not well developed. Cornicles (Fig. 137) with straight, sides, tapering but slightly towards apex, flange at apex poorly developed, strongly imbricated throughout their length, in length either equal to or subequal to the length of the fourth antennal segment and averaging about .27. Cauda (Fig. 197) about equal to the length of the fifth antennal segment and averaging about .19, constricted in the middle; with four to five hairs on a side, the two terminal pairs being very strongly inwardly bent.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.87. Head and thorax mainly dark dusky brown. Abdomen yellowish-brown with a greenish tinge, particularly greenish on lateral portions. Abdomen free from lateral patches anterior to cornicles, but there is a small brownish patch directly posterior to the cornicles; posterior extremity of the abdomen, cornicles, cauda (posterior to constriction), and patch directly anterior to anal plate are dark brownish, almost black. First and second antennal segments concolorous with head; basal half of third antennal segment lighter in color than remaining half, which is brown; remaining antennal segments uniformly brownish. Legs similar in color to those of the alate viviparous female.

Head and appendages.—Average width of head across eyes, .47. Antennal segments with comparative lengths as follows: III—.29 to .41, average .35; IV—.23 to .33, average .27; V—.13 to .23, average .19; VI—.11 to .14, average .12 plus .19 to .29, average .23. The secondary sensoria of this species present an interesting study in variation: two specimens, apparently normal in every other way, have no secondary sensoria; many other specimens, also apparently normal apterous females, not presenting the appearance of alate individuals in which the development of the wings has been arrested, have secondary sensoria on the third, fourth, and fifth antennal segments (Fig. 267). Other evidence that these female specimens having secondary sensoria are not potentially alate viviparous females is provided by the peculiar arrangement of the sensoria, which is entirely unlike that of the alate viviparous female and utterly unlike that of any *Aphis* species now known to the writers. The sensoria, when present, are distributed on the segments as follows: third segment 2-9, average 5; fourth segment 8-17, average 10; fifth segment 1-2, generally 1. The sensoria on the third segment, although scattered, are limited to the apical one-third of the segment—a very unusual occurrence outside of the genus *Cinara*; on the fourth segment they cover a little more than one side of the segment but extend from end to end; and on the fifth segment the sensoria appear to have no fixed position.

Thorax and abdomen.—Similar to alate viviparous female.

Holotype.—Alate viviparous female; Cairo, Illinois, June 2, 1928, on *Senecio glabellus*, (Frison and Hottes). Slide No. 10338. *Morphotype.*—Apterous viviparous female; same data as for holotype. Slide No. 10339. *Paratypes.*—Twenty-four slides of alate and apterous viviparous females, pupae and nymphs; all collected at Cairo, Illinois, on *Senecio glabellus*, June 2, 1928, and June 22, 1929, (Frison and Hottes). Slides Nos. 10340-10357 and others unnumbered.

Superficially this new species is suggestive of *Aphis rumicis* L. It differs, however, as follows: the apterous viviparous female normally has secondary sensoria on the third and fourth antennal segments; in alate viviparous females the secondary sensoria are more numerous on the third and fourth antennal segments and are invariably present on the fifth antennal segment; and there is no pulverulent matter on the dorsum of live specimens. It differs from *Aphis senecionis* Williams, a closely related species, of which cotypic slides were kindly loaned by the U. S. National Museum, in having a longer fourth antennal segment and in the larger number of sensoria on the third, fourth, and fifth antennal segments. It may be separated from *A. luridis* and *A. signatis* by characters given in the key.

This aphid congregates on the main flower stalks, particularly near the flower heads. It is easy to detect because its color contrasts with that of its host plant.

APHIS OESTLUNDI GILLETTE

Aphis oestlundi Gillette, Annals of the Entomological Society of America, Vol. XX, No. 3, September, 1927, p. 345.

This species was probably first reported from the state by Davis (1910e) as *Aphis ocnotherae* Oestlund. *A. oestlundi* is almost impossible to separate from *A. gossypii* on the basis of morphological or color characters, but appears to be distinct biologically, having the evening primrose (*Ocnothera biennis*) as its primary host. We have tried without success to transfer spring migrants from *Ocnothera* to squash plants in the insectary so that in spite of a lack of visible differences, it seems necessary to consider the species on *Ocnothera* distinct from *A. gossypii*.

In Illinois we have found in October the sexual forms of *oestlundi* on the undersides of leaves of *Ocnothera* located near the ground. Since they have never been described, the following descriptions are given. Both sexes are apterous and resemble closely the brief descriptions of the sexual forms of *gossypii* given by Patch.

APTEROUS MALE

Length from vertex to tip of anal plate, .77. Color of head, including antennae, brown; thorax yellowish green with pleurae and lateral and anterior areas of dorsum brownish; abdomen yellowish green with the cornicles and external genitalia brown. Legs, with coxae, most of femora, apices of tibiae, and tarsi, brown; trochanters, bases of femora, and most of tibiae, luteous. Width of head across eyes 27. Antennae imbricated, comparative lengths as follows: III—19, IV—13, V—14, VI—.07 plus .21. Secondary sensoria distributed at random over segments as follows: III—13 to 19, average 17; IV—7 to 10, average 8; V—3 to 8, average 6. Third and fourth segments often fused. Cornicles and cauda as in other forms, respectively .13 and .09 in length.

APTEROUS OVIPAROUS FEMALE

Length from vertex to tip of anal plate, 1.10. Color deep bright green, with the head, antennae, cornicles, anal plate, apices of tibiae, and tarsi, brownish. Width of head across eyes .29. Antennae only five-segmented, imbricated, the comparative lengths as follows: III—.20, IV—.10, V—.09 plus .21. Secondary sensoria lacking, fourth segment with a small circular primary sensorium near apex, fifth with one at base of terminal filament. Cornicles and cauda as in other forms, respectively .17 and .09 in length. Hind tibiae .43 in length, robust, slightly swollen and tuberculate, with distinct setae; sensoria, if present, small and very inconspicuous.

Allotype.—Apterous male; Slide No. 9712, Oakwood, Illinois, October 22, 1930, on *Oenothera*. (Frison and Ross). On slide with two apterous males.

Morphotype.—Apterous oviparous female; Slide No. 9716, same data as allotype. On slide with two oviparous females.

Data associated with our viviparous specimens, which were all taken on *Oenothera biennis*, are as follows: Carbondale (June 4), Galena (June 26), Havana (June 21), Herod (May 31), Marshall (May 25), Pekin (June 20), Quincy (June 6), Shawneetown (May 27), Starved Rock State Park (June 12), 1928; Columbia (Sept. 11), Monticello (May 24), Peoria (May 4), Springfield (May 2), Urbana (Aug. 13), 1929; Garden Prairie (May 15), Oakwood (Oct. 22), 1930. Sexual forms and mating pairs, also on *Oenothera*, at Muncie on October 22, 1930.

APHIS PADI LINNAEUS

FIG. 25, 210

Aphis padi Linnaeus, 1758, Systema Naturae, Editio Decima, p. 451.

This species is here recorded from Illinois for the first time. Our observations indicate that it has possibilities of doing serious injury to peach and plum trees, the leaves of which it causes to curl (Fig. 25), and it has been recorded by Smith (1921) as the most important plant louse affecting plum trees in Idaho. According to Theobald (1927), who presents a good account of the habits and structural characters of this species, it over-winters on plum and migrates to numerous plants during the summer months. Our records from Illinois indicate that the life cycle is about the same in Illinois as in Europe. This species has heretofore been known under the name of *Aphis helichrysi*; we follow Theobald in considering it a synonym of *padi*.

Our data associated with our viviparous specimens are as follows: Bondville (Sept. 26), Evanston (Feb. 19), Urbana (Sept. 3, Oct 7, 9), 1929; Evanston (March 12), 1930. Oviparous females were found at Bondville on September 26, 1929. Our material was collected in fall from *Prunus* and in winter in greenhouses on *Scenecio cruentus* and *Myosotis*.

APHIS PERSICAE-NIGER SMITH

Aphis persicae-niger Smith, Entomologica Americana, Vol. VI, No. 6, Brooklyn, June, 1890, p. 101.

The black peach aphid has been previously reported as a common pest of peach in Illinois by Davis (1910c). According to various writers, it over-winters on the roots of peach and migrates to the leaves and tender shoots in spring. The alate and apterous viviparous

females have been described and figured by Smith (1890) and Gillette (1908b). The sexual forms are unknown.

We have records of this species only from Carbondale (May 14) and Herod (May 31), 1928, both times upon *Prunus Persica*.



Fig. 25. Curling of leaves of peach, *Prunus Persica*, caused by *Aphis padi* Linnaeus; Urbana, Oct. 7, 1929.

APHIS POMI DEGEER

FIG. 14

Aphis pomi DeGeer, Mémoires pour servir à l'histoire des Insectes, Tome III, 1773, p. 53, Pl. 3, fig. 20.

Because the green apple aphid is widely distributed throughout the world and is often a serious pest of apples, it has been the subject of many extensive investigations. Until rather recent years, it was known as *A. mali* Fabricius, but at the present time the prior name of *pomi* is in use. The recognized presence of *pomi* in Illinois certainly dates back to Thomas (1879), and it is possible that some of the Illinois material recorded by Fitch (1855) belonged to this species. Davis (1910e) recorded it from Illinois as "common and often destructive pest of the apple."

The most complete account of the structural features and biology of this aphid is that by Baker and Turner (1916), and their summary of it is here reproduced:

"The life history of *Aphis pomi* may be briefly outlined as follows: The egg is laid upon the tender twigs of the apple, though occasionally it is laid upon the bark of the older twigs. It is light yellow when laid, but later changes to shining black. Development for a few days is very rapid, after which the egg rests for the winter. When the revolution of the embryo is completed in the spring, an increase in temperature will cause the egg to hatch. Before this revolution a high temperature only tends to destroy it. Early in April the egg hatches by a uniform splitting over the insect's head.

"The stem mother is wingless and becomes mature in about 10 days. She produces summer forms, both winged and wingless, with the winged ones predominating. There are 9 to 17 generations of the summer forms at Vienna, Va. After the second generation the wingless forms always outnumber the others, but winged forms may occur in every generation. They become rare toward the end of the season. On the other hand, a wingless line may be carried from the stem mother to the egg. A third form, the intermediate, may occur throughout the summer.

"The wingless sexes begin to appear about the 1st of September. They occur in all generations, from the eleventh to the nineteenth, inclusive, and probably also in the ninth and tenth.

"The summer wingless forms and the oviparous females, which live longer than the males, remain on the trees at Vienna, Va., until the leaves drop, usually about the middle to the last of November.

"Mating commences toward the close of September, one male usually serving more than one female. Both sexes feed. The oviparous female may lay infertile eggs if not reached by a male, and these eggs do not become black. The fertile egg develops to the resting stage before the first heavy frosts; otherwise it may be winterkilled and will not hatch to a stem mother the following spring."

The bulletins of Gillette and Taylor (1908), Matheson (1919), Hodgkiss (1919), and Patch (1923a) contain much additional data of interest to the general student of aphids. Control measures are fully dealt with in numerous experiment station publications and general entomological texts (Metcalf and Flint, 1928).

Within recent years the opinion has been advanced that *A. pomi* DeGeer and *A. spiraccola* Patch (= *spiracella* of American authors) were the same species. Patch (1923a and 1929) has concluded that the two forms are very closely related and "originated from a common ancestor and that the diverging forms have not yet gone far on their separate ways," and has shown that *Spiraea* is the over-wintering host in Maine for a form (*spiraccola*) whose summer generations frequent a great variety of plants. Likewise, the other form (*pomi*) finds apple an "all year host," although it may have summer generations on other plants and can be colonized on *Spiraea*. In this paper we have considered the two as separate species because of the following: (1) the presence in the south of an aphid attacking citrus which is of much economic importance and clearly of the *spiraccola* race; (2) the fact that the tibiae of the oviparous females of *spiraccola* are swollen and thickly studded with sensoria, whereas in *pomi* on apple they are comparatively slender and with but few sensoria; (3) the males of *spiraccola*, as far as known, are winged and the males of *pomi* apterous.

Data associated with our specimens are as follows: Normal (Aug. 24), 1883; Anna (Aug. 13), 1884; Normal (Aug. 7), 1885; Urbana (July 13), 1897; Antioch (June 15), Bement (July 17), Carbondale (June 4), Centralia (Aug. 6), Champaign (June 21), East Peoria (July 22), Elizabethtown (May 29, 31), Galena (June 26), Kankakee (June 29), LeRoy (June 20), Metropolis (May 31, June 1), Mt. Carmel (May 26), Oregon (June 28), Rock Island (June 24), Shawneetown (May 27), St. Joseph (June 17), Union County (June 4), Urbana (May 22-24, June 6, 11, 14, 23), 1928; Beach (June 13), Decatur (June 12), Homer (June 17), Mitchell (June 25), Newton (June 17), Rock Island (July 7), Waukegan (July 13), 1929; Effingham (Nov. 13), 1930. Material collected on *Crataegus* sp., *Prunus domestica*, *Prunus japonica*, *Prunus virginiana*, *Pyrus americana*, *Pyrus communis*, and *Pyrus Malus*.

APHIS PULCHELLA new species

FIGS. 141, 276

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.36. Head, thorax, and abdomen, including cornicles, cauda, and anal plate, dark brown in mounted specimens. In life the body of this species is distinctly bluish-green and somewhat pulverulent. First and second antennal segments concolorous with head or lighter; flagellum entirely yellowish brown. Front and middle femora brown, paler at base; hind femora with extreme base light yellowish, remainder dark brown; tibiae light yellowish, with dark brown band at apex equal to length of tarsi; tarsi dark brown. Beak yellowish brown, extreme tip blackish. Stigma and veins light yellowish brown, posterior margin of front wings in vicinity of anal vein light brown.

Head and appendages.—Average width of head across eyes, .43. Antennal segments with the following comparative lengths: III—.24 to .36, average .32; IV—.23 to .30, average .26; V—.23 to .30, average .27; VI—.09 to .14, average .13 plus .16 to .30, average .26. Secondary sensoria (Fig. 276) limited to third antennal segment, arranged in a straight row and numbering from 5 to 7, averaging 6. Antennae with very sparse, short, fine hair; all segments imbricated. Primary sensoria of fifth and sixth segments subequal. Beak extending to, or a little beyond, the mesothoracic coxae.

Thorax and appendages.—Prothorax with a pair of peg-like lateral tubercles, which are only slightly larger than the ocular tubercles. Second fork of media closer to margin of wing than to first fork. Hair on tibiae short, about half the width of tibiae, spine-like and comparatively sparse.

Abdomen.—First abdominal segment and segment posterior to cornicles with small, lateral tubercles. Cornicles (Fig. 141) averaging .17 in length, straight, neither constricted nor with a distinct flange at apex, the apical third smooth, the remaining portion imbricated. Cauda .16 in length, constricted just anterior to tip of anal plate, with from 4 to 5 pairs of lateral hairs, the apical pair strongly incurved. Anal plate normal.

APTEROUS VIVIPAROUS FEMALE (VIRGOGENIA)

Size and general color.—Average length from vertex to tip of anal plate, 1.63. General color as in alate viviparous female, differing in having the appendages a slightly deeper shade of brown.

Head and appendages.—Average width of head across eyes, .43. Antennal segments with comparative lengths as follows: III—.21 to .27, average .30; IV—.11 to .29, average .21; V—.13 to .24, average .21; VI—.10 to .13, average .11 plus .16 to .27, average .22. Secondary sensoria absent. Primary sensorium on sixth antennal segment with a group of much smaller marginal sensoria on one side. Antennae imbricated, with comparatively few, fine, short hairs. Beak extending slightly beyond mesothoracic coxae.

Thorax and appendages.—Prothorax with a pair of lateral tubercles.

Abdomen.—First abdominal segment and segment posterior to cornicles with small lateral tubercles. Cornicles averaging .19 in length, in shape

similar to those of alate viviparous female. Cauda averaging .19 in length, slightly constricted beyond the anal plate, and with 6 to 7 pairs of lateral hairs, the terminal ones incurved.

ALATE MALE

Size and general color.—Average length from vertex to tip of anal plate, 1.17. Color essentially as for alate viviparous female except as follows: antennae being darker; first three segments almost concolorous with head, the remainder of antennal segments decreasing in intensity towards apex, the extreme bases of all segments of flagellum luteous. Genital organs dark brown.

Head and appendages.—Average width of head across eyes, .43. Antennal segments with the following comparative lengths: III—.26 to .39, average .33; IV—.24 to .33, average .28; V—.23 to .29, average .25; VI—.10 to .13, average .12 plus .27 to .33, average .29. Secondary sensoria numerous on third, fourth, and fifth segments, very much crowded on one side (hence difficult to count), distributed as follows: III—22 to 33, average 29; IV—17 to 22, average 20; V—10 to 14, average 11. Primary sensorium of sixth antennal segment with a group of small marginal sensoria on one side. Beak reaches to, or just beyond, the mesothoracic coxae.

Thorax and appendages.—Prothorax with a pair of lateral tubercles. Venation of wings as in alate viviparous female.

Abdomen.—Cornicles averaging .11 in length, slightly imbricated with the flange very poorly developed. Cauda averaging .14 in length, indistinctly constricted near base, and with from 4 to 5 hairs on each side.

APTEROUS OVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.52. Head, thorax, and abdomen, including cornicles, cauda, and anal plate, reddish brown. Antennae entirely yellowish-brown. Beak yellowish-brown, tipped with darker brown. Femora reddish-brown; tibiae slightly lighter except their apices which are tipped with dusky-brown; tarsi dusky-brown.

Head and appendages.—Average width of head across eyes, .43. Antennal segments with the following comparative lengths: III—.21 to .24, average .23; IV—.17 to .26, average .21; V—.21 to .24, average .22; VI—.11 to .13, average .12 plus .21 to .27, average .25. Antennae without secondary sensoria; primary sensorium on sixth segment with a group of several marginal sensoria; all antennal segments imbricated. Beak reaching to meta-thoracic coxae. Hind tibiae considerably swollen except for apical portion; with numerous sensoria, one tibia with approximately 90.

Thorax and appendages.—Prothorax with a pair of small lateral tubercles.

Abdomen.—First abdominal segment and segment posterior to cornicles with small lateral tubercles. Cornicles about .16 long, distinctly imbricated at base, less distinctly at apex, with very poorly developed flange. Cauda about .20 long, only slightly constricted, and with 6 to 7 pairs of lateral hairs, the terminal ones incurved. Anal plate normal.

Holotype.—Alate viviparous female; Beach, Illinois, July 13, 1929, on *Euphorbia* sp., (Frison and Hottes). On slide with alate viviparous female and nymphs. Slide No. 10404. *Allotype.*—Alate male; Centralia, Illinois, September 26, 1929, on *Euphorbia* sp., (Frison and Hottes). On slide with apterous viviparous females and apterous oviparous female. Slide No. 10405. *Morphotype.*—Apterous viviparous female; same data as for holotype. On slide with alate viviparous females, apterous viviparous female, and pupa. Slide No. 10406. *Morphotype.*—Apterous oviparous female; same data as allotype. On slide with male, apterous oviparous female, and apterous viviparous females. Slide No. 10407. *Paratypes.*—Fifty-one slides, containing alate and apterous viviparous females, alate males, apterous oviparous females, pupae, and nymphs, all with same data as holotype or allotype; and five slides, Kankakee, Ill., September 19, 1930, on *Euphorbia*. Slides Nos. 10408-10440 and others unnumbered.

APHIS RHAMNI FONSCOLOMBE

Aphis rhamni Fonscolombe, Annales de la Société Entomologique de France, Tome X, 1841, p. 177.

This aphid is here reported from Illinois for the first time. It has been studied very thoroughly by Patch (1924) under the name of *A. abbreviata* Patch, with especial reference to its seasonal migration. Theobald (1927), also, describes the forms of this species and gives its synonymy. The winter and spring host is buckthorn (*Rhamnus*), from which the spring migrants disperse to a large number of summer hosts. The sexual forms mate on the buckthorn in fall, and the over-wintering eggs are deposited on this host.

Data associated with our viviparous specimens are as follows: Galena (June 26), Quincy (June 6), Havana (June 21), 1928; Homer (June 29), Kappa (Sept. 9-22, Oct. 1-3), Starved Rock State Park (Aug. 14), 1929; Kappa (May 7), 1930. Males and oviparous females taken at Kappa (Oct. 3), 1929, on *Rhamnus lanceolata*. Viviparous specimens taken on *Amsonia Tabernaemontana*, *Hibiscus* sp., *Nepeta cataria*, and *Rhamnus lanceolata*.

APHIS ROCIADAE COCKERELL

FIG. 191

Aphis rociadae Cockerell, Transactions of the American Entomological Society, Vol. XXIX, 1903, p. 115.

Aphis rociadae is here recorded from Illinois for the first time. When abundant on its host, larkspur, it causes severe leaf curling and encrusts the flower stalks. The sexes are produced in Illinois in May, so that the larger part of the year is passed in the egg stage. This seems to be an adaptation to the short period of growth of its host. The hairs of this species are somewhat enlarged apically—a rather peculiar characteristic for a species belonging to this genus. Davis (1919) has described all forms.

Data associated with our viviparous specimens are as follows: Evans-ton (July 15), 1929; Decatur (May 12), Elk Grove (June 7), Kappa (May 7, 13), 1930. Oviparous females collected at Kappa, May 13, 1930. All specimens collected on *Delphinium tricornis*.

APHIS ROSEA (BAKER)

FIG. 139

Anuraphis roseus Baker, Canadian Entomologist, Vol. LIII, No. 4, April, 1921, p. 95.

The rosy apple aphid in many sections of the country is one of the most injurious plant lice feeding upon the leaves of apple. At times, when the infestation is particularly heavy, the fruit is attacked and characteristic deformed "aphid apples" produced. Outbreaks of this aphid are fortunately scarce in Illinois.

This species has been previously reported from Illinois by Davis (1910e) under the name of *A. sorbi* Kaltenbach as a "rather uncommon species, which I have taken only in southern Illinois." Baker and Turner (1916), under the name of *A. malifoliae* Fitch, have

given a complete account of its general biology and descriptions of its various forms. Their studies show that it migrates between apple and plantain, the latter plant serving as the summer host.

Data associated with our viviparous specimens, all collected on *Pyrus Malus* or *Plantago* sp., are as follows: Marshall (May 25), Murphysboro (June 22), Shawneetown (May 27), Union County (June 5), and Urbana (May 23, 28, June 6), 1928; Oakwood (Oct. 22), 1930.

APHIS RUBICOLA OESTLUND

Aphis rubicola Oestlund, Geological and Natural History Survey of Minnesota, Bulletin No. 4, 1887, p. 60.

This species is now recorded from Illinois for the first time, and our observations indicate that it is not common. The name of *A. rubicola* Oestlund (1887) was thought by Hottes (1930a) to be preoccupied by *rubicola* Haldeman (1844). Haldeman's specific name referring to a different, red-colored species, however, was spelled *rubecula* in the original description, as photostat copy shows, and hence the name of *rubicola* Oestlund is still available. The best account of the life history of this raspberry aphid is that by Winters (1929b), whose studies have shown that *A. rubiphila* Patch is a synonym of *rubicola* Oestlund.

Data associated with our specimens, all taken on raspberry (*Rubus* sp.), are as follows: Kansas (June 17), Macomb (May 4), 1929.

APHIS RUMICIS LINNAEUS

FIGS. 26, 28, 80

Aphis rumicis Linnaeus, Systema Naturae, Editio Decima, 1758, p. 451.

This species (Fig. 26) is the most common dark-colored aphid found in Illinois. Its polyphagous habits make it of special importance as a pest in home gardens and greenhouses. It may be that this plant louse, supposed to be a native of Eurasia, was found in Illinois by Thomas (1879) but he gives no definite data regarding its occurrence. There are, however, specimens in the Survey collection proving its existence in the state at least as early as 1884. Gillette (1910) was apparently the first to record it from Illinois. The biology of this insect has been studied from various angles by many investigators. These studies have shown it to be a somewhat variable species, attacking over two hundred plants, and over-wintering on *Chenopodium*, *Evonymus*, *Rumex*, and *Viburnum*. Good technical descriptions of all its forms and much other summarized information concerning its biology can be found in the papers of Davidson (1921), Horsfall (1925), and Theobald (1927).

Data associated with our viviparous specimens are as follows: Normal (May 9, June 2), 1884; Normal (May 24), Urbana (April 28), 1887; Albion (May 26), Antioch (June 15), Bement (July 7), Cairo (June 2), Carbondale (June 4), Champaign (May 19), East Peoria (July 22), Elizabethtown (May 29), Galena (July 27), Golconda (Oct. 13), Havana (June 21), Kankakee (June 29), LeRoy (June 20), Mattoon (June 10), Metropolis (June 1), Muncie (Oct. 6), Oregon (June 27), Pekin (June 20), Quincy (June



Fig. 26. One of the most common aphids in Illinois, *Aphis rumicis* Linnaeus, on dock, *Rumex crispus*; Urbana, June 10, 1929.

6), Rock Island (June 23), Shawneetown (May 27), Urbana (May 14, 17, 22, 23, 28, June 6-7, July 7, 23, Sept. 26, Oct. 19, Dec. 5), 1928; Arlington Heights (July 3), Beach (July 13), Decatur (June 12), DesPlaines (July 10), Elizabethtown (June 20), Grayville (June 19), Herod (June 21), Homer (June 17), Kankakee (July 14), Lewistown (May 4), Macomb (May 4), Melrose Park (July 12), Oakwood (May 17, Sept. 22), Oregon (July 9), Putnam (May 5), Springfield (May 2), Starved Rock State Park (July 5, 6, Urbana (April 18, May 1, June 28), Waukegan (July 13), Woodford (July 5), 1929; Effingham (Nov. 13), Urbana (Oct. 20, 24), 1930. Sexual forms taken at Effingham (Nov. 13), and Urbana (Oct. 20-24), 1930, on *Viburnum* sp. Mating pair taken at Urbana (Oct. 20), 1930. What are apparently stem mothers were collected in early May on *Evonymus*, *Ligustrum*, *Rumex*, and *Viburnum*. We have not given a complete list of food plants upon which we have found this aphid, since it attacks almost any plant.

APHIS RUMICIS VAR. GERARDIAE (THOMAS)

Siphonophora gerardiae Thomas, Eighth Report of the State Entomologist on the Noxious and Beneficial Insects of the State of Illinois, 1879, p. 65.

Colonies of blackish aphids which agree very well with Thomas' original description of *Siphonophora gerardiae* have been collected on *Gerardia pedicularia* at Tremont, Indiana, and at Kankakee and Oakwood, Illinois, in September and October. Thomas' material was collected on "*Gerardia tenuifolia*" at Carbondale, Illinois, during the latter part of September. This species has not been reported since the time of its original description. Although our material is closely related to *A. rumicis* L., agreeing well in color and general proportions, we have preserved the name of *gerardiae* as a varietal name. This is because the cornicles average longer and the secondary sensoria are much more numerous on the fourth (6-16) and fifth antennal segments than in *rumicis* and its variations as defined by David-son (1921), Horsfall (1925), and Theobald (1927).

Possibly future investigations will prove that the material reported upon here is entitled to specific recognition. If not, the concept of *rumicis* must be broadened. That we are here dealing with the form named as *gerardiae* by Thomas seems certain to us.

Data associated with our viviparous specimens from Illinois are as follows: Kankakee (Sept. 19) and Oakwood (Oct. 5), 1930. All material collected on *Gerardia pedicularia*.

APHIS SALICETI KALTENBACH

Aphis saliceti Kaltenbach, Monographie der Familien der Pflanzenläuse, I Theil, Aachen, 1843, p. 103.

This species was redescribed by Thomas (1879) as new by the name of *Siphonophora salicicola* from specimens sent to him from Peoria, Illinois. Although we have not collected it in southern Illinois, we believe it will eventually be found to be distributed throughout the state. Davis (1910e) reports it as common in Illinois. For descriptions of all forms and further information, the reader is referred to the papers by Gillette and Bragg (1918) and Theobald (1927). This aphid is peculiar in that the sexual forms are produced during spring or early summer, as is the case with *A. rociadue*

Cockerell. According to all who have studied this species, it does not have an alternate host.

Specimens of *S. salicicola* Thomas (Vial 61—Thomas) were included among the cotypic material recently recovered and have been mounted in damar balsam. This slide (8178) contains portions of alate viviparous females. The data associated with this cotypic slide are as follows: Peoria, Illinois, June 28, 1877, on *Salix*, collected by A. E. Smith.

Data associated with our viviparous specimens are as follows: Champaign (May 16, 23), Kankakee (June 29), Oregon (June 27), Starved Rock State Park (June 12), 1928; Springfield (May 2), Starved Rock State Park (July 6), 1929; Urbana (May 6), 1930. All material collected on *Salix* sp.

APHIS SAMBUCIFOLIAE FITCH

Aphis sambucifoliae Fitch, Fourth Annual Report of the Regents of the University, on the Condition of the State Cabinet of Natural History, State of New York, January 14, 1851, p. 66.

This species was first reported from Illinois by Thomas (1879) as *Aphis sambuci* Linn. Thomas questionably considered *Aphis sambucifoliae* Fitch as a synonym of *A. sambuci*. It was again reported by Davis (1910e) as common on "ornamental elder in the Chicago parks." Theobald (1927) has recently considered this species a synonym of *A. sambuci*, but we are holding *sambucifoliae* as distinct, largely on the basis of additional secondary sensoria on the fourth and fifth antennal segments. Sanborn (1904) has given fairly complete descriptions of the viviparous forms. Davis mentions the sexual forms on elder in September and October in northern Illinois.

We have never taken this species on elder growing in the open; it seemingly shows a decided preference for hosts growing in shaded situations.

Data associated with our viviparous specimens are as follows: Urbana (June 13, July 23, Oct. 18), 1928; Grayville (June 19), Jonesboro (June 23), Rock Island (July 9), Starved Rock State Park (July 5), Urbana (April 8, Sept. 23), 1929; Effingham (Nov. 13), Urbana (Oct. 13, 20 and 24), Vandalia (Nov. 14), 1930. Oviparous females have been taken as follows: Effingham (Nov. 13), Urbana (Oct. 13-24), and Vandalia (Nov. 14), 1930. All specimens from *Sambucus canadensis*.

APHIS SANBORNII PATCH

Aphis sanbornii Patch, Maine Agricultural Experiment Station, Bulletin 225, February, 1914, p. 52, figs. 8, 9, 10, 11, 29, 35.

The green gooseberry aphid, now recorded from Illinois for the first time, is a fairly common species on gooseberry in the north-central portion of the state. We have never found it doing conspicuous injury to its host since it usually attacks only the terminal leaves or a few shoots on a bush. Our determination of this species has been verified by Dr. Patch, who has described the species and further reported on its biology (1927), stating that it alternates between *Ribes* and *Epilobium*.

Data associated with our viviparous specimens are as follows: Galena (June 26) Oakwood (July 18), Starved Rock State Park (June 12, 13), 1928; El Paso (July 5), Kansas (June 17), 1929; Rock Island (June 3), 1930. All specimens collected on *Ribes Grossularia* and *Ribes nigrum*.

APHIS SIGNATIS new species

FIG. 265

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.57. Head and thorax dark brown; abdomen dark green except for some dark brown, lateral, segmentally arranged patches. Cauda, anal plate, and cornicles greenish-brown to dark brown. Dark lateral patches at base of cornicles more or less confluent posteriorly. Antennae with two basal segments concolorous with head, flagellum a uniform, slightly lighter brown. Front femora with base and ventral margin yellow, apical and dorsal portions light brown; middle and hind femora yellowish at extreme base, the remainder dark brown. Tibiae yellowish to light brown, slightly darker at base, and with a distinct dark brown band at apex, not quite as wide as twice length of tarsi. Tarsi brown. Stigma, costa, veins, and hind margin of wing at apex of anal vein, brown. Beak yellowish-brown, its extreme apex dark brown.

Head and appendages.—Average width of head across eyes, .46. Antennal segments with the following comparative lengths: III—.39 to .47, average .43; IV—.19 to .24, average .21; V—.17 to .21, average .19; VI—.09 to .10, average .09 plus .16 to .29, average .22. Secondary sensoria (Fig. 265) present on third, fourth, and fifth segments, distributed as follows: III—38 to 43, average 41; IV—7 to 15, average 11; V—1 to 8, average 4. Third segment, except extreme base, thickly dotted with sensoria, tuberculate in appearance; fourth and fifth segments with scattered sensoria, those on the fifth usually confined to one side; sensoria with rather wide rims. Beak extending to middle of mesothoracic coxae.

Thorax and appendages.—Prothorax with a pair of well-developed, peg-like, lateral tubercles. Second segment of hind tarsus subequal to one-half the length of the cornicles. Second fork of media closer to margin of wing than to first fork, distance from first to second fork usually twice the distance from second fork to margin of wing.

Abdomen.—First segment and segment posterior to cornicles with lateral tubercles, the tubercles posterior to cornicles small and difficult to locate. Cornicles subequal to three times the length of the base of sixth antennal segment, middle portion usually slightly narrowed, otherwise of almost uniform thickness throughout, strongly imbricated, flange present but poorly developed. Anal plate broadly rounded. Cauda subequal to three-quarters length of cornicle, constricted in the middle, with four to five hairs on each side, the terminal hairs strongly incurved.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.79. Head, including two basal segments of antennae, prothorax, anterior portion of mesothorax, and pleurae of meso- and metathorax, chocolate brown; remainder of thorax and abdomen, except brown patch at base of cornicles, dark green. Cornicles, cauda, and anal plate brown to dark greenish-brown. Flagellum of antennae varying in color; younger specimens usually with the third and most of the fourth antennal segment yellowish, the apical portion shading to dark brown; older specimens sometimes with only the basal half of the third antennal segment yellowish, the remainder dark brown. Legs and beak essentially as in the alate viviparous female.

Head and appendages.—Average width of head across eyes, .44. Antennal segments with comparative lengths as follows: III—.33 to .43, average .39; IV—.17 to .21, average .18; V—.16 to .20, average .19; VI—.09 to .11, average .11 plus .21 to .29, average .25. Secondary sensoria absent. Beak extending to metathoracic coxae.

Thorax and Abdomen.—Prothorax with a pair of well-developed lateral tubercles. Tarsi, exclusive of claws, equal to half length of cornicles. First segment of abdomen and segment posterior to cornicles with a pair of lateral

tubercles. Cornicles subequal in length to the terminal process of the sixth antennal segment, usually straight, sometimes slightly constricted as in the alate viviparous female. Cauda more than half as long as the cornicles.

Holotype.—Alate viviparous female; Urbana, Illinois, May 22, 1929, on *Zizia* sp., probably *Z. aurea*, (Frison and Ross). On slide with alate viviparous female, apterous viviparous females, and pupae. Slide No. 10396. *Morphotype*.—Apterous viviparous female; same data as holotype. On slide with alate viviparous female, pupae, and nymphs. Slide No. 10397. *Paratypes*.—Thirty-three slides containing alate and apterous viviparous females, pupae, nymphs, collected in Illinois, by T. H. Frison, F. C. Hottes, H. H. Ross, and C. O. Mohr, on *Zizia aurea*, *Zizia* sp., *Angelica* sp., and *Sanicula* sp. The localities and dates are as follows: Channel Lake, Antioch (June 15), Herod (May 29), 1928; and Urbana (May 22), 1929; Charleston (May 31), and Homer (May 29), 1931. Slides Nos. 10398-10403 and 10881-10898, and seven others unnumbered.

This species resembles somewhat in color and structure *Aphis sambucifoliae* Fitch, from which it differs in having shorter, feebly constricted cornicles, fewer tubercles on the abdomen, and a peg-like prothoracic tubercle. It may be separated from *A. luridis* and *A. nyctalis* by characters given in the key.

APHIS SOLIDAGINIFOLIAE WILLIAMS

FIG. 27

Aphis solidaginifoliae Williams, University Studies, University of Nebraska, Vol. X, No. 2, March, 1911, p. 58.

This species has not been previously recorded from Illinois. Although we have collected it at only four localities, it is probably more widely distributed than our records indicate. It is peculiar among most members of the genus *Aphis* in that it causes the leaves of goldenrod (*Solidago* sp.) to fold longitudinally and become pod-like (Fig. 27). Since these folded leaves still retain their normal green color, infested plants are apt to be overlooked. The body of this species has long, somewhat knobbed hairs. The viviparous females have been described by Davis (1911c). The oviparous females formed the basis for the original description.

Data associated with our viviparous specimens are as follows: Danville (Aug. 4), Muncie (Oct. 6), 1928; Rock Island (July 7), Urbana (Aug. 21), 1929. Oviparous females were collected at Muncie, October 6, 1928.

APHIS SPIRAECOLA PATCH

Aphis spiraeella Schouteden, Gillette, Journal of Economic Entomology, Vol. 3, No. 5, October, 1910, p. 404. Misidentification.

Aphis spiraeicola Patch, Maine Agricultural Experiment Station, Bulletin 233, November, 1914, p. 270.

This species is very closely related to *A. pomi* and has been considered by some writers as identical. Our reasons for holding it as distinct have already been given (see *pomi*). The articles by Patch (1923a and 1929), previously cited, show that *spiraeicola* over-winters on *Spiraea* in Maine and has a large number of summer hosts.

This aphid is referred to in the southern states as the "citrus aphid" and is of considerable economic importance. It is a pest on

Spiraea used in ornamental plantings in all parts of Illinois. Davis (1910e) records it from Illinois by the name of "*spiracella* Schout.??" and doubts its identity with the European species. He also describes the viviparous females and mentions the swollen tibiae bearing numerous sensoria.



Fig. 27. Pseudo-galls on leaves of golden rod (*Solidago*), caused by *Aphis solidaginifoliae* Williams. Normal foliage on right and infected foliage on left; Seymour, Aug. 22, 1929.

Data associated with our viviparous specimens are as follows: Berwyn (June 14), Cairo (June 3), Carbondale (June 4), Centralia (Aug. 6), Champaign (May 21), Elizabethtown (May 29, 31), Galena (June 26), Havana (June 22), Kankakee (June 29), LeRoy (June 20), Marshall (May 25), Metropolis (May 31, June 1), Mt. Carmel (May 26), Muncie (Oct. 6), Oregon (June 27, 28), Ottawa (June 14), Pekin (June 20, July 22), Quincy (June 6), Rock Island (June 22), Shawneetown (May 27), St. Joseph (June 17),

Urbana (May 22, 29, June 7, July 10, 26), 1928; Alton (June 25), Decatur (June 12), Edwardsville (Sept. 11), Grayville (June 19), Jerseyville (June 25), Pontiac (Aug. 12), Starved Rock State Park (July 6), Urbana (May 15, June 10), 1929; Des Plaines (June 16), Urbana (Sept. 28), 1930. Collected on *Acer Negundo*, *Apocynum* sp., *Aquilegia canadensis*, *Asclepias* sp., *Catalpa speciosa*, *Celastrus scandens*, *Convolvulus* sp., *Cornus stricta*, *Cucumis sativus*, *Helichrysum bracteatum*, *Hydrangea* sp., *Liatris squarrosa*, *Pastinaca sativa*, *Polygonum* sp., *Rumex crispus*, *Vernonia* sp., *Viburnum* sp., *Vitis* sp.

APHIS SPIRAEPHILA PATCH

FIG. 208

Aphis spiracphila Patch, Maine Agricultural Experiment Station, Bulletin 233, November, 1914, p. 270.

This aphid, previously unrecorded from Illinois, frequents the terminal shoots of native meadow-sweet, *Spiraea salicifolia*. According to Patch, it apparently spends its whole life cycle on this one host. Through the kindness of Dr. Patch our specimens were compared with cotypic material of this species. The original description refers to the apterous viviparous form as being "huckleberry black with a slight white bloom of wax powder." Our Illinois material was more pinkish than black.

Data associated with our viviparous specimens are as follows: Havana (June 22), 1928; Beach (July 13), Rock Island (July 9), Urbana (July 1), 1929; Rock Island (June 3), 1930.

APHIS TULIPAE FONSCOLOMBE

Aphis tulipae Fonscolombe, Annales de la Société Entomologique de France, Vol. X, 1841, p. 167.

This more or less cosmopolitan species is recorded from Illinois for the first time here. It has been recorded in Europe feeding upon various liliaceous plants, including *Gladiolus* and *Tulipa*, and upon carrot and parsley roots. According to Theobald (1927), Felt (1909) redescribed it under the name *Aphis gladioli* from gladioli in America, presumably New York. A little information concerning this species is given by Theobald (1927).

The single Illinois collection was made at Urbana, October 19, 1930, on roots of carrot (*Daucus carota*).

APHIS VERNONIAE THOMAS

Aphis vernoniae Thomas, Bulletin Illinois State Laboratory of Natural History, Vol. 1, No. 2, June, 1878, p. 10.

This species, described from Illinois by Thomas in 1877, has not been recorded from the state since then. Our records indicate that it is quite generally distributed throughout Illinois. It occurs on the flower stems of its hosts. Supplementary descriptions have been given by Sanborn (1904).

Cotypes of this species were included among the typic material of Thomas recently recovered. They have been mounted in damar balsam on

four slides: Slide No. 7704 has been designated as the *lectotypic* slide, and Slides Nos. 7705-7707 as *paratypic* slides. Data associated with the lectotypic and paratypic slides, alate and apterous viviparous females, are as follows: Carbondale, Illinois, June 20, 1877, collected by Thomas on *Vernonia fasciculata*.

Data associated with our viviparous specimens are as follows: Carbondale (June 4), Morton (July 22), Urbana (July 23), 1928; Cairo (June 22), Elizabethtown (June 20), Hardin (June 25), Newton (June 17), Olney (June 18), Rock Island (July 7), Urbana (August 21), 1929. Collected on *Eupatorium purpureum* var. *maculatum*, *Helenium autumnale*, and *Vernonia fasciculata*.

APHIS VIBURNICOLA GILLETTE

FIG. 28

Aphis viburnicola Gillette, Entomological News, Vol. XX, No. 6, June, 1909, p. 280.

Aphis viburnicola Gillette was first reported from Illinois by Davis (1910e). Our records indicate that it is very widely distributed in Illinois. This species over-winters on snowball (*Viburnum*) and in



Fig. 28. Pseudo-galls on the snowball, *Viburnum Opulus* var. *Americana*, started by *Aphis viburnicola* Gillette, later occupied by *Aphis rumicis* Linnaeus and *Aphis viburniphila* Patch; Urbana, June 10, 1929. Normal foliage on left and infested foliage on right.

early spring causes the leaves to curl and form pseudo-galls (Fig. 28). After a short time the species leaves its primary host for an unknown one and then returns again in autumn. Gillette (1909c) has given detailed descriptions of all the forms found on the winter host.

Data associated with our viviparous specimens are as follows: Antioch (June 15), Decatur (Oct. 20), Urbana (May 17), 1928; Lewistown (May 4), Macomb (May 4), Rantoul (April 24), Springfield (May 2), Urbana (April 16), 1929; Carbondale (April 17), Effingham (Nov. 13), Lawrenceville (April 14), Metropolis (April 17), Urbana (Oct. 20, Dec. 20), 1930. Sexual forms have been taken at Effingham (Nov. 13) and Urbana (Dec. 20), 1930. A mating pair was collected at Effingham. All specimens collected on *Viburnum Opulus* var. *americanum* or *Viburnum* sp.

APHIS VIBURNIPHILA PATCH

FIG. 28

Aphis viburniphila Patch, Journal of Economic Entomology, Vol. 10, No. 4, August, 1917, p. 416.

This species is probably the aphid reported by Thomas (1899) from Carbondale, Illinois, under the name of *Aphis viburni* Scop. Specimens of this species are often found mixed with colonies of *Aphis rumicis* Linn. The alate and apterous viviparous females and the apterous oviparous females have been described by Patch (1917), who states that the species is present all year on *Viburnum*.

Data associated with our viviparous specimens of this species are as follows: Galena (June 26), Havana (June 21), Kankakee (June 29), LeRoy (June 20), Metropolis (June 1), Oregon (June 27, 28), Pekin (June 20), 1928; Catlin (May 17), Rantoul (April 24), Springfield (May 2), Urbana (April 16), 1929; Urbana (June 23), 1930. All material collected on *Viburnum* sp.

APHIS ZILORA new species

FIGS. 143, 194, 278

ALATE VIVIPAROUS FEMALE

Size and general color.—Length from vertex to tip of anal plate, 1.11. Head and thorax dark dusky brown, lateral portions of prothorax and posterior portion of head somewhat yellowish. Abdomen green. Cornicles greenish, slightly dusky apically. Cauda yellowish brown, anal plate brown. Antennae uniformly brown. Femora light yellowish brown, more yellowish near base; basal portions of tibiae yellowish, or light yellowish brown with apical portions darker brown; tarsi brown. Beak yellowish brown at base shading to light dusky brown at apex. Stigma of fore wings light dusky brown, brownish subcostal infusion present; veins and posterior margin of wings in vicinity of anal veins concolorous with stigma.

Head and appendages.—Average width of head across eyes, .33. Comparative length of antennal segments as follows: III—.14 to .16, average .14; IV—.10 to .13, average .12; V—.10 to .13, average .11; VI—.07 to .09, average .08 plus .14 to .19, average .17. Secondary sensoria (Fig. 278) confined to third antennal segment, arranged in a straight row, numbering from 3 to 5, usually 3, in most cases confined to apical portion of segment. Primary sensorium on sixth segment with marginal sensoria apparently absent. All antennal segments imbricated. Beak reaching to metathoracic coxae except in one specimen in which it just fails to reach the mesothoracic coxae.

Thorax and appendages.—Prothorax with a pair of lateral tubercles, anterior lateral margin of mesothorax also with lateral tubercles. Stigma of fore wings quite shallow and bluntly pointed. Radial sector only slightly curved. Second fork of media lacking in one specimen, in others extremely variable in regard to first fork and margin of wing, usually closer to the latter. Ventral portion of mesopleuron with a wax-pore plate.

Abdomen.—Cornicles (Fig. 143) .09 long, straight, faintly imbricated, without flange at apex, subequal to base of sixth antennal segment, and either equal to or shorter than the cauda. Cauda (Fig. 194) .10 long, not constricted, with four inwardly curved hairs on each side, apex sharply pointed. First abdominal segment and segment posterior to cornicles with a pair of lateral tubercles.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.09. Color of head, thorax, and abdomen light green. Cornicles yellowish with the apical portion dusky. Cauda and anal plate brownish. Antennae yellowish, except for apical segments, which are light dusky. Beak yellowish

with the apical portion brown. Femora yellowish with apical portions dusky; tibiae yellowish with the apical portions brownish; tarsi brown.

Head and appendages.—Average width of head across eyes, .30. Comparative lengths of antennal segments for specimens with six-segmented antennae as follows: III—.09 to .13, average .11; IV—.09 to .10, average .09; V—.09; VI—.07 to .09, average .08 plus .14 to .16, average .15. Comparative length of antennal segments for specimens with five-segmented antennae (which are the most common) as follows: III—.17 to .21, average .19; IV—.09 to .11, average .09; V—.07 plus .14 to .19, average .15. Secondary sensoria absent. Primary sensorium on last antennal segment with a group of five marginal sensoria. All segments of antennae imbricated. Beak reaching to metathoracic coxae.

Thorax.—Prothorax with a pair of lateral tubercles, anterior portion of mesothorax also with lateral tubercle.

Abdomen.—Abdomen with a pair of lateral tubercles near anterior portion and a pair posterior to the cornicles. Cornicles .10 long, cauda .09 long, cornicles, cauda and anal plate similar to those of alate viviparous female.

Holotype.—Alate viviparous female; Beach, Illinois, August 29, 1929, on *Liatriis elegans*, (Frison and Hottes). On slide with paratype alate and apterous viviparous females. Slide No. 10525. *Morphotype.*—Apterous viviparous female; same data as holotype. Slide No. 10526. *Paratypes.*—Four slides of alate and apterous viviparous females and nymphs. Same data as holotype. Slides Nos. 10527-10529 and one other unnumbered.

This species belongs to the *maidi-radicis* group, and may be separated from closely allied forms by the characters given in the key to the genus *Aphis*.

GENUS ASIPHONAPHIS WILSON AND DAVIS

Key to the Species of the Genus *Asiphonaphis*

1. Antennae with very few hairs; lateral tubercles on abdomen slender, much longer than width at base (Fig. 315); pulverulent in life.....*anogis* n. sp. p. 225
- Antennae with numerous hairs about as long as width of antennal segments; lateral tubercles on abdomen stout, about as long as width at base (Fig. 312); not pulverulent in life.....*pruni* Wilson & Davis p. 227

ASIPHONAPHIS ANOGIS new species

FIGS. 205, 270, 315

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.68. Body in live specimens covered with a dense coat of whitish down, more abundant posteriorly than anteriorly. In mounted specimens the head is dark dusky brown, becoming almost black at the vertex, but usually a lighter color in the vicinity of the eyes and posterior to them. The prothorax on the dorsum is concolorous with the head; laterally it has a greenish tinge and is considerably lighter in color; the meso- and metathoracic segments are dark dusky brown, certain portions being almost black. The abdomen is yellowish brown, the cauda and anal plate dusky brown. All antennal segments essentially concolorous with lighter portions of the head. Basal portion of anterior femora slightly lighter in color than remaining femora, femora essentially dusky brown or dusky yellowish brown near the base, shading gradually to a more intense dusky brown at the apex; tibiae almost uniformly dusky brown; tarsi dusky brown. Stigma fuscus; veins fine, dark brown, very faintly bordered with brown, anal vein darkest and

most heavily bordered, posterior margin of wing near articulation with anal vein thickened and brownish. Beak yellowish-brown with the apical segments darker than others.

Head and appendages.—Average width of head across eyes, .44. Antennal segments with comparative lengths as follows: III—.33 to .46, average .41; IV—.21 to .31, average .27; V—.14 to .26, average .21; VI—.09 to .17, average .14 plus .14 to .26, average .20. Numerous secondary sensoria on third and fourth antennal segments (Fig. 270), sometimes one or two secondary sensoria are found on the fifth segment; in structure they are large and have wide rims; sensoria on the third antennal segment number from 9-16 with an average of 12 and are arranged in an irregular row; sensoria on fourth antennal segment arranged in a regular row and number from 3 to 7 with an average of 5. The primary sensorium on segment six is small; in fact, the only way that it can be distinguished from the marginal sensoria is by the fringe of hair which is around its outer circumference. The beak is exceedingly variable in length; in some specimens perhaps failing to reach beyond the midway point between the coxae of the pro- and mesothoracic segments, whereas in others it may extend as far as the coxae of the metathorax.

Thorax and appendages.—Prothorax with a pair of tooth-like lateral tubercles. The tarsal segments are quite long, about equaling in length the first and second antennal segments combined. Normally the media of the fore wings is twice-branched, the second branch occurring much closer to the margin of the wing than it is to the first branch; abnormal venation is common, the media of both wings being only once-branched, or one wing with the media once-branched and the other wing with the media twice-branched, or with the media twice-branched on one wing and thrice-branched on the other.

Abdomen.—Abdomen entirely covered with wax glands similar to those found in *Amphiceroides pulchellus* (Gillette) or *Gypsoaphis oestlundii* (Hottes), and with seven pairs of tooth-like lateral tubercles (Fig. 312). Cauda (Fig. 205) not quite as long as the hind tarsae exclusive of claws, not constricted, and distinctly tapered toward apex, with from three to five pairs of lateral hairs, the terminal hairs usually strongly incurved; length varies from .13 to .14. Anal plate narrow, scarcely wider than the cauda at the base and about one-half as long.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.63. Body in live specimens entirely covered with a dense coat of whitish down. In mounted specimens the head, thorax, and abdomen are dark brown, and the cauda and cornicles as in the alate viviparous female. First and second antennal segments light brown, lighter in color than the head, sometimes slightly dusky on the anterior margin; basal half of third antennal segment concolorous with second segment, apical half more fuscous; fourth, fifth, and sixth segments uniformly light brown. All legs of about the same intensity of color, similar to the legs of the alate form except that the apical portions of the tibiae are considerably darker than the remaining portions. Beak colored as in alate viviparous female.

Head and appendages.—Average width of head across eyes, .36. Antennal segments with comparative lengths as follows: III—.30 to .40, average .36; IV—.17 to .24, average .21; V—.17 to .24, average .21; VI—.13 to .14, average .14 plus .19 to .21, average .20. Normally there are no secondary sensoria. Hairs on antennae twice as long as width of segment and fine. The beak usually extends to the coxae of the metathoracic pair of legs.

Thorax and appendages.—Prothorax with lateral tubercles. Hairs on legs fairly abundant, fine, and very long, about twice width of segments.

Abdomen.—Entire surface covered with wax glands and with seven pairs of tooth-like lateral tubercles (Fig. 315). Cauda about equal to the length of the hind tarsi exclusive of claws, measuring from .11 to .14 and averaging .13, usually with four pairs of lateral hairs on a side, the terminal hairs strongly incurved. Anal plate about twice as wide as the cauda at the base and about half as long.

ALATE MALE

Size and general color.—Average length from vertex to tip of anal plate, 1.54. General color practically the same as in alate viviparous female.

Head and appendages.—Average width of head across eyes, .44. Antennal segments with the following proportions: III—.37 to .43, average .40; IV—.26 to .29, average .27; V—.23 to .24, average .23; VI—.11 to .14, average .12 plus .13 to .24, average .21. Secondary sensoria present on the third, fourth, and fifth antennal segments; although scattered, confined largely to one side of the segment; distributed throughout the length of the third and fourth antennal segments; confined to the basal two-thirds of fifth segment; varying in size, the largest usually being on the third segment and the smallest on the fifth segment; varying in number, third segment with from 18 to 25 and average of 24, fourth segment with from 13 to 21 and an average of 15, fifth segment with from 5 to 10 sensoria and an average of 7. The marginal sensoria are almost as large as the primary sensorium on the sixth antennal segment. The beak reaches to or beyond the coxae of the metathoracic pair of legs.

Thorax and appendages.—Same as in the alate viviparous female.

Abdomen.—Similar in all respects to abdomen of alate viviparous female except that the cauda does not taper off to the apex so quickly and is more blunt at the tip. Male genitalia dark dusky-brown.

Superficially the structure of the male is so nearly like that of the alate viviparous female that a hasty examination might lead to confusing the two. The male genitalia are often rather obscured, thus leaving the presence of the more numerous secondary sensoria on the fourth and fifth antennal segments as the best means of differentiation between the two sexes.

Holotype.—Alate viviparous female; Decatur, Illinois, October 19, 1929, on *Pilea pumila*, (Hottes and Tauber). Slide No. 10747. *Allotype.*—Alate male; Decatur, Illinois, October 13, 1929, on *Pilea pumila*, (Hottes and Tauber). Slide No. 10748. *Morphotype.*—Apterous viviparous female; Decatur, Illinois, October 20, 1929, on *Pilea pumila*, (Hottes and Tauber). Slide No. 10749. *Paratypes.*—Thirty-five slides of alate viviparous and apterous females, pupae and nymphs, collected at Decatur, Illinois, October 13-20, 1929, on *Pilea pumila*, (Hottes and Tauber). Slides Nos. 10750-10772 and others unnumbered.

This species feeds along the main stem near the top of the plant and along the main stalk of the flower stem. When seen on their host plant they do not suggest aphids at all, because they are so closely clustered along the stem and often obscured by their downy flocculence. This new species can be separated from *A. pruni* Wilson and Davis, the only other species in the genus, by the following characters: the entire surface of the body is covered with wax glands, the lateral tubercles are considerably less developed and thinner, and there are no hairs on the antennae.

ASIPHONAPHIS PRUNI WILSON AND DAVIS

FIG. 312

Asiphonaphis pruni Wilson and Davis, Entomological News, Vol. XXX, No. 2, February, 1919, p. 39.

This species is here reported from Illinois for the first time. We have found it only in the extreme northern portion of this state. Very little information is available concerning its range in North America. The typic material was collected in Wisconsin. According to our observations, *pruni* causes a severe curling of the leaves of its host.

Descriptions of the viviparous females and male are given by Wilson and Davis (1919).

Data associated with our viviparous specimens are as follows: Chicago (June 13), 1928; Beach (July 13), Galena (July 10), 1929. All collected on *Prunus virginiana*.

GENUS BRACHYCOLUS BUCKTON

BRACHYCOLUS TRITICI GILLETTE

Brachycolus tritici Gillette, Entomological News, Vol. XXII, No. 10, December, 1911, p. 441.

Davis (1910d) first reported this species from Illinois. It has not been taken since. Parker (1916) refers to this aphid as the "Western wheat aphid" and states that at times it is a serious pest of winter wheat in Montana and that it also attacks barley. According to Parker this plant louse over-winters in the egg stage on wheat. All forms have been described by Gillette (1911c).

Data associated with our viviparous specimens are as follows: Aurora (Sept. 24), 1908, collected from grass by J. J. Davis.

GENUS BREVICORYNE VAN DER GOOT

BREVICORYNE BRASSICAE LINNAEUS

FIGS. 3, 160, 204

Aphis brassicae Linnaeus, Systema Naturae, Editio Decima, 1758, p. 452.

The cabbage aphid is discussed at some length by Thomas (1879), and it is very probable that his remarks can be construed as indicating the presence of this louse in Illinois in 1879 although no definite Illinois locality is mentioned. Davis (1910c) reports it from Illinois as "our most generally destructive aphid of the vegetable gardens." Although our records for the cabbage aphid are confined to the central and northern parts of the state, it no doubt occurs everywhere within our territory. It is a pest in Europe as well as in this country. Herrick and Hungate (1911) have published a detailed account of this species and show that the entire life cycle is spent upon cabbage or closely related plants.

Data associated with our viviparous specimens are as follows: Champaign (Oct. 1, 2), Normal (Sept. 10), Rose Hill (Sept. 26), 1883; Decatur (Nov. 11), 1928; Kansas (June 17), 1929; Arlington Heights (Sept. 29), 1930. Males are in the collection from Champaign, October 1-2, 1883. All collected on *Brassica oleracea*.

GENUS CAVARIELLA DEL GUERCIO

CAVARIELLA AEGOPODII (Scopoli)

FIG. 206

Aphis aegopodii Scopoli, Entomologica Carniolica, 1763, p. 399.*Hyadaphis pastinacae* Davis, Journal of Economic Entomology, Vol. 3, No. 6, December, 1910, p. 493. In part misidentification.

An examination of material belonging to Professor J. J. Davis proves that some specimens of this species were included in his records of *Hyadaphis pastinacae* from Illinois in 1910. These slides are as follows: Chicago, Illinois, Oct. 1, 1908, on *Zizia aurea*, and Oak Park, Illinois, August 4, 1909, on willow. No Illinois records, however, have been previously reported under this specific name. Dr. Theobald has kindly determined specimens of this species submitted to him. Although we have collected this species only on *Salix* it is known to migrate to *Aegopodium* and other plants, as the records of Davis (1910e) and others demonstrate.

Data associated with our Illinois specimens, all collected on *Salix*, are as follows: Elizabethtown (June 30), Grayville (June 19), Starved Rock State Park (July 6), 1929; Seymour (June 20), 1930.

GENUS CEROSIPHA DEL GUERCIO

CEROSIPHA RUBIFOLII (THOMAS)

FIGS. 29, 138, 192, 275

Sipha rubifolii Thomas, Eighth Report of the State Entomologist on the Noxious and Beneficial Insects of the State of Illinois, 1879, p. 121.

This is a minute yellowish-green aphid with five-segmented antennae. Our records indicate it is widely distributed in Illinois. Although small and usually not very abundant, its habit of twisting and curling the leaves (Fig. 29) of blackberry (*Rubus* sp.) makes it conspicuous. It is likely that Thomas described this species from material collected in Illinois. Davis (1910e) was the first to definitely record the species from Illinois stating it "is very common in Illinois, curling and injuring the foliage of the cultivated and wild blackberry." Winter (1929b) has summarized most of the literature relating to this species.

Data associated with our slides of viviparous specimens of this species are as follows: Albion (May 26), Carbondale (June 4), Champaign (Aug. 9), East Peoria (July 22), Herod (May 29), Metropolis (May 31, June 1), Mt. Carmel (May 26), Oakwood (May 12, 20, July 18, Sept. 17), Oregon (June 28), 1928; Elizabethtown (June 21), Hardin (June 25), Kansas (June 17), Lisle (July 14), Maryville (Sept. 11), Oakwood (June 1), Olney (June 18), Rock Island (July 7), Starved Rock State Park (July 6), Urbana (Oct. 21, 28), 1929. Oviparous females taken at Urbana, October 21-28, 1929. Male at Oakwood on October 14, 1929.

In view of the limitations of the original description, a few descriptive details of the alate viviparous female are given, together with a description of the heretofore unrecorded apterous oviparous female.



Fig. 29. Curling leaves of blackberry, *Rubus*, caused by *Cerosipha rubifolii* (Thomas); Oakwood, July 24, 1929.

ALATE VIVIPAROUS FEMALE

Thomas' original description may be emended as follows: Length, 1.12. Average width of head across eyes, .37. Comparative lengths of antennal segments as follows: III—.27, IV—.15, V—.11 plus .26. Secondary sensoria (Fig. 275) confined to third antennal segment, numbering from 2 to 7, averaging 4, rarely as few as 2 or as many as 7. Cornicles (Fig. 138) .16 long, straight. Cauda (Fig. 192) .08 long, not constricted, with about four hairs on a side. Second fork of media variable in position.

APTEROUS OVIPAROUS FEMALE

Average length from vertex to tip of anal plate, 1.14. General color throughout essentially similar to apterous viviparous female. Average width of head across eyes, .29. Comparative lengths of antennal segments as follows: III—.17 to .23, average .21; IV—.11 to .13, average .12; V—.09 to .10, average .09 plus .16 to .21, average .20. Antennal segments without secondary sensoria. Beak reaching to mesothoracic coxae. Cornicles .14 long, straight, imbricated, rim at apex poorly developed. Cauda .11 long, constricted near middle, with three hairs on a side. Hind tibiae only slightly swollen, with about 20 to 30 sensoria.

Neotype.—Alate viviparous female; Slide No. 4425, Albion, Illinois, May 26, 1928, on blackberry, (Frison and Hottes). On slide with alate and apterous viviparous females, pupae, and nymphs. Since this species was originally described from Illinois and the types are lost, a slide in the Survey collection has been selected as the *neotype*. *Morphotype*.—Apterous oviparous female; Slide No. 8424, Urbana, Illinois, October 28, 1929, on blackberry, (T. H. Frison). On slide with oviparous females and nymphs.

GENUS HYALOPTERUS KOCH

Key to the Species of the Genus Hyalopterus

1. Secondary sensoria present on fourth antennal segment (4-9).....2
- Secondary sensoria absent on fourth antennal segment, numbering from 8 to 14 on third.....*atriplicis* (Linnaeus) p. 231
2. Secondary sensoria present on fifth antennal segment (3-5), third segment with about 10-15, less than 20..*hyperici* (Monell) p. 232
- Secondary sensoria absent on fifth antennal segment, third segment with 20 to 40.....*pruni* (Geoffroy) p. 232

HYALOPTERUS ATRIPLICIS (LINNAEUS)

Aphis atriplicis Linnaeus, Fauna Svecica, Editio Altera, Auctior, Stockholm, 1761, p. 262.

This cosmopolitan species was first recorded from Carbondale, Illinois, by Monell (1879), who examined specimens sent to him by Thomas' assistant, Miss Middleton. Also previously reported from Illinois by Forbes (1900) and Davis (1910e). It causes a severe leaf curling or podlike folding of the leaves of goosefoot, or lamb's quarters. Hayhurst (1909) has given detailed descriptions of all the various forms and a general account of its biology.

Our records of viviparous specimens of this species are as follows: Antioch (June 15), Cairo (June 2), Carbondale (June 4), Danville (July 15), Elizabethtown (Oct. 12), El Paso (July 5), Galena (June 25), Havana (June 21), Kankakee (June 29), LeRoy (June 20), Oregon (June 27), Quincy (June 6), Rock Island (June 24), Shawneetown (May 27), Starved Rock State Park (June 13), 1928; Homer (June 17), Sparta (June 24), Urbana (May 26), 1929. All collected on *Chenopodium album*.

HYALOPTERUS HYPERICI (MONELL)

Aphis hyperici Monell, Bulletin of the United States Geological and Geographical Survey of the Territories, Vol. V, No. 1, 1879, Art. 1, p. 25.

Myzocallis hypeici Thomas, Eighth Report of the State Entomologist on the Noxious and Beneficial Insects of the State of Illinois, 1879, p. 108. *New Synonymy*.

The types of *Myzocallis hypeici* Thomas (index indicates spelling of specific name was intended for *hyperici*) have recently been discovered, on Slides No. 2796 and 2797 in the Survey collection. Slide No. 2797 has been designated the *lectotype* and Slide No. 2796 the *paratype*. These have been compared with slides of *H. hyperici* (Monell) kindly loaned by Professor J. J. Davis. The species apparently belongs to the genus *Hyalopterus*. It has not been recorded from Illinois except by Thomas, the data with his specimens being: Carbondale, Illinois, in April, on *Hypericum prolificum*.

HYALOPTERUS PRUNI (GEOFFROY)

FIG. 199

Aphis pruni Geoffroy, Histoire abrégée des Insectes qui se trouvent aux environs de Paris, dans laquelle ces animaux sont rangés suivant un ordre méthodique. Paris, Durand, 1762, 2 Vols., p. 497. Published anonymously but known to be work of Geoffroy.

The proper specific name to use for this species, commonly referred to as the mealy plum aphid, is *pruni* Geoffroy (1762). Fabricius (1775) listed this species under two names, *arundinis* and *pruni*; the former having page priority and hence causing its use by recent writers. *Pruni*, however, should be used and credited to Geoffroy (1762) because Geoffroy first proposed it as a binomial name. Attention has been called to Geoffroy's use of *pruni* as a binomial by Hottes (1930a).

This enemy of plums and related fruits has been previously recorded from northern Illinois by Davis (1910e) under the name of *H. arundinis* Fabricius. A good account of its life history and habits is given by Davidson (1919). It is known to migrate, having spring and fall generations on plum, the leaves of which it causes to curl, and summer generations on *Phragmites*, *Typha*, and *Arundo*; or at times in certain localities to spend the entire year on plum. Like many other aphids of economic importance, it is reported from many parts of the world.

Data associated with viviparous specimens in the Survey collection are as follows: Antioch (Aug. 13), 1906, on *Phragmites*; Rock Island (July 7), and Urbana (June 25), 1929, both on *Prunus domestica*.

GENUS HYSTERONEURA DAVIS

HYSTERONEURA SETARIAE (THOMAS)

FIGS. 30, 89, 135, 283

Siphonophora setariae Thomas, Bulletin of the Illinois State Laboratory of Natural History, Vol. I, No. 2, June, 1878, p. 5.

This brown plum aphid was described by Thomas from specimens collected at Carbondale, Illinois. Our records indicate that it is very



Fig. 30. Infestation of the rusty plum aphid, *Hysteroneura setariae* (Thomas), on the ornamental plum, *Prunus triloba*; Urbana, June 3, 1929.

widely distributed in the state. It over-winters on plum and in spring is often very abundant on the stems and leaves of the new growth (Fig. 30). Later it migrates to grasses and other plants upon which it spends the summer.

The cotypes of this species (Vial 40 of the Thomas collection) have recently been recovered and mounted on two slides in gum damar. Slide No. 7714 has been designated as the *lectotypic* slide and Slide No. 7715 as the *paratypic* slide. Both slides contain specimens of alate and apterous viviparous females. Data associated with these slides are as follows: on *Setaria glauca*, Carbondale, Illinois, August 16, 1877.

Data associated with our viviparous specimens are as follows: Normal Aug. 7), 1883; Duquoin (June 7), 1884; Odin (May 7), 1895; Urbana (October 29), 1901; Rockport (May 21), 1906; Lincoln (May 6), 1925; Albion (May 26), Carbondale (May 17, June 4-14), Centralia (Oct. 12), Elizabethtown (May 29-31), Herod (May 31), LeRoy (June 20), Metropolis (June 1), Mt. Carmel (May 26), Muncie (Oct. 6), Shawneetown (May 27), Urbana (May 23-24), 1928; Bondville (Sept. 26), Galena (July 10), Macomb (May 3), Olney (June 18), Oregon (July 11), Rock Island (July 7), Springfield (May 2), Urbana (June 1-17, July 24), 1929; Effingham (Nov. 13), Flora (Nov. 13), Metropolis (April 17) and Starved Rock State Park (May 13), 1930. Sexual forms and mating pairs were collected at Flora, November 13, 1930. Host records are as follows: *Melilotus alba*, *Prunus avium*, *Prunus domestica*, *Prunus persica*, *Prunus triloba*, *Prunus virginiana*, *Prunus* sp., *Setaria glauca*, and *Setaria viridis*.

GENUS RHOPALOSIPHUM KOCH

(SUPGENERA RHOPALOSIPHUM KOCH, HYADAPHIS KIRKALDY, AND LIOSOMAPHIS WALKER)

Key to the Species of the Genus *Rhopalosiphum*

1. Cornicles with apical portion much swollen and contrasting with narrow basal portion (Fig. 148).....2
- Cornicles approximately cylindrical (Fig. 134).....5
2. Terminal filament of sixth antennal segment about as long as basal portion.....*berberidis* (Kaltenbach) p. 235
- Terminal filament of sixth antennal segment over twice as long as basal portion.....3
3. Third antennal segment with more than 25 sensoria; fourth antennal segment with at least 5 sensoria..*melliferum* (Hottes) p. 238
- Third antennal segment with less than 25, usually about 15 sensoria; fourth antennal segment usually without sensoria, sometimes with one or two.....4
4. Hind tibiae about three times as long as width of head through the eyes; third antennal segment rarely with as many as ten secondary sensoria; cauda stout.....*rhois* Monell p. 240
- Hind tibiae about twice as long as width of head through the eyes; third antennal segment with more than ten secondary sensoria; cauda somewhat elongate....*nymphaeae* (Linnaeus) p. 238
5. Terminal filament of sixth antennal segment less or not more than twice as long as basal portion; basal portion about equal in length to the fifth antennal segment.....
-*rufomaculatum* (Wilson) p. 241
- Terminal filament of sixth antennal segment over twice as long as basal portion; basal portion not as long as fifth antennal segment6

6. Terminal filament of sixth antennal segment less than three times as long as basal portion; cornicles and hind tibiae usually of about the same thickness .*pseudobrassicæ* (Davis) p. 240
- Terminal filament of sixth antennal segment about four or more times as long as basal portion; cornicles usually wider than hind tibiae7
7. Abdomen essentially greenish.....*prunifoliae* (Fitch) p. 239
- Abdomen essentially brown.....*enigmæ* n. sp. p. 235

RHOPALOSIPHUM BERBERIDIS (KALTENBACH)

FIG. 148

Aphis berberidis Kalténbach, Monographie der Familien der Pflanzenläuse, Aachen, 1843, p. 95.

The barberry plant louse was first recorded from Illinois by Davis in 1908 and again in 1910 as "a common and often abundant species, occasionally in such numbers as to injure the barberry." It is a small yellowish form with the apterous forms predominating. According to our observations and those of others, it spends its entire life cycle on barberry. Detailed descriptions of all forms are given by Davis (1908c).

Data associated with our viviparous specimens are as follows: Antioch (June 15), Berwyn (June 14), Galena (June 25), Marshall (May 25), Mt. Carroll (June 25), Oregon (June 27), Urbana (Sept. 26, Oct. 19), 1928; Alton (June 25), Catlin (May 17), Effingham (June 18), El Paso (July 5), Starved Rock State Park (July 6), Urbana (May 8, Oct. 24), 1929. Males and oviparous females were collected at Urbana, October 24, 1929. All material taken on *Berberis Thunbergii minor*.

RHOPALOSIPHUM ENIGMAE new species

FIGS. 134, 200, 207, 262, 263

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 2.18. Head and thorax dark dusky brown. Abdomen varying in color from yellowish brown to dark reddish brown with slight indications of darker brown spots on the lateral margins. Cornicles, cauda, and anal plate dark dusky brown. Antennae dark dusky brown except extreme base of third segment and terminal filament of sixth, which are yellowish brown. Femora of all legs dark brown except for basal portions, which are yellowish or yellowish brown. Tibiae yellowish brown with a dark brown band at apex equal to length of tarsi; tarsi dark brown. Stigma of fore wings yellowish brown, veins of wings dusky, posterior margin of wings in vicinity of anal vein brown. Beak brown.

Head and appendages.—Vertex of head prominently pointed. Average width of head across eyes, .46. Antennal segments with the following comparative lengths: III—.33 to .36, average .34; IV—.19; V—.17; VI—.09 plus .50 to .57, average .53. Secondary sensoria (Fig. 262) confined to third and fourth antennal segments. Third segment with sensoria numbering from 7 to 11, averaging 9, arranged in an irregular row. Fourth segment usually with one or two secondary sensoria. Primary sensoria on sixth segment with a group of very small marginal sensoria. All segments of antennae imbricated. Beak comparatively short, failing to reach middle coxae by a considerable distance.

Thorax and appendages.—Prothorax with a pair of small finger-like lateral tubercles. Mesothorax with a pair of small wax glands on the

anterior ventro-lateral region. Stigma of fore wings rather sharply pointed; second fork of media extremely close to margin of wing when present; all veins ending in brownish suffusions.

Abdomen.—First abdominal segment and the segment posterior to cornicles with small lateral tubercles. Cornicles (Fig. 134) about .29 in length, only very slightly swollen, the swelling accentuated by the pronounced constriction just before the well-developed flange; entire surface distinctly imbricated. Cauda (Fig. 200) poorly developed, .12 in length, distinctly constricted near middle, with two hairs on each side. Anal plate about three times as wide at the base as the cauda, and with only a few hairs.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 2.26. Head, thorax, and abdomen concolorous, varying from dark reddish brown to greenish brown. Cauda, anal plate, cornicles, and beak dark brown. Antennae similar in color to those of alate viviparous female. Femora dark brown, paler at base; tibiae greenish yellow, their apices and the tarsi infuscated with brown.

Head and appendages.—Average width of head across eyes, .47. Antennal segments with the following comparative lengths: III—.27 to .33, average .31; IV—.17 to .23, average .20; V—.17 to .23, average .20; VI—.09 to .10, average .10 plus .46 to .57, average .50. All segments without secondary sensoria, distinctly imbricated, and with sparse hairs. Beak reaching just beyond mesothoracic coxae.

Thorax.—Prothorax with a pair of small lateral tubercles.

Abdomen.—Surface of abdomen reticulated and with a very few long, fine hairs. First segment and segment posterior to cornicles with minute lateral tubercles, similar tubercles occasionally seen on other segments. Cornicles similar in shape to those of alate viviparous female, averaging .45 in length. Cauda about .17 long, and little stouter than that of the alate viviparous female, with two hairs on each side, one side occasionally with three hairs. Anal plate normal.

APTEROUS OVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.90. Color essentially similar to that of apterous viviparous female.

Head and appendages.—Average width of head across eyes, .44. Antennal segments with the following comparative lengths: III—.19; IV—.11 to .13, average .12; V—.13; VI—.07 plus .29 to .46, average .37. Secondary sensoria absent. Third and fourth antennal segments with a decided tendency to remain united or to separate incompletely, and in many cases the antennae are but five-segmented. All segments of antennae imbricated. Beak reaching midway between pro- and mesothoracic coxae.

Thorax and appendages.—Prothorax with a large, well-developed pair of lateral tubercles. Hind tibiae with the basal half very slightly swollen, sensoria very pale and difficult to count.

Abdomen.—Six segments of the abdomen with very minute lateral tubercles. Cornicles about .28 long, otherwise similar to those of alate viviparous female. Cauda .11 in length (Fig. 207), with hairs on each side, very thick, and not constricted, in this respect unlike that of viviparous females. Anal plate normal.

ALATE MALE

Size and general color.—Length from vertex to tip of anal plate, 1.20. Color essentially similar to that of alate viviparous female.

Head and appendages.—Antennal segments with the following comparative lengths: III—.33; IV—.23; V—.21; VI—.09 plus .54. Secondary sensoria (Fig. 263) distributed as follows: III—17; IV—14; V—10; irregularly arranged and scattered over entire surface of segment. Primary sensorium of sixth antennal segment with a group of about five small marginal sensoria at one side. Antennae imbricated and with a few short hairs. Beak reaching to the mesothoracic coxae.

Thorax and appendages.—Prothorax with a pair of lateral tubercles. Wings and wing veins similar to those of alate viviparous female.

Abdomen.—Cornicles .24 long, otherwise similar to those of alate viviparous female.

NYPH

Nymphs of apterous and oviparous females usually with five-segmented antennae.

Holotype.—Alate viviparous female; Eldorado, Illinois, June 19, 1929, on *Typha latifolia*, (Frison and Hottes). On slide with four paratypic nymphs. Slide No. 10719. *Allotype*.—Alate male; Danville, Illinois, November 4, 1928, on *Typha latifolia*, (T. H. Frison). On slide with paratypic nymphs. Slide No. 10720. *Morphotype*.—Apterous viviparous female; Catlin, Illinois, May 17, 1929, on *Typha latifolia*, (Frison and Ross). On slide with paratypic apterous viviparous female and nymphs. Slide No. 10721. *Morphotype*.—Apterous oviparous female; same data as allotype. On slide with paratypic oviparous females and nymphs. Slide No. 10722. *Paratypes*.—Thirty-seven slides, containing alate and apterous viviparous females, oviparous females, a male, and nymphs, all collected in Illinois on cat-tail (*Typha latifolia*) by T. H. Frison, F. C. Hottes, and H. H. Ross, except one slide collected at Thompson's Lake, Havana, Illinois, August 11, 1896, on *Sparganium*, (Hart and Adams). The dates and localities are as follows: Carbondale (June 4), Centralia (Oct. 12), Danville (Nov. 4), Herod (May 31), Metropolis (June 1), and Quincy (June 6), 1928; Allerton (June 17), Catlin (May 17), Eldorado (June 19), Elizabethtown (June 20), Hardin (June 25), Maryville (Sept. 11), Oakwood (Oct. 17), and Seymour (June 12), 1929. Slides Nos. 4516-4521, 4524, 4535, 10723-10746 and others unnumbered.

This species is structurally very similar to *R. prunifoliae* (Fitch), from which it differs in color, being a deep reddish brown instead of green or greenish yellow. The few alate specimens of *R. enigmæ* in our possession differ from the usual condition found in *prunifoliae* in having only one or two sensoria on the fourth antennal segment. *Prunifoliae*, however, varies so greatly in respect to this character that it is not of practical use. This species was sent to Dr. Edith M. Patch for determination, and she considered it to be *R. nymphææ* (L.), but it differs from the form we are considering as *R. nymphææ* in a number of characters, especially in the length and shape of the cornicles. It should be noted that we have taken all forms on cat-tail and that specimens have been taken on this host in the spring before any migratory species in the same vicinity, so far as known, had left their overwintering hosts.

RHOPALOSIPHUM ENIGMÆ VAR. PARVÆ new variety

This variety is essentially like *R. enigmæ* new species, except that the antennae are only five-segmented, the cornicles shorter, and the lateral tubercles better developed. The average width of head across the eyes is .41. The comparative antennal measurements are as follows: III—.19 to .26, average .22; IV—.08 to .10, average .09; V—.07 plus .21 to .27, average .24. The cornicles average .15 in length.

Holotype.—Apterous viviparous female, Danville, Illinois, July 22, 1930, on *Carex*, collected by F. C. Hottes and O. E. Tauher. Slide No. 10642. *Paratypes*.—Twenty-one slides with same data as for holotype. Slides Nos. 10643-10656 and others unnumbered.

In view of the shorter cornicles and certain other slight differences, it has seemed inadvisable to group these specimens with

enigmae. Future collecting may prove *enigmae* to be a very variable species and that this new variety can be relegated to synonymy. On the other hand there is the possibility that the variety *parvae* may prove to be an entirely distinct species.

RHOPALOSIPHUM MELLIFERUM (HOTTES)

Aphis xylostei Schrank, Fauna Boica, Durchgedachte der in Baiern einheimischen und zahmen Thiere, 2 Bd., 1 Abt., Ingolstadt, 1801, p. 107. A homonym.

Hyadaphis mellifera Hottes, Proceedings of the Biological Society of Washington, Vol. 43, October 7, 1930, p. 184.

This cosmopolitan species migrates from honeysuckle, upon which it over-winters, to parsnip and a number of other summer hosts. Good descriptions of the viviparous forms are given by Theobald (1927) and some data regarding its biology by Gillette (1911b). We have seen two of the slides recorded as "*Hyadaphis pastinacae* Linn.?" from Illinois by Davis (1910e) and find them to be the species *Cazariella aegopodii* (Scopoli) and not this species, which is the *pastinacae* of some American authors.

Data associated with our viviparous specimens are as follows: Mt. Carmel (June), Normal (Aug. 18), 1884; Urbana (July 27), 1912 (Davis); Albion (May 25-26), Antioch (June 15), Cave-in-Rock (May 29-30), Champaign (May 17, July 26), Decatur (Nov. 4), Metropolis (May 30-31, June 1), Quincy (June 6), Starved Rock State Park (June 12), Urbana (May 23-28, June 7, Sept. 26, Oct. 1), 1928; Allerton (June 17), Alton (June 25), Catlin (May 17), Galena (June 10), Morriston (July 9), Oakwood (Oct. 14), Oregon (July 11), Rock Island (July 7), Seymour (Oct. 16), Starved Rock State Park (July 6), Urbana (May 26, June 3, July 2, Aug. 22), 1929. We have taken males at Seymour, October 16, and at Oakwood, October 14, 1929. Collected on *Carex* sp., *Conioselinum chinense*, *Cryptotactnia canadensis*, *Lonicera flava*, *Lonicera sempervirens*, *Lonicera* sp., and *Pastinaca sativa*.

RHOPALOSIPHUM NYMPHAEAE (LINNAEUS)

Aphis nymphaeae Linnaeus, Fauna Svecica, Editio Altera, Auctior, Stockholm, 1761, p. 260.

This cosmopolitan aphid is of more than ordinary interest because it attacks aquatic plants and at times leads almost a semi-aquatic existence. Patch (1915b) has demonstrated that the species is migratory, plum serving as the over-wintering host and aquatic plants as the summer host. The same type of life cycle is followed also in California, according to Davidson (1917). It occasionally spoils the appearance of aquatic plants in greenhouses and may injure the fruit of plums.

Davis (1910c) first recorded it from Illinois and proved that *aquaticus* Jackson (1908) was a synonym of *nymphaeae*. Jackson (1908), Patch (1912a), and Theobald (1927) have given good descriptions of the viviparous forms and male. Davidson (1917b) briefly mentions the oviparous females which are produced in autumn on plum. Our material agrees well with the description of the European form except that the secondary sensoria on the fourth antennal segments of alate forms consistently average fewer.

Data associated with our viviparous specimens are as follows: Havana (Sept. 14), 1894; Havana (July 21), 1897; Ottawa (July 20), 1901; Decatur (Oct. 20), Urbana (May 23), 1928; Cobden (June 21), Mt. Vernon (Sept. 26), Oakwood (Oct. 17), 1929; Evanston (March 12), 1930. Collected on *Nymphaea costaleifera*, *Nymphaea* sp., *Lemna trisulca*, *Potamogeton natans*, *Galium* sp., *Eichhornia* sp.

RHOPALOSIPHUM PRUNIFOLIAE (FITCH)

FIGS. 31, 196

Aphis prunifoliae Fitch, Transactions of the New York State Agricultural Society, Vol. XIV, 1854 (printed 1855), p. 826.

The apple-grain aphid was first reported from Illinois by Thomas in the *Prairie Farmer* for 1862 as *Aphis avenae* Fabricius. Because of its cornicles—somewhat intermediate between an aphid and a typical



Fig. 31. Leaves on hawthorn, *Crataegus*, curled by spring generations of the apple grain aphid, *Rhopalosiphum prunifoliae* (Fitch); Urbana, April 20, 1929.

Rhopalosiphum—this species is difficult to place generically. We are placing it in the genus *Rhopalosiphum* in accordance with present usage, although it has no more in common with species in this genus than with certain species of *Aphis*, the genus in which it was placed for many years. It is exceedingly abundant in Illinois in the spring of the year on *Crataegus* (Fig. 31) and on apple, from which it soon migrates to grasses and small grains to spend the summer months. The fact that this species leaves the apple early in the season lessens its importance as an apple pest.

Data associated with our viviparous specimens are as follows: Normal (June 21), 1883; Urbana (May 23, Aug. 9), 1885; Urbana (Oct. 27), 1886; Tontit (Oct. 14), 1887; Urbana (June 25), 1889; Normal (Nov. 16), 1894; Havana (Aug. 11), 1896; Peoria (Nov. 7), 1906; Beech Ridge (May 22).

1907; Carbondale (Oct. 13), 1926; Antioch (June 15), Carbondale (May 17, June 4), Decatur (Sept. 20, 29, Nov. 4), Herod (May 31), Marshall (May 25), Metropolis (June 1), Muncie (Oct. 6), Nelson (June 8), Quincy (June 6), Urbana (May 21, Oct. 9, 18, 19, Nov. 14), 1928; Lewistown (May 4), Macomb (May 3), Mahomet (April 3), Olney (June 18), Rantoul (April 24), Seymour (Oct. 30), Springfield (May 2), St. Joseph (April 12), Urbana (April 16, 17, 22, 24, May 9), Woodriver (May 20), 1929; Effingham (Nov. 13), Urbana (Nov. 19), 1930. Collected on *Avena sativa*, *Carex* sp., *Crataegus* sp., *Prunus japonica*, *Pyrus*, *Malus*, *Pyrus* sp., and undertermined grasses.

RHOPALOSIPHUM PSEUDOBRASSICAE (DAVIS)

Aphis pseudobrassicae Davis, Canadian Entomologist, Vol. XLVI, July, 1914, p. 231, Figs. 21, 22.

Probably many of the previously published records of *Brevicoryne brassicae* Linn. from Illinois have reference to this species since it has been our experience that *pseudobrassicae* is by far the more common and destructive species attacking cabbage and cruciferous plants in the state. Only the viviparous forms have been described, and there is some question as to how the species over-winters in Illinois. In the original description Davis suggests that the viviparous females over-winter. Paddock (1915), who has studied this species in considerable detail in Texas, reports that in Texas it is not found on cultivated host plants from May until September, thus suggesting it has an alternate host during the hot summer months. It occurs throughout the state and often is a serious pest in spring and fall on cruciferous garden crops.

Data associated with our viviparous specimens are as follows: Cairo (June 3), Carbondale (June 4), Champaign (June 19), Decatur (Sept. 18), DesPlaines (July 6), Elizabethtown (May 29), Galena (June 25), Golconda (Oct. 13), Harrisburg (May 28), Havana (June 21), Herod (May 31), Kankakee (June 29), Metropolis (May 31, June 1), Mt. Carroll (June 25), Oregon (June 27), Quincy (June 6), Urbana (Aug. 6), 1928; Cairo (June 21), Homer (June 17), Kansas (June 17), Oakwood (June 29), Starved Rock State Park (July 5, 6), 1929; Allendale (October 8), 1930. All our material has been collected on *Brassica oleracea*, *Brassica rapa*, *Raphanus sativus*, and *Lepidium virginicum*.

RHOPALOSIPHUM RHOIS MONELL

Rhopalosiphum rhois Monell, Bulletin of the United States Geological and Geographical Survey of the Territories, Vol. V, No. I, January 22, 1879, Art. 1, p. 27.

This large brown aphid is often very conspicuous because of its superabundance on the undersides of the leaves of sumach. In the early summer this species is reported to migrate to various grasses (Gillette, 1915) upon which it spends the remaining portion of the summer. We have collected it only on sumach (*Rhus glabra*). The summer generations of this aphid were described as a new species by Wilson (1911) under the name of *Amphorophora howardii*. Later Davis (1914a) redescribed in detail the viviparous forms and the male produced on wild and cultivated grasses. The latter author states, "Although careful search was made, we were unable to find oviparous females [produced on grasses]." Further he states, "It appears . . . that

the winged males and winged viviparous females migrate [from grasses] to an unknown host in the fall of the year, where the oviparous females are produced." We have found the oviparous female on sumach in fall. A description of the heretofore undescribed apterous oviparous female is presented.

Data associated with our viviparous specimens of this species are as follows: Dixon (July 29, 30), 1883; Champaign (July 18), 1884; Champaign (June 26), 1886; Champaign (July 31), East Peoria (July 22), Goleconda (Oct. 13), Marshall (May 25), Metropolis (May 31), Mt. Carmel (May 26), Starved Rock State Park (June 13), Urbana (July 10, Aug. 2), 1928; Collinsville (Sept. 11), Elizabethtown (June 20), El Paso (July 5), Galena (July 10), Hardin (June 25), Kappa (July 5), Mounds (June 21), Mt. Carroll (July 9), Oregon (July 11), Richmond (July 12), Rock Island (July 7), 1929.

APTEROUS OVIPAROUS FEMALE

Average length from vertex to tip of anal plate, 1.34. General color essentially similar to apterous viviparous female. Average width of head across eyes, .34. Comparative lengths of antennal segments as follows: III—.30; IV—.16 to .17, average .17; V—.14; VI—.10 plus .30 to .36, average .34. Secondary sensoria absent. Primary sensorium on sixth antennal segment with about 5 marginal sensoria. Cornicles .36 long. Cauda .18 long, with about three strongly incurved hairs on a side. Hind tibiae considerably swollen, with about 130 sensoria.

Morphotype.—Apterous oviparous female; Slide No. 8135, Collinsville, Illinois, September 11, 1929, on *Rhus glabra*, (Frison and Ross). On slide with alate viviparous female and apterous oviparous females.

RHOPALOSIPHUM RUFOMACULATUM (WILSON)

Aphis rufomaculata Wilson, Entomological News, Vol. XIX, No. 6, June, 1908, p. 261.

This species was first reported from Illinois by Davis. Our records indicate that it is of considerable economic importance as a pest of chrysanthemums growing in greenhouses. None of our specimens were taken on chrysanthemum growing out of doors. This species is the genotype of *Coloradoa* Wilson which has been placed as a synonym of *Rhopalosiphum* by Baker (1920). There is some evidence, however, for retaining *Coloradoa* as a subgeneric name. Only the viviparous forms have apparently been described.

Data associated with our viviparous specimens are as follows: Carbonale (June 4), Chicago (June 14), Des Plaines (Dec. 18), Hutsonville (Nov. 28), Lawrenceville (Nov. 28), Urbana (May 23, June 6), 1928; Quincy (Nov. 6), 1930. Collected only on *Chrysanthemum* sp.

GENUS TOXOPTERA KOCH

TOXOPTERA GRAMINUM (RONDANI)

Aphis graminum Rondani, Nuovi annali delle scienze naturali. Bologna, Ser. 3, Vol. VI, 1852, p. 10.

The green bug, as it is referred to in the literature of economic entomology, has at times caused serious and widespread damage to wheat and oats in Illinois and many other states. It is of particular in-

terest to entomologists because of the marked epidemic character of its depredations, the epidemics depending mostly upon weather conditions. In normal years the excessive abundance of the green bug is held down by parasites. During long periods of cool, wet weather, however, when the temperature remains below 65°F, the rate of reproduction of the parasites is retarded whereas the green bug continues its normal rate of reproduction under temperatures running almost as low as 40°F. Sexual forms are produced in Illinois, but in the southern states the green bug breeds viviparously throughout the year.

There are numerous references to this species in literature, among which those by Hunter and Glenn (1909), Webster and Phillips (1912), and Theobald (1927) contain good descriptions of the various forms as well as giving much information regarding its biology.

Data associated with our viviparous specimens are as follows: Mt. Carmel (June 10), 1890; Beech Ridge (May 22), 1907; Homer (June 17), Rock Island (July 7), Seymour (June 13), 1929. Collected on *Arena sativa*, *Carex* sp., and *Triticum* sp.

SUPERTRIBE CALLIPTEREA

KEY TO GENERA

1. Eyes without ocular tubercles (Fig. 321).....2
- Eyes with ocular tubercles (Fig. 83).....5
2. Hind wing with longitudinal vein rarely forked more than once (Fig. 88); cauda constricted near middle and knob-like (Fig. 178); terminal filament much longer than greatest width of sixth segment (Fig. 242).....3
- Hind wing with longitudinal vein forked twice (Fig. 91); cauda not constricted but rounded (Fig. 216); terminal filament scarcely, if any, longer than greatest width of sixth segment (Fig. 244)*Stegophylla* p. 268
3. Body with peculiar modified setae (Fig. 316).....4
- Body with normal type of spine-like setae (Fig. 324).*Thripsaphis* p. 270
4. Modified setae on margins of abdomen long and conspicuous; third antennal segment and hind tibiae about equal in length; veins of wings conspicuously outlined with fuscous...*Iziphya* p. 250
- Modified setae on margins of abdomen small and inconspicuous; third antennal segment much shorter than hind tibia; veins of wings not conspicuously outlined with fuscous....*Saltusaphis* p. 265
5. Terminal filament scarcely, if any, longer than greatest width of sixth segment (Fig. 244).....6
- Terminal filament much longer than greatest width of sixth segment (Fig. 266).....7
6. Cauda rounded (Fig. 216); third antennal segment with ten or more narrow and transverse secondary sensoria, fourth segment with a few sensoria.....*Tamalia* p. 268
- Cauda knobbed (Fig. 211); third antennal segment with less than ten secondary sensoria which are almost circular in shape, fourth segment without sensoria.....*Phyllaphis* p. 264
7. Conspicuous tubercles on dorsum of anterior abdominal segments (Fig. 327).....8
- Tubercles on dorsum of anterior abdominal segments wanting or very rudimentary10

8. Terminal filament of sixth antennal segment at least three or four times as long as basal portion of same segment (Fig. 243); cornicles moderately long and prominent (Fig. 154); anal plate slightly indented (Fig. 217).....**Drepanaphis** p. 246
- Terminal filament of sixth antennal segment at most twice as long as basal portion of same segment (Fig. 247); cornicles short and somewhat trapezoidal (Fig. 156); anal plate deeply indented (Fig. 168).....9
9. Abdomen with well-developed lateral tubercles (Fig. 310) in addition to those on dorsum.....**Melanocallis** p. 251
- Abdomen without lateral tubercles.....**Tuberculatus** p. 271
10. Cauda elongate and spatulate-shaped beyond constriction (Fig. 183) **Cepegillettea** p. 246
- Cauda knob-like beyond constriction.....11
11. Fore femora with a projection or tubercle near distal end (Fig. 325) **Shenahweum** n. gen. p. 267
- Fore femora without a projection or tubercle near distal end (Fig. 326)12
12. Cornicles very short, not produced, almost ring-like (Fig. 155).....
- Cornicles distinctly produced, short or of medium length but never almost ring-like (Fig. 150).....13
13. Mesal apex of antennal tubercle protruding much beyond vertex (Fig. 78)14
- Mesal apex of antennal tubercle not or scarcely protruding beyond vertex (Fig. 81).....15
14. Radial sector well-developed (Fig. 72); anal and cubital veins of fore wings not margined with fuscous (Fig. 72); anal plate entire or nearly so (Fig. 173).....**Euceraphis** p. 249
- Radial sector lacking (Fig. 65) or partly developed (Fig. 57), except that in some specimens of *C. castaneae* it is entirely but weakly developed; anal and cubital veins of fore wings distinctly margined with fuscous (Fig. 57); anal plate somewhat bilobed or cleft (Fig. 220).....**Calaphis** p. 243
15. Cauda lengthened, constricted and with apex knob-like (Fig. 178) **Myzocallis** p. 254
- Cauda not distinctly constricted and more rounded (Fig. 211).....**Neosymydobius** p. 261

GENUS CALAPHIS WALSH

Key to the Species of the Genus Calaphis

1. Dorsum of thorax with one median and two lateral dark stripes **betulella** Walsh p. 244
- Dorsum of thorax without dark stripes.....2
2. Fourth and fifth antennal segments uniformly dark-colored, third antennal segments with about eight round sensoria (Fig. 235); on chestnut.....**castaneae** (Fitch) p. 245
- Fourth and fifth antennal segments with basal portions light and apical portions dark, third antennal segment with about twelve to eighteen oval sensoria (Fig. 236); on birch.....**betulaecolens** (Fitch) p. 244

CALAPHIS BETULAECOLENS (FITCH)

FIGS. 9, 11, 236

Aphis betulaecolens Fitch, Fourth Annual Report of the Regents of the University on the Condition of the State Cabinet of Natural History, State of New York, January 14, 1851, p. 66.

Davis (1909b) first reported the taking of this species in Illinois, saying "it doubtless occurs [in Illinois] wherever the birch is found." Our collecting indicates it is common in the northern part of the state, where the white birch, its host, is native, and that it is likely to be found wherever there are trees of this species. All of the various forms have been previously described in detail, particularly by Davis (1909b) and Baker (1916d). At times this species is abundant at Urbana and the eggs form regular masses (Fig. 9) on the low branches and watersprouts of its host. The lack of apterous viviparous females, or at least their rarity, is a feature in the life history of this species, and that of the next two following species, which differs from that of certain other closely related genera.

Data associated with our alate viviparous specimens, pupae, and nymphs are as follows: East Dubuque (June 25), Galena (June 25), Urbana (July 10), 1928; Beach (Aug. 29), Macomb (May 3), Savanna (July 9), Urbana (Aug. 20), Waukegan (July 13), 1929. Males and oviparous females have been taken at Decatur (Oct. 7) and Urbana (Oct. 15), 1929. All specimens collected on white or canoe birch, *Betula alba* var. *papyrifera*.

CALAPHIS BETULELLA WALSH

FIGS. 65, 78, 220

Calaphis betulella Walsh, Proceedings of the Entomological Society of Philadelphia, Vol. I, December, 1862, p. 301.

This large and handsome species of plant louse was originally described by Walsh from specimens taken in August on *Betula nigra* at Rock Island, Illinois. Since then it has not been recorded from the state, but our survey has shown that it is common from May to September in all parts of Illinois on the red or river birch (*Betula nigra*). This agile species preferably frequents the undersides of the succulent leaves. Baker (1916d) gives further details of the structural characters of the alate viviparous females.

Our collection records for alate viviparous females, pupae, and nymphs of this species are as follows: Cairo (June 2), Carbondale (June 4), East Dubuque (June 25), Harrisburg (May 28), Herod (May 29), Kankakee (June 29), Metropolis (May 31), Quincy (June 6), Rock Island (June 24), Urbana (Sept. 22), 1928; Hardin (June 25), Macomb (May 4), Pinckneyville (June 25), 1929; Urbana (Sept. 28), 1930. *Betula nigra* is the preferred host, but at times specimens were taken on other species of trees of this same genus.

Neotypic Slide.—Since this species was originally described from Rock Island, Illinois, by Walsh and the types are lost, a slide in the Survey Collection is selected as the *neotype*. The data associated with this slide are as follows: Slide No. 4657, Rock Island, Illinois, June 24, 1928, on *Betula nigra*, collected by T. H. Frison and F. C. Hottes.

CALAPHIS CASTANEEAE (FITCH)

FIG. 57, 235

Callipterus castaneae Fitch, Transactions of the New York State Agricultural Society, Vol. XVI, 1856, p. 471. [Third Report on the Noxious and Other Insects of the State of New York, 1856, p. 471].

Not previously recorded from Illinois. Found by the writers on specimen trees of *Castanea dentata* in southern and central Illinois. Baker (1916d) has presented information regarding the typic specimens of Fitch and further details concerning characters of alate viviparous females. Descriptions are presented of the heretofore undescribed sexual forms.

Data associated with our specimens of alate viviparous females, pupae, and nymphs of this species are as follows: Decatur (Oct. 20), Urbana (July 1), 1928; Carbondale (June 21), Grayville (June 19), 1929. Oviparous females taken at Decatur (Oct. 20), 1928, and males and oviparous females taken at Urbana (Oct. 14), 1929. All taken on the under sides of leaves of host.

ALATE MALE

Size and general color.—Average length from vertex to tip of anal plate, 1.50. Head dusky brown; prothorax dusky brown on dorso-meson, remaining portion yellowish; meso- and metathorax dusky brown on dorsum, yellowish laterally; abdomen uniform pale yellowish, including cornicles, cauda, and anal plate; genitalia brownish. Femora yellowish except for slightly brownish areas on dorsum near apex; tibiae and tarsi uniformly dark brownish black. First and second antennal segments and extreme base of third antennal segment concolorous with head, remaining segments brown. Stigma with posterior margin brown, remaining portion smoke-color, extreme basal portion with a much darker brownish spot. Anal and cubital veins much darker than media, with brownish borders. Beak yellowish with terminal portion brownish.

Structure.—Average width of head across eyes, .46. Comparative length of antennal segments as follows: III—.86 to .93, average .89; IV—.56 to .57, average .56; V—.40 to .46, average .43; VI—.17 to .23, average .19 plus .36 to .43, average .40. Secondary sensoria present on third, fourth, fifth, and sixth antennal segments; on the third and fourth segments widely scattered, covering the entire segment; on the fifth and sixth more frequently confined to an irregular row. Beak scarcely reaching midway between first and second pair of coxae. Second fork of media considerably closer to first fork than to margin of wing. Radial sector absent for part of its length. Cornicles .07 long. Cauda .08 long, with a well-developed knob-like structure at the tip.

APTEROUS OVIPAROUS FEMALE

Size and general color.—Average length, 2.10. Head reddish brown; pro- and mesothorax dusky greenish brown; metathorax and abdomen yellowish green, dorsum anterior to cornicles with segmentally arranged transverse greenish brown strips and subquadrate lateral spots, all of which merge for three or four segments to form a brown patch immediately in front of cornicles. Segments posterior to the cornicles yellowish green. Cornicles and cauda dusky. Legs and antennae same color as in alate male.

Structure.—Average width of head across eyes, .41. Comparative average lengths of antennal segments as follows: III—.82; IV—.46; V—.40; VI—base .21, with no measurements for the terminal filament. Antennae usually without secondary sensoria, rarely third segment with one. Cornicles as in alate male, .10 long. Hind tibiae much swollen and with from 30 to 90 sensoria, usually more than 60. Distance between tip of ovipositor and cornicles, .46.

Allotype.—Alate male; Slide No. 8386, Urbana, Illinois, October 14, 1929, on *Castanea dentata*, (Frison and Park). *Morphotype.*—Apterous oviparous female; Slide No. 8383, same data as allotype.

GENUS CEPEGILLETTEA GRANOVSKY

CEPEGILLETTEA BETULAEFOLIAE GRANOVSKY

FIGS. 183, 326

Cepegillettea betulaefoliae Granovsky, Proceedings of the Entomological Society of Washington, Vol. 30, No. 7, October, 1928, p. 115.

This recently described species was collected in Illinois and recognized as distinct previous to its description by Granovsky. It is highly probable that it is restricted in distribution in Illinois to the extreme northeastern part of the state. Although it is recorded from *Betula alba* var. *papyrifera* by its describer, we have found it only on a dwarf birch, *Betula pumila*. Granovsky gives excellent descriptions of all forms of this species. His material was from Wisconsin and British Columbia.

Our specimens were collected at Antioch, June 15, 1928, and at Beach, Aug. 29, 1929.

GENUS DREPANAPHIS DEL GUERCIO

The treatment of this genus was prepared with the collaboration of Dr. A. A. Granovsky. His description of a new species is included without change. His measurements of antennal segments are expressed in comparative terms, not in millimeters.

Key to the Species of the Genus Drepanaphis

1. Species with more than one pair of prominent finger-like tubercles on dorsum of anterior abdominal segments (Fig. 327)....
..... *acerifoliae* (Thomas) p. 246
- Species with only one pair of prominent tubercles on dorsum of anterior abdominal segments and these united at the base (Fig. 323) 2
2. Wing veins broadly bordered with fuscous; only a single pair of prominent tubercles on dorsum of anterior abdominal segments.....*keshenae* Granovsky n. sp. p. 248
- Only the tips of veins marked by light brown flecks; single large or prominent pair of tubercles and occasionally two additional pairs of minute on dorsum of anterior abdominal segments....
..... *monelli* (Davis) p. 249

DREPANAPHIS ACERIFOLIAE (THOMAS)

FIGS. 154, 217, 243, 327

Siphonophora acerifoliae Thomas, Bulletin Illinois State Laboratory of Natural History, Vol. I, No. 2, June, 1878, p. 4.

This species spends the entire year on its host. It appears early in spring and produces the sexual forms in the autumn. The eggs are laid in almost any protected place on the limbs and trunk. We are not aware of the production of apterous viviparous females. Davis (1910d) reports the species as "common throughout the state on soft maple and occasionally on hard and Norway maple but seldom in such numbers as

to be injurious." At Urbana in late summer or fall this species sometimes becomes a nuisance, the walks beneath infested trees being kept damp by the falling of honeydew. The alate viviparous females have been described and figured by several (Sanborn, 1904, and Patch, 1923b). Descriptions of the apterous oviparous female and male have apparently not appeared in literature and hence are given here.

Cotypes of this common species, which inhabits the undersides of the leaves of maple trees, were included among the recently discovered type specimens of Thomas in the Survey collection. These cotypes have been mounted in damar balsam on two slides. Slide No. 7168 has been designated as the *lectotypic* slide and Slide No. 7169 as a *paratypic* slide. Both slides contain alate viviparous females and pupae in poor condition. The original vial containing these specimens was given the number 59 by Thomas. The data associated with the type slides are as follows: Ft. Dodge, Iowa; Dubuque, Iowa; and Peoria, Illinois; September 1, 1877.

APTEROUS OVIPAROUS FEMALE

Length from vertex to tip of anal plate, 2.18. General color yellowish suffused with light dusky brown. Antennae dusky brown, terminal filament and base of third segment lighter in color. Femora yellowish brown, tibiae either uniform brownish or with the basal portion darker than the apical portion; tarsi light dusky. Average width of head across eyes, .57. Antennae with the following comparative lengths: III—.57 to .69, average .61; IV—.36 to .46, average .42; V—.43 to .53, average .47; VI—.10 to .14, average .13 plus .43 to .53, average .48. Secondary sensoria absent. Beak reaches to mesothoracic coxae. Dorsum of abdomen without tubercles. Cornicles .18 long, with just a suggestion of a swelling at one side near the base. Posterior extremity of abdomen with a very elongate ovipositor. Anal plate and cauda rounded. Cauda .08 long, not longer than it is wide at base. Hairs on body enlarged at the tip. Hind tibiae very slightly swollen, with about 50 sensoria, mostly on one side, of the basal three-fourths of the segment.

Morphotype.—Apterous oviparous female; Slide No. 8423, Urbana, Illinois, October 9, 1929, on *Acer saccharinum*, (T. H. Frison). On slide with other oviparous females.

ALATE MALE

Length from vertex to tip of anal plate, 1.09. Width of head across eyes, .54. Color essentially as in alate viviparous female. Wings with veins, except bases, distinctly bordered with fuscous. Abdomen with a lateral row of quadrate brown spots and a median, dorsal brown stripe separating into small spots towards apex. Venter of abdomen with a median brown stripe terminating in the gonapophyses, which are also brown.

Average comparative antennal lengths as follows: III—.89, IV—.59, V—.56, VI—.14 plus 1.00. Secondary sensoria present on all antennal segments, numbering as follows: III—71 to 98, average 83; IV—34 to 55, average 43; V—15 to 29, average 20; VI—0 to 2, average 1. Dorsal tubercles of abdomen prominent, much as in alate viviparous female (Fig. 327), but with the first two small pairs reduced or absent. Cornicles .28 in length, mesal margin more or less straight, outer margin often greatly flared out at base, base wide. Cauda and anal plate as in alate viviparous female.

Allotype.—Alate male; Slide No. 8414, Metropolis, Illinois, September 28, 1929, on *Acer saccharinum*, (Frison and Hottes). On slide with nymph.

A series of specimens in which the veins of the front wings are not margined with fuscous except at the extreme apices, differ from the above description only in having the cornicles shorter, averaging .20 in length, and less swollen at the base.

Data associated with our Illinois specimens are as follows: Normal (May 10-15), 1884; Springfield (July 1), 1885; Urbana (June 24), 1887; Tonti (May 10), 1888; Urbana (Oct. 28, 1897; Albion (May 26), Cairo (June 2), Carbondale (June 4), Catlin (Sept. 27), Danville (Sept. 18),

Elizabethtown (May 29), Golconda (Oct. 13), Havana (June 21), Kankakee (June 29), Leroy (June 20), Marshall (May 25), Mattoon (June 10), Metropolis (May 31), Mt. Carmel (May 26), Mt. Carroll (June 25), Oregon (June 27), Pekin (June 20), Quincy (June 6), Shawneetown (May 27), Starved Rock State Park (June 12), Urbana (May 16, June 6-7, Oct. 25), 1928; Alton (June 25), Edwardsville (Sept. 11), Elizabethtown (June 20), Grayville (June 19), Herod (Sept. 27), Macomb (May 3), Metropolis (Sept. 28, Oct. 7), Newton (June 17), Rock Island (July 7), Springfield (May 2), Urbana (Oct. 7-9), 1929. Collected on *Acer saccharinum* and *Acer saccharum*. Sexual forms and mating pairs collected at Urbana in October.

DREPANAPHIS KESHENAE GRANOVSKY new species

ALATE VIVIPAROUS FEMALE

Length of body from frons to the tip of cauda about 2.084. General color is light brown or tan with yellowish undertone. The entire body is somewhat heavily covered with the white, waxy, flocculent secretion. This secretion is especially heavy along the dorso-median line of the prothorax, thorax and abdomen. The first two anterior abdominal segments and the transverse area just back of the cornicles, as well as the lateral abdominal tubercles, are also covered with heavy wax. The dorsal tubercles and the areas around the cornicles are free from waxy threads, and only slightly dusted with a gray powder of waxy secretion. Head dusky brown with black circles around ocelli; posterior margin of the head with a distinct narrow black line, extending from eye to eye. Frons provided with a few fine hairs. Eyes large, carmine. Antennae placed on prominent diverging tubercles. Length of antenna—4.34. Comparative average lengths of antennal segments as follows:— I— 7.50; II— 3.00; III— .56.78; IV— 40.64; V— 39.83; VI— 9.25 plus unguis 91.00. Antennal segment I dusky brown; segment II yellowish orange; segments III to VI orange to light brown with very narrow black annulations at distal ends. Base of the segment VI short, dusky brown. Unguis long, dusky. Antennae distally imbricated and provided with a few short, fine setae. The basal three-fifths or two-thirds of antennal segment III carries from 12 to 15 rather large, circular, secondary sensoria. The primary circular sensorium at the end of the segment V and the long oval sensorium at the base of the unguis are fringed with long sensilia in a form of crown; the latter sensorium is surrounded with a crowded row of auxiliary sensoria and two additional circular sensoria, each placed singly some distance from its poles of longitudinal axis. Rostrum not quite reaching to the second pair of coxae.

Thorax dark brown; thoracic lobes prominent, occasionally almost black. Legs pale yellow, clothed with fine hairs. Fore femora dark brown to dusky black; hind femora slightly dusky with dark brown to black bands at distal ends; middle femora the lightest in color, without such bands. All tibiae dusky brown at proximal ends and to a lesser extent distally, the middle tibiae being the lightest. All tarsi slightly dusky. Wings hyaline. Costa and subcosta of the fore wings yellow with brown or dusky areas near anal veins. Stigma heavily bordered with dusky brown, leaving the yellow oblong cell in the middle, which touches the outer margin of the stigma. Radial sector deeply curved. Media twice-branched. All veins, with the exception of costa and subcosta, are broadly banded with dusky brown, especially toward the tip of each vein, while bases of the media and cubitus are lighter and almost free from dusky borders. Hind wings with media and cubitus present, although latter only faintly indicated; media, distal end of costa, and areas near hamuli bordered with dusky brown.

Abdomen yellowish olive green to light brown, sparsely clothed with fine hairs. Lateral tubercles small, each bearing a single hair and usually dusky, especially on third, fourth, and fifth abdominal segments. The dorsum of the third abdominal segment is provided with a pair of black finger-like tubercles, united from the upper third to the base. The average length of the entire tubercle is 0.37; the width of the base 0.27; the height of the

united base 0.24; and the length of the finger-like processes 0.12. Cornicles dark dusky brown, almost black, having bowling-pin shape, paler and somewhat constricted at the base, and with a narrow pale flange at the distal ends. The average length of the cornicle 0.23; the width at the base 0.09; the width of the narrow neck 0.05. The abdominal area between the dorsal tubercles and the cornicles often with four rows of small dusky tubercular spots; these are often inconspicuous and faint. Cauda yellow, short, globular on a conical base with several long hairs. Anal plate yellow, slightly dented, hairy.

Host plant and feeding habits. Hard maple (*Acer saccharum*), feeding singly on lower side of the young leaves. Adults are quite active and often leap when foliage is only slightly disturbed.

Described from 7 alate viviparous females collected by A. A. Granovsky, September 14, 1927, at Keshena, Wisconsin, in virgin forest, and 9 specimens taken by T. H. Frison and F. C. Hottes, June 20, 1929, at Elizabethtown, Illinois.

Type locality. Keshena, Wisconsin, and Elizabethtown, Illinois.

Cotypes in the collections of the U. S. National Museum, Illinois State Natural History Survey (Slide Nos. 7616-7617), and in the private collection of A. A. Granovsky.

DREPANAPHIS MONELLI (DAVIS)

FIG. 323

Phymatosiphum monelli Davis, Annals of the Entomological Society of America, Vol. II, No. 3, Sept., 1909, p. 197.

This species is here recorded from Illinois for the first time. Our specimens were collected from the undersides of the leaves of hard maple and buckeye. The sexual forms have not been described.

A lectotypic slide (3119) was selected from cotypic slides of this species by Frison (1927).

Data associated with our viviparous specimens, all collected on *Acer saccharum* and *Aesculus glabra*, are as follows: Havana (June 21), Kankakee (June 29), Mt. Carroll (June 25), Oakwood (July 8), Urbana (May 16, June 7), 1928; Rock Island (July 9), 1929; and Urbana (July 23), 1930.

GENUS EUCERAPHIS WALKER

EUCERAPHIS BETULAE (LINNAEUS)

FIGS. 10, 72, 173

Aphis betulae Linnaeus, Systema Naturae, Editio Decima, 1758, p. 452.

This is the first record of the occurrence of this species in Illinois. It was collected on native white, or canoe, birch (*Betula alba* var. *papyrifera*) in the northwestern part of the state. Records in literature, ranging in North America from Connecticut to California and Europe, indicate that *betulae* is likely to be found wherever its host grows as a native tree. Good descriptions of the alate viviparous female and sexual forms have been given by Theobald (1927). Baker (1917b) has shown that *cerasicolens* (Fitch) is a synonym of *betulae* and has presented a key for the recognition of most of the American species belonging to this genus.

Data associated with our specimens of this species are as follows: East Dubuque (June 25) and Galena (June 25), 1928.

GENUS IZIPHYA NEVSKY

IZIPHYA FLABELLA (SANBORN)

FIG. 316

Chaitophorus flabellus Sanborn, Kansas University Science Bulletin, Vol. III, No. 1, July, 1904, p. 37.

This species has not previously been reported from Illinois. It is most easily taken by sweeping *Carex*, the host genus to which, according to published records and our collecting, it is confined. Originally described from Kansas and reported since from Colorado. Gillette (1909b) has given good descriptions and illustrations of the alate and apterous viviparous females.

Data associated with our specimens are as follows: Beach (Aug. 30), Carbondale (June 21), Grayville (June 19), Seymour (June 26, July 20), 1929.

GENUS MELANOCALLIS OESTLUND

MELANOCALLIS FUMIPENNELLA (FITCH)

Aphis fumipennella Fitch, Transactions of the New York State Agricultural Society, Vol. XIV, 1854 (printed 1855), p. 870.

Davis (1910b) described this species as new from material collected at Lake Forest, Illinois, under the name *Callipterus caryacfoliae*. Baker (1911b), on the basis of a study of Fitch's type, declared the species described by Davis a synonym of *Melanocallis fumipennella* (Fitch). Fitch's original description, however, fails to agree in some respects with specimens we are calling this species. This minute and very active black aphid was collected on the under surface of leaves of *Carya* sp. One of the cotypic slides of *caryacfoliae* Davis was designated as the *lectotypic* slide, No. 1838, by Frison (1927). Descriptions of the sexual forms, heretofore undescribed, are presented.

Data associated with our specimens are as follows: Mt. Carmel (May 27), 1884; Lake Forest (June 24), 1909; Dauville (Sept. 18), Havana (June 21), Marshall (May 25), Metropolis (June 1), Mt. Carmel (May 26), Mt. Carroll (June 25), Shawneetown (May 27), 1928.

ALATE MALE

Length from vertex to tip of anal plate, 1.16. Color essentially that of alate viviparous female. Average width of head across eyes, .50. Comparative lengths of antennal segments as follows: III—.49, IV—.26, V—.24, VI—.14 plus .10. Secondary sensoria (Fig. 234) distributed as follows: III—60, IV—24, V—17, VI—7, irregularly arranged and scattered over entire surface of segments. Wings, legs, cornicles, cauda, anal plate, and tubercles similar to those found on alate viviparous female.

APTEROUS OVIPAROUS FEMALE

Length from vertex to tip of anal plate, 1.43. Head dusky brownish, thorax and abdomen light brownish with dark brown spots on dorsum and lateral portions, spots on middle of dorsum of abdomen often confluent and forming stripes. Cornicles and area around their base brown; no brownish

marking posterior to cornicles. Average width of head across eyes, .39. Comparative lengths of antennae as follows: III—.36; IV—.16; V—.17; VI—.11 plus .10. Secondary sensoria absent. Ovipositor elongate. Hind tibiae scarcely swollen, with about 35 sensoria. Dorsum and lateral portions of abdomen without tubercles. Hairs on body very elongate and with enlarged tips.

Allotype.—Alate male; Seven Hills, Alabama, October 24, 1928, on *Carya illinoensis*, (L. L. English). Slide No. 10570. *Morphotype*.—Apterous oviparous female; on same slide as allotype, together with another male and two alate viviparous females.

GENUS MONELLIA OESTLUND

The key to the species belonging to this genus and the description of a new species were prepared by Dr. A. A. Granovsky, and the identification of all Illinois material has been checked by him. His measurements of antennal segments are expressed in comparative terms, not in millimeters.

Key to the Species of the Genus *Monellia*

1. Costal margin of wing with broad black band intercepted before stigma..... *costalis* (Fitch) p. 252
- Costal margin clear or yellowish without black band..... 2
2. Abdomen without brown or black maculation; terminal filament about equal to or only very slightly shorter than the basal portion of the sixth antennal segment; anal veins narrow and delicate; wings at rest held in flat position... *caryella* (Fitch) p. 252
- Abdomen usually with brown or black maculation with the exception of early summer forms, which have abdomen without such maculations, but then antennae and wings typical of the species; anal veins prominent, somewhat dusky; wings at rest held in erect position..... 3
3. Abdomen usually with four rows of large brown or black spots most conspicuous on anterior segments; spring forms without such spots; terminal filament usually longer than, or seldom equal to, the basal portion of the sixth antennal segment....
- *caryae* (Monell) p. 251
- Abdomen usually with two very prominent black spots near the cornicles; spring forms without such spots; fall forms with six or eight rows of small spots over the dorsum; terminal filament usually shorter than and seldom equal to the basal portion of the sixth antennal segment.....
- *nigropunctata* Granovsky n. sp. p. 252

MONELLIA CARYAE (MONELL)

Callipterus caryae Monell, Bulletin of the United States Geological and Geographical Survey of the Territories, Vol. V, No. 1, January 22, 1879, Art. 1, p. 31.

Davis (1910d) has previously recorded the American walnut aphid as "occurring everywhere throughout the state on hickory and walnut." It frequents the lower surfaces of the leaves and holds the wings erect while resting. Davidson (1914b) has given detailed descriptions of all forms and presented much information concerning the life history of this species as he found it in California on walnut. Davidson

failed to find, during eighteen months of study, any trace of wingless viviparous females.

Data associated with our viviparous specimens are as follows: Mt. Carmel (May 27), 1884; Danville (Sept. 18), Kankakee (June 29, July 15), Mt. Carmel (May 26), St. Joseph (Aug. 5), 1928; Bloomington (July 5), Edwardsville (Sept. 11), Galena (July 10), Hardin (June 25), Kansas (June 17), Rock Island (July 7), 1929. An oviparous female was collected at Edwardsville, Sept. 11, 1929. All specimens taken on *Carya* sp., *Juglans nigra*, *Juglans* sp., and *Quercus* sp.

MONELLIA CARYELLA (FITCH)

FIG. 157

Aphis caryella Fitch, Transactions of the New York State Agricultural Society, Vol XIV, 1854 (printed 1855), p. 867.

The little hickory aphid was first recorded from Illinois by Davis (1910d), who states, "I have collected this species but once, namely, on hickory at Centralia, Ill., August 13, 1907." In the field it may be separated from *M. caryac* and *M. nigropunctata* by the fact that the wings are held when at rest in a flat position over the body. Davidson (1914b) has published much information concerning the biology of this species and given technical descriptions of all the forms. He reports that the viviparous forms, so far as observed, all develop wings.

Data associated with our viviparous specimens from Illinois, all collected on *Carya ovata*, *Carya* sp., or *Juglans* sp., are as follows: Antioch (June 15), Mt. Carroll (June 25), Shawneetown (May 27), 1928; Columbia (Sept. 11), Elizabethtown (June 20), Grayville (June 19), 1929.

MONELLIA COSTALIS (FITCH)

FIGS. 155, 251

Aphis caryella var. *costalis* Fitch, Transactions of the New York State Agricultural Society, Vol. XIV, 1854 (printed 1855), p. 869.

This species has not been previously recorded from Illinois. It is easily recognized because of the dark band on the costal margin of the fore wing. Baker (1917b) has redescribed the alate viviparous female but the sexual forms are apparently unknown or at least not described.

Data associated with our viviparous specimens are as follows: Mt. Carroll (June 25), Oregon (June 28), 1928; Cairo (June 22), Elizabethtown (June 20), Grayville (June 19), 1929. All specimens collected on *Carya ovata*, *Carya* sp., and *Juglans nigra*.

MONELLIA NIGROPUNCTATA GRANOVSKY new species

ALATE VIVIPAROUS FEMALE

Length of body from frons to the tip of cauda about 1.71. General body color from pale lemon yellow to orange or deep butter yellow with greenish tinge. Head concolorous with the body; frontal lobes may be slightly dusky about ocelli with a few singly placed bristles. Eyes bright red. Antennae on very small frontal tubercles, each of which is marked with a thin black line on lower edge of the antennal socket, nearly as long

as the width of the first antennal segment, slightly thicker at the outer end. Length of antenna 1.19. Comparative average lengths of antennal segments as follows: I— 3.2; II— 3.0; III— 22.10; IV— 12.78; V— 12.43; VI— 8.04 plus unguis 6.77. Unguis dusky, usually shorter than the base of the sixth segment. Antennae pale to pale yellow with dark brown to black annulations at distal ends of segments II to VI, inclusive; irregular slightly dusky shading over the sensorated area of segment III usually present. The entire antennae, with the exception of segments I and II, finely imbricated, more conspicuously distad of each segment. Antennae almost naked or with a few extremely minute setae. The tip of the unguis carries a few capitate hairs. The basal three fifths or more of segment III with a row of from 4 to 8, usually 5 to 7, rather large, oval, secondary sensoria. Only rarely some individuals have more and as many as 11 sensoria, covering almost the entire segment III. Segment V with a circular primary sensorium, and the usual primary oval sensorium with a few auxiliary ones at the base of the unguis. Both primary sensoria provided with fine fringes of short sensory hairs, especially at the base of each sensorium. Rostrum with its dusky tip barely reaches beyond the first pair of coxae.

Thorax deep orange, occasionally with dusky tinge. Each lateral margin of prothorax is marked with a dark brown or black line, extending from the head margin to half or two-thirds of the length of the prothorax, fading caudad. Legs pale yellow, sparsely clothed with short fine hairs. Distal ends of pro- and meta-femora on inner side marked with black conspicuous patches. Meso-femora without such patches. All femora and tibiae very slightly dusky distad. All tarsi dusky. Wings hyaline. Fore wings with costa and subcosta pale yellow; stigma deeper yellow with brownish margins, especially along the radial vein, and with a conspicuous dusky patch at the base. Radial sector short, nearly obsolete or very faintly indicated distally. Media twice-branched, brown at the base, color fading to the tips of the branches. Cubitus dark brown at the base, intensity of the color diminishing distally. Anal vein dark brown with diffused shading. Cubitus and anal veins conspicuously curved at their bases. Hind wings with media and cubitus present. Wings when at rest are held in upright position.

Abdomen from pale yellow to orange yellow normally with an oval, black or dark brown blotch, placed on each side, somewhat in front of the middle of the fifth abdominal segment, each with a clear hair tubercle in the middle. These blotches from dorsal and ventral sides may appear as heavy lines. They are often lacking on early spring forms, or they may be only faintly indicated. Late summer and fall forms almost without exception have dorsum of the abdomen speckled with from six to eight rows of small dark brown or dusky tubercles, each bearing very small fine hair. Lateral tubercles small and usually without maculations. Cornicles reduced to pore-like chitinized rings, back of the black abdominal blotches. Cauda yellow, short, globular, with five long bristle-like and several smaller hairs. Anal plate yellow, deeply bilobed, and provided with a few long, stout hairs supplemented with several shorter ones.

Immature forms are pale yellow to orange, with from six to eight rows of very prominent dusky tubercles, each bearing stiff, long, capitate hairs.

Described from over two hundred specimens collected at various places in Wisconsin, Illinois, Pennsylvania, Minnesota, New York, Georgia, South Carolina, Mississippi and other states.

Host plants. Black walnut (*Juglans nigra*), butternut (*Juglans cinerea*), shagbark hickory (*Carya ovata*), bitternut (*Carya cordiformis*), and pecan (*Carya illinoensis*). Names of the trees given after Gray.

Habit of feeding. This species feeds singly or in small scattered colonies, usually near the mid-rib or lateral veins on lower side of the leaves.

Distribution. It is evidently distributed throughout the eastern half of the United States and Southern Canada, wherever host plants are available. It has not been collected in the area of the Great Plains and in the Western states.

Type locality. It is advisable to limit the type locality to two states, namely, Illinois and Wisconsin.

Cotypes in the collections of the U. S. National Museum, Illinois State Natural History Survey, and in the private collection of A. A. Granovsky, are listed in the following tabulation:

Date	Locality	Collector	Hosts	Number of slides	Alate viviparous females	Nymphs	Sexes
July 24, 1925	Egg Harbor, Wis..	A. A. G.	Butternut....	2	3	1	.....
Aug. 12, 1925	Egg Harbor, Wis..	A. A. G.	Butternut....	2	2	3	.....
Aug. 17, 1925	Sun Prairie, Wis..	A. A. G.	Hickory.....	3	3	6	.....
July 8, 1927	Viroqua, Wis.....	A. A. G.	Black walnut	2	5	1	.....
Aug. 7, 1927	Egg Harbor, Wis..	A. A. G.	Black walnut	2	15	.....	.....
Aug. 9, 1927	Green Bay, Wis....	A. A. G.	hickory.....	3	7	13	.....
Aug. 28, 1927	Egg Harbor, Wis..	A. A. G.	Bitternut....	5	10	.....	.....
Sept. 2, 1927	Green Bay, Wis....	A. A. G.	Hickory.....	6	4	18	4 ♂ 14 ♀ ♀
June 21, 1928	Havana, Ill.....	F. & H.	Hickory.....	3	4	2	.....
June 19, 1929	Grayville, Ill.....	F. & H.	Walnut.....	5	12	1	.....
June 20, 1929	Elizabethtown, Ill.	F. & H.	Hickory.....	3	6	.....	.....
June 20, 1929	Elizabethtown, Ill.	F. & H.	Black walnut	1	4	.....	.....
June 22, 1929	Cairo, Ill.....	F. & H.	Hickory.....	2	4	.....	.....

In addition to the cotypic material listed above we have the following Illinois records: Kankakee (July 29), Metropolis (June 1), Mt. Carroll (June 25), Urbana (July 10), 1928; and Columbia (Sept. 11), 1929. All taken on *Carya illinocensis*, *Carya ovata*, or *Carya* sp.

GENUS MYZOCALLIS PASSERINI

(SUBGENERA MYZOCALLIS PASSERINI AND THERIOAPHIS WALKER)

Key to the Species of the Genus *Myzocallis*

1. Wings between veins conspicuously mottled with brownish or blackish patches (Fig. 61); markings not restricted to bordering of veins or to costal area.....2
- Wings between veins not conspicuously mottled (Fig. 63); dark markings restricted either to the apices and bordering of veins or to costal area.....4
2. Cornicles and area around their base dark-colored.....
- Cornicles and area around their base not dark but light.....3
3. Species found on milkweed (*Asclepias*).....*asclepiadis* (Monell) p. 256
- Species found on oak (*Quercus*).....*alhambra* Davidson p. 255
4. Cornicles almost or at least with apical portion dark-colored.....5
- Cornicles entirely light-colored.....4
5. Dorsum of abdomen with numerous dark patches or spots; third antennal segment with about eight secondary sensoria.....
- Dorsum of abdomen without dark patches or spots; third antennal segment usually with less than six secondary sensoria.....6
6. Basal third of third antennal segment with two to four secondary sensoria.....
- Basal portion of third antennal segment without secondary sensoria, sensoria numbering from three to eight and located upon swollen middle area of segment (Fig. 249).....
- Basal portion of third antennal segment dark-colored and with more or less oval or transverse oval sensoria.....
- Basal portion of third antennal segment light-colored and with round sensoria.....8

8. Fore wings with tips of all or almost all veins ending in fuscous areas *punctata* (Monell) p. 259
- Fore wings with tips of few or no veins ending in fuscous areas.....9
9. Fore wings immaculate except for small dark spot in stigmal area; forms small; on hazel (*Corylus*).....*coryli* (Goeze) p. 257
- Fore wings not entirely immaculate, usually a distinct dark band extending along costal margin to tip of wing (Fig. 63); on oak (*Quercus*)10
10. Femora of fore legs mostly dark.....*bella* (Walsh) p. 257
- Femora of fore legs mostly pale.....*walshii* (Monell) p. 259

MYZOCALLIS ALHAMBRA DAVIDSON

FIG. 334

Myzocallis alhambra Davidson, Canadian Entomologist, Vol. LII, No. 6, August, 1920, p. 176.

This species has been determined for us by Dr. Granovsky and is here recorded from Illinois for the first time. It is so closely related to *M. asclepiadis* (Monell) that we have been unable to separate it from the latter except upon the basis of host plants. Davidson described this species from California. Our material has been collected on *Quercus macrocarpa*, *Quercus alba*, and *Quercus bicolor*. Since the sexual forms have not been described, brief descriptions of them are presented here.

Data associated with our specimens are as follows: Carbondale (June 4), Catlin (Sept. 27), Havana (June 20), 1928; El Paso (July 5), Urbana (Oct. 11, 15), 1929; Urbana (Oct. 20, 24), 1930. Sexual forms were taken at Urbana on various dates in October, 1929 and 1930. A mating pair was taken on October 24, 1930.

ALATE MALE

Size and general color.—Length from vertex to tip of anal plate, 1.35. Width of head across eyes, .45. Head and thorax dark brown, thorax with lighter areas. Dorsum and venter of abdomen with segmentally arranged, wide, oblong dark brown areas occupying most of the two aspects; lateral margins of abdomen with quadrate dark spots; area between these spots yellowish green, sometimes interspersed with small round brownish areas; gonapophyses brown. Antennal flagellum brown, bases of segments lighter. Legs and wings as in alate viviparous female. Cornicles dusky, but with a clear area surrounding the base.

Structure.—Average comparative antennal lengths as follows: III— .51, IV— .36, V— .30, VI— .14 plus. 20. Secondary sensoria present on all segments of flagellum, numbering as follows: III— 32, IV— 21, V— 7, VI— 3. Otherwise as in alate viviparous female.

APTEROUS OVIPAROUS FEMALE

Length from vertex to tip of abdomen, 2.04. Width of head across eyes, .43. Venter of body and general ground color of other portions yellow. Antennae yellowish with apical portions of flagellar segments and all of sixth except base, dusky. Dorsum of body with dark brown markings and clothed with capitate setae arising from distinct tubercles. Pattern of color markings and setae as in Fig. 334. Legs mostly concolorous with body, but with tarsi and extreme apices of tibiae blackish.

Comparative antennal lengths as follows: III— .43, IV— .26, V— .21, VI— .11 plus .17. Secondary sensoria absent. Hind tibiae swollen, with about 60 sensoria. Cornicle and cauda as in alate viviparous female.

Allotype.—Alate male; Slide No. 9654, Urbana, Illinois, October 24, 1930, on *Quercus macrocarpa*, (Frison and Ross). On slide with males. *Morphotype.*—Apterous oviparous female; Slide No. 9350, Urbana, Illinois, October 11, 1929, on *Quercus macrocarpa*, (Frison and Ross).

MYZOCALLIS ALNI (DeGeer)

Aphis alni DeGeer, Memoirs pour servir à l'histoire des Insectes, Tome 3, 1773, p. 47.

This species was first reported from the United States by Davis (1910d) from specimens collected in parks at Chicago, Illinois, on the undersides of alder leaves (*Alnus* sp.). He stated that it was rather common at time of collection, October 1, 4, and 20, 1909. It has not been reported from this state since then. Davis described the alate viviparous females and sexual forms. All forms have been redescribed in detail and figured by Granovsky (1928b). Davis (1919) referred his determination of this species in 1910 to *alnifoliae* (Fitch), but Granovsky has shown that the original determination of Davis was correct. According to Granovsky it is known in North America only from Illinois, Oregon, and British Columbia. It is a common species in Europe (Theobald, 1927).

MYZOCALLIS ALNIFOLIAE (FITCH)

FIG. 249

Lachnus alnifoliae Fitch, Fourth Annual Report of the Regents of the University on the Condition of the State Cabinet of Natural History State of New York, January 14, 1851, p. 67.

This species is here recorded for the first time from Illinois, since the record of Davis (1919) refers to *M. alni* (DeGeer). It was found to be exceedingly abundant on the undersides of the leaves of alder (*Alnus* sp.) in the Ozarkian region of southern Illinois. Granovsky (1928b) has given detailed descriptions and illustrations of all forms, as well as a summary of its present known distribution.

Data associated with our specimens are as follows: Herod (June 21) 1929 and (April 16) 1930.

MYZOCALLIS ASCLEPIADIS (MONELL)

FIG. 311

Callipterus asclepiadis Monell, Bulletin of the United States Geological and Geographical Survey of the Territories, Vol. V, No. 1, January 22, 1879, Art. 1, p. 29.

Gillette (1910) was the first to report this species from Illinois, and later Davis (1910d) reported it as common throughout the state. As already mentioned elsewhere, this species is closely related to *Myzocallis alhambra* Davidson, and we have been able to separate the two only on the basis of host plants; *alhambra* occurring on *Quercus* and *asclepiadis* on *Asclepias*. Dr. Granovsky writes us that the two are distinct. It is very common in all parts of Illinois and feeds on the undersides of the leaves. A description of the previously undescribed oviparous female is given here.

Data associated with our specimens are as follows: Champaign (July 27), Danville (July 15), Havana (June 21), Kankakee (July 15), Oakwood (Sept. 17), St. Joseph (Aug. 5), Urbana (July 23), 1928; Beach (Aug. 29),

Cairo (June 22), Edwardsville (Sept. 11), Eldorado (June 19), Galena (July 10), Grayville (June 19), Jerseyville (June 25), Kansas (June 17), Richmond (July 12), Rock Island (July 7), Seymour (Oct. 16), Starved Rock State Park (July 5, 6), 1929; Cerro Gordo (Oct. 15), 1930. Oviparous females have been taken at Seymour (Oct. 16) and at Urbana (Oct. 14), 1929.

APTEROUS OVIPAROUS FEMALE

Length from vertex to tip of body, 1.97. Width of head across eyes, .39. Body coloring as in oviparous female of *M. alhambra* (Fig. 334) with very similar markings and setal distribution. Average comparative antennal lengths as follows: III— .34, IV— .21, V— .21, VI— .10 plus .20. Secondary sensoria absent. Very similar to the oviparous female of *M. alhambra* and perhaps inseparable from it.

Morphotype.—Apterous oviparous female; Slide No. 8978, Urbana, Illinois, October 14, 1929, on milkweed (*Asclepias* sp.), by T. H. Frison. On slide with oviparous female.

MYZOCALLIS BELLA (WALSH)

FIG. 63

Aphis bella Walsh, Proceedings of the Entomological Society of Philadelphia, December, 1862, p. 299.

This species, originally described from near Rock Island, Illinois, by Walsh, was reported as being very common in the state by Davis (1910d). It may be collected on the undersides of the leaves of black oak, where it is often associated with the somewhat similarly colored, but smaller, species *Myzocallis walshii* (Monell). The latter has often been considered a synonym of *M. bella* (Walsh). Our determination of this species has been verified by Dr. Granovsky.

Data associated with our specimens, collected on *Quercus velutina* and *Quercus* sp., are as follows: Decatur (Sept. 18), Oregon (June 28), 1928; Decatur (Sept. 20, Oct. 12), Starved Rock State Park (Aug. 14), 1929; Starved Rock State Park (May 13), 1930. It is very likely that the sexual forms of this species are represented in a collection from Decatur (Oct. 12), but due to lack of mating pairs and mixing with material of *M. walshii* (Monell) they have not been definitely segregated and therefore are not described or recorded as such.

MYZOCALLIS CORYLI (GOEZE)

Aphis coryli Goeze, Entomologische Beyträge zu des Ritter Linné zwölften ausgabe des Natursystems, Theil II, Leipsig, bey Weidmanns Erben und Reich, 1778, p. 311.

This species was first reported from the vicinity of Chicago, Illinois, by Davis (1910d), who published descriptions and illustrations of the sexual forms and alate viviparous female. Its small size, pale color, and more or less solitary habit make this species rather difficult to collect. It frequents the under surface of leaves of hazelnut (*Corylus* sp.) and is known from Europe as well as America (Theobald, 1927).

Data associated with our specimens are as follows: Antioch (June 15), Catlin (Sept. 27), Galena (June 25, 27), Kankakee (July 15), Oregon (June 28), Urbana (July 10), 1928; Beach (Aug. 29), 1929.

MYZOCALLIS DISCOLOR (MONELL)

FIGS. 61, 168, 178

Callipterus discolor Monell, Bulletin of the United States Geological and Geographical Survey of the Territories, Vol. V, No. 1, January 22, 1879, Art. 1, p. 30.

This species was first reported from Illinois by Davis (1910d), who stated it was common in Illinois. It is a dark-colored aphid with brown or blackish spotted wings and occurs as solitary specimens on the under surface of the leaves of oak and hickory. The sexual forms have been described by Weed (1888) and by Knowlton (1929b). Dr. Granovsky has checked our determination of this species.

Data associated with our specimens are as follows: Mt. Carmel (May 27, 28), 1884; Carbondale (June 4), Danville (Sept. 18), Decatur (Oct. 23), Herod (May 29), Mt. Carmel (May 26), Oakwood (Nov. 4), 1928; Cairo (June 21), Starved Rock State Park (Aug. 14), Urbana (Oct. 11), 1929; Starved Rock State Park (May 13), 1930. We have taken the sexual forms at Quincy (Nov. 6) and Urbana (Oct. 20), 1930.

MYZOCALLIS ONONIDIS (KALTENBACH)

FIG. 32

Aphis ononidis Kaltenbach, Entomologische Zeitung, Herausgegeben von dem entomologischen Vereine zu Stettin, Vol. VII, 1846, p. 173.

Most remarks and descriptions in literature relating to the yellow clover aphid (Fig. 32) have been recorded under the name of *Callip-*

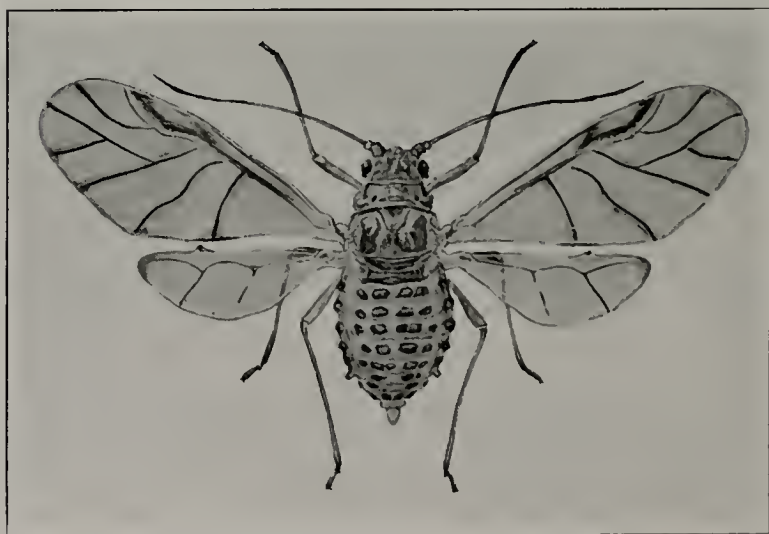


Fig. 32. Alate viviparous female of *Myzocallis ononidis* (Kaltenbach). (After Folsom: Ill. Ent. Rep. 25.)

terus trifolii Monell which is now considered to be a synonym of *M. ononidis* (Kaltenbach). This species was first recorded from Illinois

by Davis (1908c) as a "common species on clover, but of little economic significance." The accounts by Folsom (1909) and Davis (1908c, 1914b) give a very complete picture of the biology, characteristics, and structural details of all forms of this species. All writers seem to agree, and this also is our own opinion, that although the yellow clover aphid is common in clover fields every year, it does not rank with *Macrosiphum pisi* (Kaltenbach) as a serious clover pest. It is found in Eurasia and Africa as well as North America.

Data associated with our specimens, all collected on *Trifolium pratense* and *T. procumbens*, are as follows: Mascoutah (July 17), 1906; Carbondale (June 4), Herod (Oct. 12), Marshall (May 28), St. Anne (July 15), 1928; Edwardsville (Aug. 11), Elizabethtown (June 20), Farmer City (July 5), Homer (June 17), Olney (June 18), Orleans (April 15, June 15), 1929.

MYZOCALLIS PUNCTATA (MONELL)

FIG. 71

Callipterus punctata Monell, Bulletin of the United States Geological and Geographical Survey of the Territories, Vol. V, No. 1, January 22, 1879, Art. 1, p. 30.

Myzocallis punctatus (Monell) was reported by Davis (1910d) as "not uncommon in Illinois." Very little is given in literature regarding this species, and the sexual forms have apparently not been described. Our determination of this species has been checked by Dr. Granovsky.

Data associated with our specimens, all collected on various species of *Quercus* and *Asclepias*, are as follows: Antioch (June 15), Havana (June 21), Herod (May 29), Kankakee (June 29), Mt. Carmel (May 26), Shawneetown (May 27), Urbana (May 28, 31, June 6), 1928; Bluff Springs (May 2), 1929.

MYZOCALLIS TILIAE (LINNAEUS)

Aphis tiliae Linnaeus, Systema Naturae, Editio Decima, 1758, p. 452.

This species was first reported in Illinois from Chicago and vicinity by Davis (1909b) under the name of *Callipterus tiliac*. It lives on the undersides of the leaves of basswood (*Tilia americana*). It is easily determined by its clouded wings. It is another one of the species of this supertribe which are widely distributed in North America and Europe. All forms have been described and figured in detail by Davis.

Data associated with our alate and apterous viviparous specimens are as follows: Antioch (June 16), Starved Rock State Park (June 13), Urbana (July 6, 7, Aug. 6, 11, Sept. 26), 1928; Chicago (July 13), Urbana (Oct. 16), Waukegan (July 13), 1929. Sexual forms were taken at Urbana on Oct. 16, 1929.

MYZOCALLIS WALSHII (MONELL)

FIG. 333

Callipterus walshii Monell, Bulletin of the United States Geological and Geographical Survey of the Territories, Vol. V, No. 1, January 22, 1879, Art. 1, p. 29.

This species has not been previously recorded from Illinois. Our collections indicate that it is quite widely distributed in the state. We

are considering it a distinct species from *M. bellu* (Walsh), from which it differs in having much lighter-colored legs, particularly the prothoracic legs, and lighter-colored wings and lateral stripes. Our determinations of certain of our slides of this species have been checked by Dr. Granovsky. Specimens have been collected on the undersides of leaves of various oaks and hickories (*Quercus alba*, *Q. velutina*, *Q. imbricaria*, *Quercus* sp., and *Carya* sp.).

Data associated with our specimens are as follows: Danville (Sept. 18), Golconda (Oct. 13), Havana (June 20, 21), Marshall (May 25), Mt. Carmel (May 26, 28), Oregon (June 28), Shawneetown (May 27), Urbana (June 6, July 10, 26, Aug. 23, 25, Sept. 26), 1928; Beach (July 13), Cairo (June 22), Decatur (Oct. 12), Metropolis (Sept. 28), Starved Rock State Park (July 6), Urbana (Oct. 14), 1929; Urbana (Oct. 14), 1930. Sexual forms and mating pairs have been taken on Oct. 14, 1929, and 1930, at Urbana.

We have a series of slides collected on June 1, 1928, at Metropolis, Illinois, which may represent spring forms of this species or *M. punctata* Monell, or again may represent a new species. We have preferred to consider them for the present as undetermined.

Descriptions of the undescribed sexual forms are presented here:

ALATE MALE

Size and general color.—Length from vertex to tip of anal plate, 1.37. Width of head across eyes, .40. Head and thorax dark brown except the metathorax and a longitudinal dorsal area on each side of meson of prothorax, which are luteous, and the scutellum, which is conspicuously brownish black; abdomen pale greenish yellow, with the gonapophyses brown, with from two to several pale-brown lateral tubercles, and with seven segmentally arranged, oblong, blackish-brown areas on the dorsum forming a mesal band running the length of the abdomen. Antennae grayish brown, with basal half of third segment and extreme bases of fourth and fifth segments paler. Legs as in alate viviparous female, but with the femora infuscate with grayish brown. Wings as in alate viviparous female.

Structure.—Average comparative antennal lengths as follows: III— .47, IV— .31, V— .29, VI— .15 plus .28. Secondary sensoria present on all segments of flagellum, averaging in number as follows: III— 26, IV— 13, V— 10, VI— 4. Abdomen with small lateral tubercles as mentioned in color description. Dark patches of abdomen bearing one or two lateral setae. Remaining structure, except gonapophyses, as in alate viviparous female.

APTEROUS OVIPAROUS FEMALE

Length from vertex to tip of abdomen, 1.86. Width of head across eyes, .38. Venter of entire body and ground color of dorsum greenish yellow. Antennae greenish white with the apical portion of the third, fourth and fifth segments and sixth except base, blackish. Dorsum of body with brownish black areas, these areas bearing tubercles upon each of which is a capitate seta. Arrangement of color pattern and setae as in Fig. 333. Cornicles dusky. Legs mostly colorless with body, but with tarsi and extreme apices of tibiae blackish.

Average comparative antennal lengths as follows: III— .34, IV— .22, V— .22, VI— .16 plus .29. Secondary sensoria absent on antennae. Hind tibiae swollen, with about 70 sensoria. Cornicle and cauda as in alate viviparous female.

Allotype.—Alate male; Slide No. 9699, Urbana, Illinois, October 14, 1930, on *Quercus alba*, (T. H. Frison). On slide with other males. *Morphotype.*—Apterous oviparous female; Slide No. 9703, same data as allotype. On slide with oviparous female.

GENUS NEOSYMYDOBIUS BAKER

Key to the Species of the Genus Neosymydobius

1. Sixth antennal segment with the terminal filament shorter than the base (Fig. 245).....*albasiphus* (Davis) p. 261
- Sixth antennal segment with the terminal filament as long or longer than the base (Fig. 247).....2
2. Secondary sensoria of third antennal segment extending from near base to about two-thirds the length of segment (Fig. 254).....*annulatus* (Koch) p. 262
- Secondary sensoria of third antennal segment extending from near base almost to apex of segment (Fig. 255).....3
3. Secondary sensoria on third antennal segment averaging about nine; head and thorax brown, abdomen dorsally essentially lemon yellow; on oak.....*memoralis* n. sp. p. 262
- Secondary sensoria on third antennal segment averaging over twenty; color essentially brown; on birch.*americanus* (Baker) p. 261

NEOSYMYDOBIUS ALBASIPHUS (DAVIS)

FIG. 245

Symydobius albasiphus Davis, Canadian Entomologist, Vol. XLVI, No. 7, July, 1914, p. 226.

Davis described this species from specimens among others collected at Elgin, Illinois. Since then it has not been reported in literature. In Illinois we find that this species has no preference between the upper and lower surfaces of the leaves of certain oaks, and that it is usually, if not always, attended by ants. All forms of this plant louse were described and illustrated by Davis. The groups of sensoria-like structures on the lateral portions of the thorax and abdomen have not been mentioned in the descriptions. Our determination of this species has been verified by Dr. Granovsky.

Data associated with our specimens, all collected on *Quercus macrocarpa* or *Quercus stellata*, are as follows: Catlin (Sept. 27, Oct. 6), Cave-in-Rock (Oct. 12), Elizabethtown (May 29, 31, June 31), 1928; Elizabethtown (June 20), 1929. Sexual forms have been collected at Catlin and Cave-in-Rock on dates already mentioned.

NEOSYMYDOBIUS AMERICANUS (BAKER)

Symydobius americanus Baker, Canadian Entomologist, Vol. L, No. 9, September, 1918, p. 319.

This species has not previously been reported from Illinois. It was collected only once, in extreme northwestern Illinois, where the white, or canoe, birch (*Betula alba* var. *papyrifera*) is abundant and native. The specimens were found feeding on the young growth near base of trees.

All forms except the male have been described by Baker in the original description. According to this same author, the records of Patch (1910b) of *S. oblongus* Heyden from Maine refer to this species.

Our material consists only of apterous specimens collected at Galena, July 10, 1929.

NEOSYMYDOBIUS ANNULATUS (Koch)

FIG. 254

Chaitophorus annulatus Koch, Die Pflanzenläuse, Aphiden, Nürnberg, Heft 1, 1854, p. 7.

This species, widely distributed in North America and Europe, has not previously been reported from Illinois. We have found it quite generally distributed in the state on the undersides of the leaves of cut-leaf birch (*Betula pendula*). Generically there is so little difference between this species, formerly placed in an assortment of genera, and species already placed in the genus *Necosymydobius* that we have placed it in the latter genus. The fact that apterous viviparous forms are common throughout the year indicates that it does not belong to the genus *Calaphis* in a narrow sense as most recently placed. Van der Goot (1915) and Davidson (1917a) have described the sexual forms as well as viviparous forms.

Data associated with our viviparous specimens are as follows: Oregon (June 28), Quincy (June 1), 1928; Carlinville (Sept. 12), Champaign (Oct. 7, 9), Decatur (Oct. 3, 7), Galena (July 10), 1929. Sexual forms have been taken at Decatur and Champaign in company with viviparous forms on dates already given. A mating pair was taken at Champaign on October 9, 1929.

NEOSYMYDOBIUS MEMORIALIS new species

FIGS. 81, 150, 211, 247, 255

ALATE VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 1.33. Head and thorax essentially chestnut-brown with darker markings; some specimens have the prothorax and head slightly lighter in color than the remaining thoracic segments. Abdomen lemon yellow on dorsum and posterior regions, with seven pairs of lateral dusky patches on the sides; cornicles arising from lateral patches but slightly lighter in color than the area around their base; anal plate concolorous with abdomen, but the cauda is a shade less yellow than the abdomen and shows some indications of being dusky, particularly along its outer margin. The first two antennal segments are concolorous with the head, the third segment is lighter in color than first and second segments except that apical one-fifth again becomes concolorous with these segments; fourth and fifth segments whitish except for apical brownish bands equal to about one-third the length of the segments; the base of the sixth segment is approximately half white and half brown, whereas the terminal process gradually shades from almost white to darker towards the apex and is never more than a dark dusky color. Femora of pro- and mesothoracic legs usually considerably lighter in color than the metathoracic femora, being yellowish-brown, with the dorsal regions somewhat darker; metathoracic femora brown except for extreme bases, which are yellowish; tibiae of all legs yellowish, usually slightly dusky at base and before apex; tarsi light brown. Stigma of fore wings light fuscous; veins brownish, anal and cubital veins darkest, all veins bordered with a light fuscous suffusion; surface of wings covered with brownish scale-like structures. Beak yellowish except extreme tip, which is brownish.

Head and appendages.—Average width of head across eyes, .40. Antennal segments with comparative lengths as follows: III— .31 to .43, average .36; IV— .20 to .26, average .23; V— .14 to .23, average .20; VI— .10 to .14; average .12 plus .16 to .21, average .20. Secondary sensoria (Fig. 255) limited to third antennal segment; varying in number from eight to ten, nine being the more common number; arranged in a straight row the length

of segment and unusually large. The beak extends to the coxae of the mesothoracic pair of legs.

Thorax and appendages.—The prothorax is quite prominent and extended laterally; upon this lateral extended area, particularly the posterior half, are grouped from six to eight sensoria-like structures. The fore wing with an accessory radial thickening (Fig. 55) and with media twice-forked; the second fork of the media is not always constant in position, but it is usually midway between the first fork of the media and the margin of the wing; an interesting feature of the venation of the wings is that none of the veins reach the margin of the wing. The tibiae of all legs are quite hairy, the longest hairs exceeding the width of the segment; hind tarsi are about equal in length to the base of the sixth antennal segment.

Abdomen.—The lateral dusky patches on the margins of the abdomen, except the patch surrounding the cornicles, contain sensoria-like structures similar to those found on the prothorax, they are very difficult to locate and count, but appear to number three or four to a patch. The cornicles (Fig. 150) are short and about as long as the anal plate, with sides slightly incurved and the valve considerably sunken. The cauda (Fig. 211) is distinctly bilobed and covered with long hairs.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.58. Head pale yellowish, thorax light dusky brown except for a few pale irregular patches, abdomen yellowish and without lateral markings. First antennal segment essentially concolorous with the head, except for a brownish tinge on the anterior margin of the segment; second segment whitish; third, fourth, and fifth segments whitish except for narrow dusky brownish bands at their apical ends which increase in intensity and length respectively; sixth segment whitish at base, then with a dark brownish area extending from about the middle of the basal portion of the segment to just beyond the primary sensorium; this band, in turn, is followed by a light area, which is followed by a dusky terminal area. The cornicles, cauda, and anal plate are concolorous with the abdomen. Legs mainly whitish-yellow, each with a dusky-brownish spot on the dorsum of the apical region of the femora (darkest on the femora of the metathoracic pair of legs); tarsi with apical halves dusky. The beak concolorous with body except extreme tip, which is dusky.

Head and appendages.—Average width of head across eyes, .40. Antennal segments with comparative lengths as follows: III— .39 to .44, average .41; IV— .24 to .26, average .25; V— .17 to .23, average .20; VI— .10 to .14, average .13 plus .13 to .21, average .17. Secondary sensoria few or lacking; when present, only on third antennal segment; distribution irregular (one specimen has four secondary sensoria on one antenna and one on the other); situated near the apex or middle area of the segment. The beak reaches between coxae of the meso- and metathoracic legs.

Thorax and appendages.—The prothorax with sensoria-like structures on postero-lateral margins similar to those of the alate viviparous female. The tibiae have long decumbent hairs; the tarsi are slightly over half as long as the fifth segment of the antennae.

Abdomen.—The lateral margins of the abdomen have segmentally arranged sensoria-like structures similar to the alate viviparous females but the light color of the abdomen makes their differentiation exceeding difficult. The abdomen of this form is otherwise similar to the abdomen of the alate viviparous female.

APTEROUS OVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.28. Head mainly yellowish with a tinge of fuscous, thorax mainly dusky brown; abdomen yellowish on dorsum and with fuscous lateral patches. First and second antennal segments essentially concolorous with head, remaining segments as in apterous viviparous female. Femora light dusky yellow, dorsal regions darkest, posterior femora considerably darker than

anterior pair; tibiae of pro- and mesothorax uniformly light dusky, posterior tibiae darker than tibiae of anterior pairs of legs; all tarsi light dusky.

Head and appendages.—Average width of head across eyes, .41. Antennal segments with comparative lengths as follows: III— .36 to .37, average .36; IV— .21 to .26, average .23; V— .19 to .20, average .19; VI— .14 to .14, average .14 plus .20 to .21, average .20. No secondary sensoria on antennae. The beak extends to the coxae of the metathoracic pair of legs.

Thorax and appendages.—Prothorax similar to prothorax of apterous viviparous female. Hind tibiae swollen and thickly studded with sensoria, which extend from base to about two-thirds length of the segment; as many as 60 sensoria have been counted on a tibia, but this is scarcely more than an estimate because they are very difficult to count accurately.

Abdomen.—Lateral portions of abdomen similar to alate viviparous female except that there appear to be fewer sensoria-like structures. Cornicles similar to cornicles of alate viviparous female. Cauda not discernible or distinctive characters not evident. Ovipositor elongate and typical for genus.

Holotype.—Alate viviparous female; Elizabethtown, Illinois, May 31, 1928, on *Quercus stellata*, (Frison and Hottes). Slide No. 10103. *Morphotype.*—Apterous viviparous female; Elizabethtown, Illinois, June 20, 1929, on *Quercus stellata*, (Frison and Hottes). On slide with two nymphs. Slide No. 10104. *Morphotype.*—Apterous oviparous female; Elizabethtown, Illinois, October 12, 1928, on *Quercus stellata*, (Frison and Hottes). On slide with apterous viviparous and oviparous female and nymphs. Slide No. 10105. *Paratypes.*—Eighteen slides of alate and apterous viviparous females, oviparous females, pupae and nymphs; all collected at Elizabethtown, Illinois, on *Quercus stellata*, by T. H. Frison and F. C. Hottes, on May 29-31 and October 12, 1928, and June 20, 1929. Slides Nos. 10106-10120 and other unnumbered.

This species is probably most closely allied to *Necosymydobius albasiphus* (Davis), from which it may be separated at once by its color and by the fact that the terminal process of the sixth antennal segment is much longer than its base. This species occurs in nature on the same leaves with *Necosymydobius albasiphus* (Davis) and is found on both the dorsal and ventral surfaces of the leaf. It seems to prefer the regions close to the mid-rib and principle veins. Specimens were sent to Dr. Granovsky for examination, who confirmed our belief that it was undescribed.

Since this species was first collected on Memorial Day, in 1928, the specific name of *memoralis* has been assigned to it.

GENUS PHYLLAPHIS KOCH

PHYLLAPHIS FAGI (LINNAEUS)

FIGS. 13, 159

Aphis fagi Linnaeus, Systema Naturae, Addition 12, 1767, p. 735.

This widely distributed species has not previously been reported from Illinois. It occurs in flocculent masses on the undersides of the leaves of beach (*Fagus grandifolia*), which occurs as a native tree in extreme southern Illinois and in a few other counties in the state. Thus far we have taken this species only in southern Illinois in woods where the beach was abundant and never on specimen trees in other parts of the state. Future collecting may reveal its presence in Vermilion County, Illinois, where some small stands of native beach still exist.

Good accounts of the habits of this plant louse and descriptions of all the forms are given by Swain (1919) and Theobald (1927). The latter author states it often does a great deal of harm to beach trees and hedges in Europe.

Data associated with our apterous viviparous specimens are as follows: Marshall (May 25), 1928; Jonesboro (June 23), Mounds (June 21), 1929.

GENUS SALTUSAPHIS THEOBALD

Key to the Species of the Genus *Saltusaphis*

1. Alate and apterous viviparous females with posterior margin of abdomen distinctly bilobed (Fig. 215).....*elongata* Baker p. 265
- Alate and apterous viviparous females with posterior margin of abdomen not distinctly bilobed, almost truncate (Fig. 219)....
.....*wanica* n. sp. p. 266

SALTUSAPHIS ELONGATA BAKER

FIGS. 215, 233, 321

Saltusaphis elongatus Baker, Canadian Entomologist, Vol. XLIX, No. 1, January, 1917, p. 4.

This elongate and yellowish species has not previously been reported from Illinois; in fact we are not aware that it has been reported from other than the typic locality of New Jersey and Madison, Wisconsin. At Seymour, Illinois, in a low prairie habitat, this species is very common, and it has been under observation from June until the last of October. It is most easily taken by sweeping species of *Carex*. Evidently no alate viviparous females are produced and the sexual forms are likewise apterous. Our determination of *Saltusaphis elongatus* has been verified by Dr. Granovsky. Since we know of no description of the male of this species, the description of this form is presented.

Data associated with our apterous viviparous females, all taken on *Carex* sp., are as follows: Beach (Aug. 30), Mineral (July 8), Seymour (June 13, 26, July 20, Aug. 6, Oct. 7, 16, 30), Silvis (July 9), Villa Ridge (Aug. 30), 1929. Sexual forms were first observed at Seymour on Oct. 16, 1929, and were very numerous on Oct. 30, 1929, when mating pairs were collected.

APTEROUS MALE

Size and general color.—Average length from vertex to tip of cauda, 1.90. Body pale yellow, with anterior portion of head, extreme lateral margin of abdomen, and cornicles pale yellowish brown; dorsum of thorax and abdomen with small brownish spots between segments, some spots confluent. Genitalia dark brown. Femora pale yellow, tibiae and tarsi slightly dusky. Antennae with first two segments and base of third concolorous with vertex, remainder of flagellum uniformly dark brown except that terminal filament is sometimes as light as the base. Beak yellowish except for extreme tip which is brownish.

Structure.—Average width of head across eyes, .40. Comparative lengths of antennal segments as follows: III— .79 to .97, average .87; IV— .49 to .51, average .50; V— .43 to .47, average .46; VI— .20 to .21, average .21 plus .36 to .39, average .37. Secondary sensoria (Fig. 233) located on the third,

fourth, and fifth antennal segments, all arranged in a very regular row and very minute, average distribution as follows: III— 20, IV— 10, V— 12, greatest variation from average being 2. All segments very finely imbricated. Posterior extremity of body much like that of apterous oviparous female except that the posterior notch is less deep.

Allotype.—Apterous male; Slide No. 8244, Seymour, Illinois, on *Carex* sp., October 30, 1929, (T. H. Frison). On slide with oviparous female; mating pair.

SALTUSAPHIS WANICA new species

FIGS. 219, 237, 242

ALATE VIVIPAROUS FEMALE

Size and general color.—Length from vertex to tip of anal plate, 2.19. General color of body light yellowish with dusky brown lateral patches. Head light yellowish on dorsum with light dusky brown patches laterally and anteriorly. Prothorax with mesal third of dorsum yellowish and with lateral portions light dusky brown; mesothorax with dorsal lobes light brown and lateral portions yellowish; metathorax yellowish with small dusky patches at sides. Abdomen light yellowish with lateral spots on first seven segments; cornicles, cauda, anal plate, and an irregular oblong patch in center of dorsum, a dusky brown; posterior to dorsal patch are five or six small dusky spots; lateral to large spot on dorsum, and following this, are several groups of from 2 to 3 minute dusky spots. Cornicles situated in, and concolorous with, the lateral dusky spots. First and second antennal segments yellowish dusky; third segment, with the exception of the extreme base, uniform brown; basal half of fourth and fifth segments yellowish, apical portions brownish; sixth antennal segment with the terminal process somewhat lighter than the base, otherwise concolorous with apical portion of fifth. Pro- and meso-thoracic femora yellowish with brownish markings towards apex; meta-thoracic femora yellowish at the base and extreme tip, otherwise brownish. All tibiae yellowish except for extreme tips, which are dusky; tarsi dusky. Stigma of fore wings light dusky brown with a brownish suffusion posteriorly; veins light brown, ending in brownish suffusion, posterior portion of wing in vicinity of anal vein dusky brown. Beak yellowish with extreme tip light brown.

Head and appendages.—Average width of head across eyes, .43. Antennal segments with the following comparative lengths: III— .57; IV— .40; V— .33; VI— .20 plus .21. Secondary sensoria (Fig. 237) confined to third antennal segment, arranged in a straight row, varying greatly in size and numbering 11 and 12. Marginal sensoria on sixth antennal segment probably lacking. All segments very finely imbricated and sparsely clothed with exceedingly fine hairs. Head with vertex rounded, with two rather large spine-like hairs on the front and with numerous, scattered, finer hairs. Beak very short, reaching only to posterior margin of prothorax. Ocelli well developed, lateral ocelli close to eyes.

Thorax and appendages.—Prothorax with postero-lateral corners turned outward, the sides somewhat bell-shaped in contour, thickly set with glandular structures on the dorsum; mesal half of mesonotum also glandular. Stigma of fore wings long and narrow, second fork of media considerably closer to margin of wing than to the first fork. Hind femora with about 12 sensoria on inner surface.

Abdomen.—Cornicles mere elevated pores, typical for the genus. Posterior extremity of abdomen transverse, at most only a little indented on the meson. Cauda .10 long, distinctly knobbed; cauda and posterior extremity with a few spine-like hairs. Anal plate bilobed. Entire surface of abdomen covered with exceedingly small, delicate imbrications. Surface of thorax and abdomen very sparsely covered with mushroom-like hairs.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 2.31. Head, thorax, and abdomen pale yellow; thorax and abdomen oc-

asionally with exceedingly faint dusky markings along lateral margins, in rare cases abdomen with narrow, faint, somewhat broken, fuscous, transverse bands on the dorsum. Eyes reddish-brown. First and second antennal segments concolorous with head; third segment very pale yellowish except for extreme apical portion, which is dusky brown; fourth with basal half to two-thirds yellowish, remaining portion dusky brown; fifth with varying amount of the basal portion yellow, and the remaining portion dusky brown; sixth segment dusky, usually with the terminal filament lighter than base, and extreme base pale. Legs entirely pale yellowish. Beak yellowish with extreme apical portion light dusky brown.

Head and appendages.—Average width of head across eyes, .44. Antennal segments with the following comparative lengths: III— .44 to .59, average .49; IV— .27 to .36, average .32; V— .26 to .34, average .30; VI— .17 to .23, average .21 plus .17 to .21, average .20. Secondary sensoria absent. Marginal sensoria on sixth antennal segment probably lacking. Beak reaching just beyond prothoracic coxae. Anterior margin of head considerably arched with four long hairs near center.

Thorax.—Prothorax with posterior margin expanded, but not with postero-lateral portions produced. Mushroom hairs more abundant than on alate form.

Abdomen.—Cornicles similar in shape to those of the alate viviparous female. Posterior portion of abdomen quite variable in shape, sometimes not unlike that of alate viviparous female, at other times considerably indented and somewhat prolonged laterally. Cauda (Fig. 219) .09 in length; it and anal plate (Fig. 219) similar to those of alate viviparous female. Angular portions of abdomen posterior to cornicles, with long spine-like hairs. Abdomen finely imbricated, with short mushroom-like hairs.

Holotype.—Alate viviparous female; Mitchell, Illinois, June 25, 1929 on *Carex* sp., (Frison and Hottes). Slide No. 10626. *Morphotype.*—Apterous viviparous female; Cairo, Illinois, June 22, 1929, on *Carex* sp., (Frison and Hottes). On slide with nymphs. Slide No. 10627. *Paratypes.*—Twenty-eight slides containing pupae, apterous viviparous females, and nymphs, all collected in Illinois on *Carex* sp. by T. H. Frison and F. C. Hottes. The dates and localities are as follows: Beach (August 30), Cairo (June 22), Elizabethtown (June 20), Galena (July 10), Mitchell (June 25), Seymour (June 13, 26, July 20, Oct. 7), Wenona (July 5), Woodford (July 5), 1929. Slides Nos. 5599-5602, 5608-5611, 5629-5630, 10628-10641 and others unnumbered.

This species is closely related to *S. virginicus* Baker, but differs in having annulated antennae and the terminal filament of the sixth antennal segment subequal to the base. Specimens of this species, questionably determined as *S. virginicus*, were submitted to Dr. Granovsky for determination, and he very kindly reported after a comparison with types of *virginicus* that they were likely a new species.

SIENAHWEUM new genus

Cornicles small, cylindrical, tapering to tip, without flange. Cauda rounded at apex, showing almost no constriction. Anal plate scarcely indented. Antennae with six segments. Dorsum of abdomen without tubercles. Fore wings with media twice-forked. Differs from *Drepanaphis* in being smaller; in having differently shaped cornicles, the anal plate less indented, and the cauda not knobbed; and in lacking prominent dorsal tubercles.

Genotype, *Drepanaphis minutus* Davis, by original and present designation.

SHENAHWEUM MINUTUM (DAVIS)

FIG. 325

Drepanaphis? minutus Davis, Entomological News, Vol. XXI, No. 5, May, 1910, p. 195.

This species was described by Davis from specimens collected at Glencoe, Illinois, September 2, 1909, on *Acer saccharum*. We failed to find this species during our collecting in various parts of the state during the last three years.

GENUS STEGOPHYLLA OESTLUND

STEGOPHYLLA QUERCICOLA (BAKER)

Phyllaphis quercicola Baker, Entomological News, Vol. XXVII, No. 8, October, 1913, p. 362.

Until the appearance of Baker's paper (1916b), *querci* Fitch was the name used by American writers for at least two species belonging to widely separated genera, one of which was the species now under discussion. The first definite record of *quercicola* (Baker) from Illinois is the listing of Davis (1911a), under the name of *Phyllaphis? querci* (Fitch), of specimens collected on oaks at Aurora, Chicago, Danville, Joliet, Normal, Peoria, and Rockford, Illinois. Baker (1916b) proposed *Phyllaphis quercicola* as a new name for the form now under discussion.

Davis (1911a) has given a good account, as well as detailed descriptions of all stages, of this aphid. It lives in small scattered colonies on the upper and lower surfaces of leaves of various species of oaks and produces a rather dense flocculence. Davis states that both alate and apterous males are produced. It is interesting that all our males collected in southern Illinois (Herod and Cave-in-Rock) are winged, whereas those from central Illinois (Urbana) are all apterous.

Data associated with our specimens are as follows: Cave-in-Rock (Oct. 12), Decatur (Oct. 3), Muncie (Oct. 6), 1928; Columbia (Sept. 11), Herod (Sept. 27), Starved Rock State Park (Aug. 14), Urbana (Oct. 11), 1929; Urbana (Oct. 24), 1930. Collections made in late September and October at Cave-in-Rock, Herod, and Urbana, include the sexual forms. No winged viviparous females have been taken.

GENUS TAMALIA BAKER

TAMALIA COWENI (CKERELL)

FIGS. 33, 83, 244

Pemphigus coweni Cockerell, Canadian Entomologist, Vol. XXXII, No. 11, November, 1905, p. 392.

The collection of this gall-making insect in Illinois is interesting in that its host, the bearberry, has a very restricted distribution in Illinois and is sometimes considered as a boreal relic. Because of the

strict fidelity of *T. coweni* (Ckll.) to the genus to which its host belongs, it is very probably confined to the sandy beach area along Lake Michigan in northeastern Illinois. This plant louse causes the leaves of bearberry to fold over and form a sort of bladder-like gall (Fig. 33) within which the aphids live well protected from some of their enemies.

Good descriptions and illustrations of all forms are given by Gillette (1909a) and Essig (1915). There has been considerable doubt concerning the generic relationships of this aphid, and it has been placed



Fig. 33. Bladder-like galls of *Tamalia coweni* (Cockerell) on the bearberry, *Arctostaphylos Uva-ursi*, caused by folding together and swelling of leaves; Beach, July 13, 1929.

in about as many different genera as there are citations to it in literature. We believe that Baker (1920) was correct in making a new genus for this species. Baker (1920) in his original description of the genus states that the media of the fore wing is once-branched, whereas this should read twice-branched. One feature in the biology of this insect is that the oviparous females are winged.

All of our material has been collected on *Arctostaphylos Uva-ursi* at Beach, Illinois; the alate and apterous viviparous females on July 13, and the oviparous females on August 29, 1929.

GENUS THRIPSAPHIS GILLETTE

Key to the Species of the Genus Thripsaphis

(Based upon apterous viviparous forms because alate forms are not common or are undescribed.)

1. Third antennal segment longer than width of head through the eyes *verrucosa* Gillette p. 271
- Third antennal segment not longer than width of head through the eyes 2
2. Third antennal segment with two or three secondary sensoria; posterior portion of body terminating in a rounded point (Fig. 218), body never with transverse grey bands.. *producta* Gillette p. 270
- Third antennal segment without secondary sensoria; last transverse segment with its posterior margin of abdomen almost straight and sides broadly rounded (Fig. 212); body always with transverse bands of grey..... *ballii* (Gillette) p. 270

THRIPSAPHIS BALLII (GILLETTE)

FIGS. 212, 324

Brachycolus ballii Gillette, Canadian Entomologist, Vol. XL, No. 2, February, 1908, p. 67.

This aphid has not previously been reported from Illinois; in fact, it has been recorded from only three states, Colorado, New Jersey, and New York. It was transferred to the genus *Saltusaphis* by Baker (1911a) and later made the genotype of *Thripsaphis* (Gillette (1911b)). The alate and apterous viviparous females have been described and figured by Gillette (1909b). Like the other species of this genus, it may be collected on various species of *Carex*, but sweeping for it is much less effective than a careful examination of the leaves.

Data associated with our alate and apterous viviparous specimens are as follows: Decatur (Sept. 29), 1928; Allerton (June 17), Decatur (June 12), Homer (June 17), Lawrenceville (June 18), Lisle (July 14), Mitchell (June 25), Seymour (June 13, Oct. 7), 1929.

THRIPSAPHIS PRODUCTA GILLETTE

FIG. 218

Thripsaphis producta Gillette, Canadian Entomologist, Vol. XLIX, 1917, p. 196.

This is the first record in literature of this species having been taken since it was described by Gillette from material collected in Colorado. It was found at only one locality in Illinois. Only the alate and apterous viviparous females have been described.

Our material consists solely of the apterous viviparous females and nymphs collected on *Carex* sp., at Danville on July 16 and 22, 1930.

THRIPSAPHIS VERRUCOSA GILLETTE

FIG. 322

Thripsaphis verrucosa Gillette, Canadian Entomologist, Vol. XLIX, 1917, p. 194.

This aphid, with the peculiar projection from the vertex, has not previously been reported in literature as having been taken outside of the typic locality of Colorado. Its host is the same as for the other species of this genus, namely, *Cercer*. The oviparous female was included through error in the original description of *T. ballii* (Gill.). This mistake was later corrected by Gillette when the specific name of *verrucosa* was proposed. Since only the oviparous female has been described, a description of the apterous viviparous female is here presented.

We have taken only apterous viviparous females, at Danville on July 16 and 22, 1930.

APTEROUS VIVIPAROUS FEMALE

Length from anterior margin of vertex to tip of abdomen, 2.29. Width of head across eyes, .49. Body entirely pale yellow except the eyes and the antennae beyond and including the extreme apex of the third segment, which are black, and the extreme apex of the tarsi, which are dusky.

Average comparative antennal lengths as follows: III— .56, IV— .32, V— .29, VI— .16 plus .19. Secondary sensoria absent. Cauda, anal plate, and terminal segment of abdomen as in Fig. 322. Otherwise, except in secondary sexual characters, as in apterous oviparous female.

Morphotype.—Apterous viviparous female; Slide No. 9411. Danville, Illinois, August 22, 1930, on *Cercer* sp., (Hottes and Tauber).

GENUS TUBERCULATUS MORDVILKO

Key to the Species of the Genus Tuberculatus

1. Wings with dark fuscous markings; on oaks...*punctatella* (Fitch) p. 271
- . Wings clear, without dark fuscous markings; on elm.....
.....*ulmifolii* (Monell) p. 272

TUBERCULATUS PUNCTATELLA (FITCH)

FIGS. 56, 319

Aphis punctatella Fitch, Transactions of the New York State Agricultural Society, Vol. XIV, 1854 (printed 1855), p. 869.

This species is here reported from Illinois for the first time. Because of the well-developed tubercles on the dorsum, it is here considered as belonging to the genus *Tuberculatus*. It is to be looked for on the undersides of oak and hickory leaves. Only the alate viviparous females have been described (Baker, 1911b).

Data associated with our alate specimens, all collected on *Quercus macrocarpa*, *Quercus alba*, *Quercus velutina*, *Quercus* sp., and *Carya* sp., are as follows: Danville (Sept. 18), Decatur (Oct. 23), Metropolis (June 1), Mt. Carmel (May 26), Rock Island (June 24), Shawneetown (May 27), 1928; Collinsville (Sept. 11), Mahomet (Aug. 17), Starved Rock State Park (Aug. 14, Sept. 10), Urbana (Oct. 11), 1929; Starved Rock State Park (May 13), 1930.

TUBERCULATUS ULMIFOLII (MONELL)

Callipterus ulmifolii Monell, Bulletin of the United States Geological and Geographical Survey of the Territories, Vol. V, No. 1, January 22, 1879, Art. 1, p. 29.

Gillette (1910) first reported this species from Illinois (Chicago). Soon after this it was reported by Davis (1910d) as being abundant on elms in Illinois, and sometimes "sufficiently common to do injury, causing the foliage to drop prematurely and coating the upper surfaces of the leaves with honey dew." Our records indicate that this yellowish species, which inhabits the undersides of elm leaves, is quite generally distributed in our state. It may be collected throughout the year on this host, as it does not migrate. Descriptions of the male and oviparous female of this species, which have not previously appeared in the literature, are given here.

Data associated with our alate viviparous females and nymphs are as follows: Champaign (June 12, 18), 1886; Cave-in-Rock (Oct. 12), Danville (Sept. 18), Oakwood (Sept. 17), St. Joseph (Aug. 5), Urbana (July 26), 1928; Bloomington (July 5), Cairo (June 21), Edwardsville (Sept. 11), Elizabethtown (June 20), Galena (July 10), Grayville (June 19), Hardin (June 25), Olney (June 18), Rock Island (July 7), Starved Rock State Park (July 6), Urbana (Oct. 9), Waukegan (July 13), 1929. Sexual forms were taken at Urbana on October 9, 1929. Collected on *Ulmus americana*, *Ulmus alata*, and *Ulmus fulva*.

ALATE MALE

Average length, 1.00. General color brownish, tubercles darkest; antennae and legs yellowish, except apical portions of femora and tarsi, which are light dusky. Genitalia dark brownish-black. Stigma with a large central clear spot, margins brownish, veins brownish with more or less brownish suffusions at their origin. Average width of head across eyes, .40. Antennae with the following average comparative lengths: III— .45; IV— .24; V— .18; VI— missing. Secondary sensoria present on the third, fourth, and fifth antennal segments, always arranged in a straight row, numbering as follows: III— 13; IV— 4; V— 3. Second fork of media closer to margin of wing than to first fork.

APTEROUS OVIPAROUS FEMALE

Average length from vertex to tip of anal plate, 1.45. General color brownish; caudal region of abdomen yellowish; antennae and legs very light yellowish, except for apical portions of antennal segments which are dusky. Average width of head across eyes, .37. Average comparative lengths of antennal segments as follows: III— .30; IV— .18; V— .18; VI— .12 plus 12. Secondary sensoria absent. Hind tibiae much swollen and with numerous sensoria, which, because of the light color of the tibiae, can not be counted. Hairs on body distinctly enlarged at the tip and situated on tubercle-like bases.

Allotype.—Alate male; Slide No. 8688, Urbana, Illinois, on *Ulmus americana*, October 9, 1929. (T. H. Frison.) On slide with oviparous female and nymphs. *Morphotype*.—Apterous oviparous female; Slide No. 8687, same data as allotype. On slide with male and nymphs.

The cotypes of *Callipterus ulmicoia* Thomas, previously recorded by Davis (1913) and placed as synonymous with *T. ulmifolii* (Monell), are mounted on Slide No. 7166 and have the following data associated with them: Sauk City, Wisconsin, June, on elm, collected by Bundy.

SUPERTRIBE MACROSIPHEA

Key to Genera

1. Radial sector of fore wing deeply curved downward and either united with media to form a closed cell beneath stigma (Fig. 74) or almost uniting with media (Figs. 58, 66).....2
- Radial sector of fore wing not deeply curved downward, no closed cell beneath stigma (Fig. 62).....3
2. Hind wings normally with two oblique veins (Fig. 91), closed cell of fore wings, if present, three-sided (Fig. 58).....
- *Idiopterus* p. 292
- Hind wings normally with one oblique vein (Fig. 95), closed cell of fore wings always present and at least four-sided (Fig. 74).....
- *Pentalonia* p. 345
3. Hind wing without oblique veins (Fig. 96).....*Microparsus* p. 333
- Hind wing with oblique veins (Fig. 91).....4
4. All veins of fore wings conspicuously outlined with wide fuscous borders (Fig. 66).....*Idiopterus* p. 292
- Some veins of fore wings not conspicuously outlined with fuscous (Fig. 72), a few species with cubitus and anal veins so outlined (Fig. 57).....5
5. Head with antennal tubercles prolonged into finger-like processes (Fig. 85).....
- *Phorodon* p. 345
- Head with antennal tubercles not prolonged into finger-like processes (Figs. 82, 84, 86).....6
6. Head with antennal tubercles converging (Fig. 86) or projecting forward (Fig. 82); apterous viviparous females with (Fig. 82) or without (Fig. 86) conspicuous globate hairs on front of head between antennae.....7
- Head with antennal tubercles diverging (Fig. 84); apterous viviparous females without conspicuous globate hairs (Fig. 84) on front of head between antennae.....8
7. Apterous viviparous females always with conspicuous globate hairs (Fig. 320) on front of head between antennae.....
- *Capitophorus* p. 280
- Apterous viviparous females without conspicuous globate hairs on front of head between antennae.....
- *Myzus* p. 334
8. Cornicles bulging or swollen (Figs. 121, 126, 127), usually conspicuously so and never with sides entirely straight.....
- *Amphorophora* p. 273
- Cornicles essentially cylindrical or tapering (Figs. 100, 113, 115), not conspicuously swollen; sometimes, however, with apex of cornicles constricted and (in *M. ribiellum* and *M. crataegi*) cornicles slightly swollen.....
- *Macrosiphum* p. 293

GENUS AMPHOROPHORA BUCKTON

Key to the Species of the Genus Amphorophora

1. Apex of cornicles distinctly reticulated (Fig. 126).....
- *vaccinii* Mason p. 280
- Apex of cornicles not reticulated but sometimes imbricated (Figs. 121, 123).....2
2. Secondary sensoria present on third, fourth, and fifth antennal segments.....3
- Secondary sensoria always lacking on fifth segment.....5

3. Cornicles much longer than width of head through eyes; hind tibiae black or fuscous.....4
- Cornicles shorter or not longer than width of head through eyes; hind tibiae with only apex black or fuscous.....*cosmopolitana* Mason p. 274
- 4 Cornicles much shorter than fourth antennal segment and weakly swollen*sensoriata* Mason p. 279
- Cornicles longer than fourth antennal segment and strongly swollen*nabali* (Oestlund) p. 275
5. Secondary sensoria numerous on fourth antennal segment.....*sensoriata* Mason p. 279
- Secondary sensoria lacking on fourth antennal segment.....6
6. Cornicles scarcely more than three times as long as greatest diameter and entirely black.....*solani* Thomas p. 280
- Cornicles five or six times as long as greatest diameter and black, fuscous, or greenish brown.....7
7. Fourth and fifth antennal segments with basal portion light and apical portion fuscous or black; cornicles entirely dark or black; cubitus and anal veins of fore wings conspicuously outlined with fuscous borders.....*nervata* (Gillette) p. 277
- Fourth and fifth antennal segments uniformly light, fuscous, or black; cornicles ranging from black to greenish-brown; cubitus and anal veins of fore wings rarely conspicuously outlined with fuscous borders.....8
8. Cornicles without a flange (Fig. 122) at apex [alate form unknown but keyed out here on basis of apterous viviparous female].....*singularis* n. sp. p. 279
- Cornicles with a distinct flange at apex (Fig. 123).....9
9. Third antennal segment with few secondary sensoria, eight in type specimen (Fig. 305), arranged in a straight row.....*nebulosa* n. sp. p. 275
- Third antennal segment with numerous secondary sensoria, twenty to fifty or more (Fig. 307), arranged in a very irregular row10
10. Third antennal segment with from 22 to 29 secondary sensoria (Fig. 307); cornicles much longer than width of head through eyes and approximately as long as third antennal segment...*rossi* n. sp. p. 277
- Third antennal segment with from 38 to 54 secondary sensoria; cornicles slightly longer than width of head through eyes and shorter than third antennal segment.....*laingi* Mason p. 275

AMPHOROPHORA COSMOPOLITANA MASON

- Amphorophora cosmopolitana* Mason, Proceedings of the United States National Museum, Vol. 67, Art. 20, Sept. 23, 1925, p. 16.
Rhopalosiphum souchi Davis, Journal of Economic Entomology, Vol. 3, No. 6, December, 1910, p. 495. *Misidentification.*

This widely distributed species has been recorded previously from Illinois under the name of *Rhopalosiphum souchi* Oestlund by Davis (1910). It is widely distributed throughout the state on *Lactuca* and *Sonchus*. Mason (1925) has given a very complete summary of information in literature regarding this species and technical descriptions of all forms. It alternates between various species of *Ribes* and such plants as *Lactuca* and *Sonchus*, occurring on the former in spring and late fall and on the latter in summer.

From a study of the actual specimens involved, kindly loaned to us by Professor J. J. Davis, we have found that the Davis (1910e) record of *Rhopalosiphum souchi* "from northern Illinois" refers to

this species and needs to be added to the bibliography of this species as given by Mason. It is very probable, too, that the record of *Siphonophora lactucae* Linn. of Thomas refers to a species of *Myzus* instead of to *cosmopolitana* as questionably placed by Mason.

Data associated with our Illinois viviparous specimens are as follows: Oak Park (Aug. 14), 1909; St. Joseph (Aug. 5), Urbana (Aug. 8, 15, 20, Sept. 26, Dec. 19), 1928; Cairo (June 22), Catlin (May 17), Edwardsville (Sept. 11), Galena (July 10), Mattoon (Sept. 11), Melrose Park (July 12), Newton (June 17), Oregon (July 11), Riverside (July 14), Rock Island (July 9), Urbana (July 19, Oct. 9, 15, 21), 1929. The specimens taken at Catlin (May 17), 1929, represent the spring generation and the specimens at Urbana (Oct. 21), 1929, the fall generation on *Ribes*. All other specimens taken on *Lactuca*, *Sonchus* sp., *Sonchus oleraceus*, and *Sonchus arvensis*.

AMPHOROPHORA LAINGI MASON

Amphorophora laingi Mason, Proceedings of the United States National Museum, Vol. 67, Art. 20, Sept. 23, 1925, p. 32.

This species is here recorded from Illinois for the first time. Mason (1925) has shown that American specimens previously determined as *A. ampullata* Buckton are distinct from the types of *A. ampullata* Buckton and, accordingly, has renamed the species. He gives descriptions of the apterous and alate viviparous females and accepts the descriptions of Van der Goot ((1915)) as applying to the male and oviparous female. Very little is known about this species except that it attacks various genera of ferns.

We have taken it but once, by sweeping ferns at Starved Rock State Park, July 6, 1929.

AMPHOROPHORA NABALI (OESTLUND)

Rhopalosiphum nabali Oestlund, Fourteenth Annual Report of the State Geologist of Minnesota, March, 1886, p. 34.

This species has not been recorded previously from Illinois. Although we have taken it in only five scattered localities in the state, it probably occurs wherever its host is common. Slides of our material have been compared with cotypic material in the collection of Dr. O. W. Oestlund. Mason (1925) has described in detail the alate and apterous viviparous females. The species tends to congregate on the upper part of the stalk and flower heads of its host.

Data associated with our viviparous specimens, all collected on *Prenanthes alba*, are as follows: Choat (Sept. 28), Herod (Sept. 27), Makanda (Sept. 28), Oakwood (Oct. 17), Starved Rock State Park (Aug. 14, Sept. 10), 1929.

AMPHOROPHORA NEBULOSA new species

Figs. 127, 164

ALATE VIVIPAROUS FEMALE

Size and general color.—Length from vertex to tip of anal plate, 1.56. Head, thorax, and abdomen essentially uniformly brown, with some lighter areas laterally. Cornicles brown with a trace of green; anal plate brown; cauda yellowish. First and second antennal segments concolorous with the

head, gibbous portion of first segment slightly darker than remaining portions; third antennal segment yellowish at base and slightly so near apex, whereas the portion covered by the sensorium is brownish; remaining segments uniformly yellowish. Basal portion of femora yellowish, shading gradually to dusky brown towards apex; tibiae yellowish with apices dusky brown; tarsae dusky brown. Veins of wings rather light in color, cubitus and anal veins slightly margined with fuscous. Beak yellowish, tipped with dark brown.

Head and appendages.—Average width of head across eyes, .46. Antennal segments with comparative lengths as follows: III— .50; IV— .43; V— .36; VI— .16 plus .79. The secondary sensoria (Fig. 305) are eight in number, limited to the third antennal segment, and are arranged in a straight row about equally distant from the anterior and posterior ends of the segment. The primary sensorium on the sixth antennal segment is of interest because of the lack of marginal sensoria. The beak reaches just to the coxae of the mesothoracic pair of legs.

Thorax and appendages.—The second fork of media of fore wing is slightly closer to the margin of the wing than it is to the first fork; radial sector strongly bowed; stigma gray, rather short. The tarsi appear comparatively short, the second segment exclusive of claws being one-third the length of the cauda.

Abdomen.—Cornicles (Fig. 127) rather slender but gradually swollen, faintly imbricated, slightly shorter than third antennal segment, with a distinct flange at their apex; their length is .47. The cauda (Fig. 164) is about twice the length of the base of the sixth antennal segment, is distinctly constricted, and has two and three hairs on a side; its length is .30. The anal plate is rounded.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.13. Head, thorax, and abdomen brown as in alate viviparous female, prothorax with lateral margins and abdomen posterior to the cornicles lighter brown. Femora varying in color from yellowish to light dusky brown; tibiae almost uniformly brown, some perhaps a little darker towards the tip; tarsi brownish. Cornicles, cauda, and anal plate as in the alate viviparous female. Beak colored as in alate viviparous female.

Head and appendages.—Average width of head across eyes, .41. Antennal segments with comparative lengths as follows: III— .39 to .43, average .41; IV— .24 to .24, average .24; V— .24 to .24, average .24; VI— .13 to .14, average .13 plus .50 to .54, average .52. Antennae without secondary sensoria; hair on the antennae exceedingly fine and short. The beak extends slightly beyond the coxae of the metathoracic pair of legs. Antennal tubercles poorly developed; in fact, many species belonging to the genus *Aphis* have the tubercles as well developed.

Thorax and appendages.—Tibiae of the first two pairs of legs subequal, a little less than five times the length of the base of the sixth antennal segment; hind tibiae much longer, almost twice as long as the terminal filament of the sixth antennal segment.

Abdomen.—Cornicles shaped as in alate viviparous female and either equal or subequal in length to the third antennal segment; average length, .39. Cauda one-third the length of the terminal filament, with two hairs on a side, but slightly constricted; average length, .17.

Holotype.—Alate viviparous female; Starved Rock State Park, Illinois, August 14, 1929, on *Poa*, (Frison and Hottes). Slide No. 10382. *Morphotype.*—Apterous viviparous female; same data as holotype. Slide No. 10383. *Paratypes.*—Two slides of pupae, nymph, and apterous viviparous female; same data as holotype. Slides Nos. 10384-10385.

The types of this species were found on a species of grass (*Poa*) growing on the ledges of a small canyon in Starved Rock State Park, Illinois. Apparently the closest ally of this new species is *A. nervata* (Gillette) from which it can be distinguished by its shorter antennal

tubercles, shorter terminal filament of the sixth antennal segment, and its wider head in proportion to length of cornicles. This species was submitted to Dr. P. W. Mason who confirmed our supposition that it was new.

AMPHOROPHORA NERVATA (GILLETTE)

FIG. 123

Rhopalosiphum nervatum Gillette, Canadian Entomologist, Vol. XL, No. 2, February, 1908, p. 63.

This species is here recorded from Illinois for the first time. The extremely limited distribution of its host plants in the state precludes this aphid from having a wide distribution. Mason (1925) has redescribed all the known forms; he states that in California this plant louse "seems to migrate between rose and *Arbutus*."

We have taken viviparous specimens of this species only once, at Beach, July 13, 1929, on *Arctostaphylos Uva-ursi*.

AMPHOROPHORA ROSSI new species

FIGS. 121, 177, 307

ALATE VIVIPAROUS FEMALE

Size and general color.—Length from vertex to tip of anal plate, 2.14. Head, first and second and extreme base of third antennal segments, and mesothorax a light brownish green; prothorax, metathorax, coxae, trochanters, abdomen, and anal plate except apical margin a light apple green; abdomen with a medial line and lateral margins a dark green, areas between lighter green, venter uniform dark green. Cornicles with translucent brownish green at base and with swollen area often fuscous; cauda light whitish green. Antennae beyond base of third segment almost black. Femora whitish green at base, shading to light brown at apex; tibiae light brown with a dark brown or black area at apices equal to three times length of tarsi; tarsi dark brown or black. Beak with basal segment whitish green, middle segment light brown, apical segment black. Wings hyaline; stigma, costa, and subcosta a light brown except that bases of latter two are whitish; veins almost of equal width, black. Eyes and base of ocelli brownish black.

Head and appendages.—Average width of head across eyes, .54. Antennal segments with comparative lengths as follows: II— .79 to .84, average .80; IV— .53 to .64, average .60; V— .44 to .59, average .51; VI— .13 to .16, average .14 plus .71 to .83, average .78. The secondary sensoria (Fig. 307) are restricted to the third segment; although not in a straight row, they are confined to one side of segment and extend its full length except for a distance equal to length of the second antennal segment; they number from 22 to 29 and average 26. The antennal tubercles are quite well developed. The beak extends slightly beyond the coxae of the second pair of legs.

Thorax and appendages.—The second segment of the tarsus, exclusive of claws, is about one-fourth the length of the cauda or as long as the second antennal segment. The second fork of media of fore-wing in relation to the first fork and margin of wings is variable.

Abdomen.—The cornicles (Fig. 121), .64 in length, slightly longer than the fourth antennal segment, only moderately swollen, the swelling being slightly more pronounced on the inner margin; apical flange quite well developed; the area immediately anterior to the flange very faintly imbricated. The cauda (Fig. 177), .34 long, is twice the length of the base of the sixth antennal segment, with a slight indication of a constriction just beyond the middle and four hairs on a side. The anal plate is quite long for its width and rather narrowly rounded at its apex.

APTEROUS VIVIPAROUS FEMALE (FUNDATRIX)

Size and general color.—Length of single specimen, 2.00. Head, including first two antennal segments, and borders of prothorax a whitish green. Remainder of thorax, anal plate, coxae, trochanters, and basal third of femora apple-green. Abdomen, except for dark green medial longitudinal stripe, a whitish green. Cornicles pale translucent brownish green, with extreme apex dark brown. Third, fourth, and fifth antennal segments greenish brown with the extreme apex dark brown; sixth segment entirely dark brown. Apices of femora and all of tibiae light brown, apices of tibiae darker; tarsi dark brown. Beak as in the alate viviparous female. Eyes brownish black.

Head and appendages.—Average width of head across eyes, .53. Proportional length of antennal segments as follows: III— .54; IV— .53; V— .29; VI— .12 plus .37. Secondary sensoria absent. Fifth and sixth antennal segments imbricated, others smooth. Primary sensorium on sixth antennal segment with a group of marginal sensoria at one side. Antennal tubercles strongly developed. Hairs on head and antennae knobbed. Beak reaching to midway between meso- and metathoracic coxae.

Thorax and appendages.—Tibiae with hairs on basal half shorter than width, those on apical half subequal to width. Hairs on appendages both normal and knobbed.

Abdomen.—Cornicles .47 in length, distinctly more swollen on inner than on outer margin, flange at apex poorly developed. Cauda .22 in length, stout, broadly rounded at apex, not constricted, with three pairs of inwardly directed hairs on each side. Anal plate normal.

APTEROUS VIVIPAROUS FEMALE (VIRGOGENIA)

Size and general color.—Average length from vertex to tip of anal plate, 2.30. Differing from stem mother in color only by being a slightly lighter shade of green.

Head and appendages.—Average width of head across eyes, .58. Antennal segments with comparative lengths as follows: III— .79 to .84, average .80; IV— .53 to .64, average .60; V— .44 to .59, average .51; VI— .13 to .16, average .14 plus .71 to .83, average .78. Secondary sensoria limited to the third antennal segment and numbering from one to two. The beak extends to the middle of the coxae of the metathoracic pair of legs.

Thorax and appendages.—Similar to appendages of alate viviparous female, except for lack of wings.

Abdomen.—Cornicles .78 in length, almost always slightly more than twice the length of cauda, about equal to the length of the third antennal segment, with an average length of .72. Cauda and anal plate shaped as in alate viviparous female; cauda with an average length of .32.

Holotype.—Alate viviparous female; Urbana, Illinois, May 3, 1930, on *Geum canadense*, (Frison and Ross). Slide No. 10358. *Morphotype.*—Apterous viviparous female (fundatrix); Same data as for holotype. Slide No. 10360. *Morphotype.*—Apterous viviparous female (virgogenia); Same data as for holotype. On slide with one paratypic apterous viviparous female. Slide No. 10359. *Paratypes.*—Thirty-eight slides of alate and apterous viviparous females, pupae, and nymphs: all collected in Illinois by T. H. Frison, F. C. Hottes, and H. H. Ross from *Geum canadense*. Other data are as follows: Muncie (October 6, 1928) and Urbana (May 3, 22 and July 26). Slides Nos. 10361-10380 and others unnumbered.

This species was submitted to Dr. P. W. Mason for examination because it could not be satisfactorily determined to species in the key published in his revisional paper of this genus (1925). Dr. Mason reported that the species was unknown to him. The alate viviparous female keys to *A. nabali* (Oestlund) in Dr. Mason's paper, but differs from that species by the absence of secondary sensoria on the fourth and fifth antennal segments. The apterous viviparous females run in Dr. Mason's key to *A. cransi* Theobald which, judging from the non-

swollen cornicles, is probably not an *Amphorophora*. *A. laingi* Mason is apparently another closely allied species from which it differs by the characters given in our key.

AMPHOROPHORA SENSORIATA MASON

Amphorophora sensoriata Mason, Proceedings of the Entomological Society of Washington, Vol. 25, No. 9, December, 1923, p. 189.

This species has not previously been reported from Illinois. It may be found by examining the stems of new shoots of its host. Our records indicate that it is generally distributed throughout the state. The species quickly drops from its host when distributed, and it is believed to have no alternate host, although the sexual forms are as yet unknown. Technical descriptions of the viviparous forms are given by Mason (1923 and 1925).

Data associated with our viviparous specimens, all collected on *Rubus* sp., are as follows: Bloomington (Aug. 14), Chicago (July 13), Galena (July 10), Jonesboro (Sept. 28), Lisle (July 14), Mahomet (Aug. 17), Morrison (July 9), Oakwood (July 22), Oregon (July 11), Pana (Sept. 10), Richmond (July 12), Starved Rock State Park (Aug. 14), Urbana (July 22), 1929.

AMPHOROPHORA SINGULARIS new species

FIGS. 122, 306

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Length from vertex to tip of anal plate 1.47. Head light brown; thorax and abdomen brownish-yellow (probably badly faded), abdomen with small clear areas at base of cornicles; cornicles very dark brown; cauda and anal plate light brownish, approximately concolorous with abdomen. First and second antennal segments concolorous with the head, third antennal segment with basal part anterior to sensorium yellowish and remainder of segment dark brown, remaining three apical segments dark brown. The coxae, trochanters and basal three-fourths of femora are yellowish, apical fourth of femora dark brown; tibiae alternately marked with yellow and brown, yellowish at their base for a distance about equal to the length of the second antennal segment, then dark brown for a distance about equal to one-half of the length of the third antennal segment, then becoming yellowish again for a distance about equal to the length of the cornicles, and finally terminating as brownish to the tarsi—a distance about equal to half the length of the cornicles; tarsi brownish. Beak yellowish, except for the last two segments, which are a light-brown.

Head and appendages.—Average width of head across eyes, 44. Antennal segments with comparative lengths as follows: III—54; IV—51; V—44; VI—.14 plus .90. The third antennal segment (Fig. 306) has a single sensorium situated about the length of the first antennal segment from its base at a point where the brown color begins. The beak reaches just beyond the coxae of the mesothoracic pair of legs.

Thorax and appendages.—The tibiae of the pro- and mesothoracic pairs of legs are about equal to twice the length of the fifth antennal segment; the tarsi comparatively short, without the claws being equal to or slightly longer than the second antennal segment.

Abdomen.—Cornicles (Fig. 122) .47 in length, approximately sub-equal in length to the third antennal segment, very gently and gradually swollen, ending very abruptly and without a flange, very faintly imbricated. Cauda .29 in length, two-thirds as long as the cornicles, comparatively narrow, and with one to two hairs on a side. Anal plate roundly pointed.

Holotype.—Apterous viviparous female; Golconda, Illinois, October 13, 1928, on unknown species of grass (Frison and Hottes). Slide No. 10381.

This species is suggestive of our new species *Amphorophora nebularis*, from which it may be separated in the apterous viviparous females by the single sensorium on the third antennal segment, the difference in the comparative lengths of the antennal segments, the differently colored legs, and the shorter beak. In Dr. P. W. Mason's (1925) revision of the genus *Amphorophora* this species keys to *A. formosana* Takahashi from Formosa. It differs from the original description of *formosana* in that the third, fourth, fifth, and sixth antennal segments are very much shorter and more nearly equal and the cornicles are about uniformly swollen on both sides.

AMPHOROPHORA SOLANI (THOMAS)

Megoura solani Thomas, Eighth Report of the State Entomologist on the Noxious and Beneficial Insects of the State of Illinois, 1879, p. 73.

This species is represented in the Survey collection by a single specimen, the type, taken by Thomas at Carbondale, Illinois. It was collected on tomato in association with other specimens including pupae—an indication that its association with this host was not accidental.

Data associated with this slide (No. 2772) are as follows: Carbondale (May 26), 1878, on *Tomato occidentalis* (= *Lycopersicon esculentum*?) collected by C. Thomas.

AMPHOROPHORA VACCINII MASON

FIG. 126

Amphorophora vaccinii Mason, Proceedings of the United States National Museum, Volume 67, Article 20, p. 67.

This species is here reported from Illinois for the first time. Our record is based upon a single collection of viviparous specimens at Grand Detour (May 15-16, 1930, on *Vaccinium vacillans*. Mason (1925) has given technical descriptions of the viviparous and oviparous females.

GENUS CAPITOPHORUS VAN DER GOOT

(SUBGENERA CAPITOPHORUS VAN DER GOOT AND CRYPTOMYZUS OESTLUND)

Key to the Species of the Genus Capitophorus

1. Cornicles much shorter than fourth antennal segment.....2
- Cornicles approximately as long as, or longer than, fourth antennal segment3
2. Secondary sensoria numerous on fourth antennal segment (about 24), a few secondary sensoria on fifth antennal segment; cornicles swollen.....*poae* (Gillette) p. 290
- Secondary sensoria lacking or few on fourth antennal segment (0 to 5), no secondary sensoria on fifth antennal segment; cornicles not swollen (Fig. 128).....*patonkus* n. sp. p. 287

3. Secondary sensoria restricted to third antennal segment.....4
- Secondary sensoria at least on third and fourth antennal segments6
4. Cornicles much longer than fourth antennal segment; hind tibiae almost uniformly dark.....*corambus* n. sp. p. 281
- Cornicles shorter or approximately the same length as the fourth antennal segment; hind tibiae mostly light colored with apices dark and contrasting.....5
5. Width of head through eyes much wider than length of cornicles; cornicles dark; secondary sensoria on third antennal segment averaging over 30.....*tetrarhodus* (Walker) p. 291
- Width of head through eyes and cornicles of about equal length; cornicles, except for extreme apices, almost concolorous with abdomen; secondary sensoria on third antennal segment averaging less than 30.....*minor* (Forbes) p. 284
6. Cauda blunt or rounded at apex (Figs. 163, 167).....7
- Cauda tapering to point at apex (Fig. 174).....8
7. Terminal filament of sixth antennal segment longer than third and fourth antennal segments together; secondary sensoria on fifth antennal segment ranging from 7 to 12.....
-*ribis* (Linnaeus) p. 290
- Terminal filament of sixth antennal segment shorter than third and fourth antennal segments together; secondary sensoria on fifth antennal segment ranging from 0 to 2....*pakansus* n. sp. p. 286
8. Apical portion of cornicles distinctly swollen.*gillettei* Theobald. p. 284
- Apical portion of cornicles not swollen.....9
9. Secondary sensoria numerous on fourth antennal segment and ranging from none to many on the fifth; cornicles much longer than width of head through eyes or length of fourth antennal segment; on *Cirsium* or *Elaeagnus*.....*flaveolus* (Walker) p. 282
- Secondary sensoria few on fourth antennal segment and usually lacking on the fifth; cornicles shorter than or about as long as width of head through eyes or length of fourth antennal segment; on *Rosa* or *Fragaria*.....10
10. Apterous forms with conspicuous capitate setae scattered over entire body; third antennal segment with secondary sensoria widely scattered and numbering about thirty.....
-*fragaefolii* (Cockerell) p. 283
- Apterous forms with conspicuous capitate setae restricted almost entirely to head and anal regions of abdomen; third antennal segment with secondary sensoria less scattered and numbering about twenty.....*minor* (Forbes) p. 284

CAPITOPHORUS CORAMBUS new species

FIGS. 125, 174, 259, 260

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.25. Head and thorax yellowish brown. Abdomen light yellowish green with brownish markings around base of cornicles and posterior to them. Cauda and anal plate brownish. Cornicles with basal half yellowish brown, shading to darker brown towards the apex. Antennae with first two segments concolorous with head and extreme base of flagellum pale yellowish, remainder of flagellum uniform blackish brown. Femora with about the basal two-thirds yellowish and the remaining portion brown. Tibiae and tarsi usually fairly dark dusky brown, sometimes apical portions of tibiae darker than the base. Beak light yellowish brown with the extreme tip dark brown. Stigma of fore wings light dusky brown with the posterior margin darkest, veins brown, cubital and anal veins darkest, veins failing to reach margin of wing but ending in a brownish suffusion, that of the anal veins being the largest and darkest.

Head and appendages.—Average width of head across eyes, .44. Antennal segments with comparative lengths as follows: III— .69 to .73, average .71; IV— .40 to .43, average .42; V— .37 to .40, average .39; VI— .10 plus .86. Secondary sensoria (Fig. 260) restricted to third antennal segment, irregularly arranged but distinctly more crowded on one side, in form rather tuberculate and varying in number from 31 to 36. Primary sensorium on sixth antennal segment with a group of about 5 marginal sensoria to one side. Hair on third antennal segment slightly knobbed, hair on remaining antennal segments blunt at the tip but not distinctly knobbed; base of hairs distinctly lighter in color than remaining portion of antennae and often suggestive of sensoria. Antennal tubercles well developed. Median portion of head between antennae with a prominent process from which capitate hairs arise. Beak reaching beyond base of mesothoracic coxae.

Thorax and appendages.—Hairs on tibiae short, rather spine-like, not longer than, if as long as, the width of segment; capitate hairs rare. Stigma of fore wings narrow, radial sector strongly curved, second fork of media distinctly closer to margin of wing than to the first fork.

Abdomen.—Cornicles (Fig. 125) averaging .55 in length, poorly imbricated throughout their length, somewhat constricted in the middle so that they have the appearance of being slightly swollen beyond the middle; the apex with a poorly developed rim. Cauda (Fig. 174) a little less than half as long as the cornicles, averaging .23 in length, not constricted or but very slightly so, with four long non-capitate hairs on each side. Hairs on remaining portion of abdomen scarce but usually somewhat capitate. Anal plate inconspicuous in our specimens but apparently normal.

APTEROUS VIVIPAROUS FEMALE

Described from one poorly mounted specimen; hence no general description will be given except for general measurements and a few other very obvious facts.

Length 1.21. Width of head across eyes, .44. Antennal segments with the following comparative lengths: III— .64; IV— .36; V— .33; VI— .10, terminal filament missing. Third antennal segment with nine secondary sensoria (Fig. 259) on basal half arranged in an irregular row. Cornicles .60, cauda .29 in length. Cornicles very similar to those of alate viviparous female, but perhaps slightly thicker. Cauda distinctly spatulate, with two hairs on each side. Hairs on body and antennae capitate, remaining hairs spine-like.

Holotype.—Alate viviparous female; Galena, Illinois, July 10, 1929, on *Rosa* sp., (Frison and Hottes). On slide with nymphs. Slide No. 10657. *Morphotype.*—Apterous viviparous female; same data as holotype. On slide with paratyptic alate viviparous female. Slide No. 10658.

This species is probably most closely allied to *C. tetrarhoda* (Walker), from which it may be separated by the more swollen and longer cornicles, the differences in comparative lengths of antennal segments, the length of the beak in the alate viviparous female, and the presence of secondary sensoria on the third antennal segment in the apterous viviparous female.

CAPITOPHORUS FLAVEOLUS (WALKER)

Aphis flavicola Walker, Appendix to the Zoologist for 1849, Vol. VII, p. 1v. *Myzus braggii* Gillette, Canadian Entomologist, Vol. XL, No. 1, January, 1908, p. 17. *New synonymy.*

This species has not been previously recorded from Illinois. We have placed *Myzus braggii* Gillette as a synonym of this species because the identical material, kindly determined for us as *flaveolus* by Dr. Theobald, has been compared by Miss Palmer with cotypes of *braggii*

and declared to be the same. All references to *M. clacagni* Del Guercio and *P. galeopsidis* Kalt. by Davis (1908c, 1911b) evidently refer to *C. gillettei* Theobald, because the cornicles are stated and figured as having the apical portion swollen.

C. flavicolus over-winters on Russian olive (*Elaeagnus*) and in summer occurs on thistle (*Cirsium*). The best general accounts and descriptions of this insect are given by Gillette (1915) and Theobald (1926).

Data associated with our viviparous specimens are as follows: Catlin (Sept. 27), Champaign (Oct. 16), Herod (Oct. 12, Nov. 29), Urbana (Sept. 26, Oct. 19), 1928; Choat (Sept. 28), Edwardsville (Sept. 11), Herod (Sept. 27), Jonesboro (June 23), Lisle (July 14), Macomb (May 5), Oakwood (Aug. 18, Sept. 22), Oregon (July 11), Rock Island (July 7), Urbana (May 9, Oct. 14), 1929. Collected on *Cirsium lanceolatum*, *Cirsium* sp., and *Elaeagnus* sp.

CAPITOPHORUS FRAGAEFOLII (COCKERELL)

FIG. 320

Myzus fragae-folii Cockerell, Canadian Entomologist, Vol. XXXIII, No. 4, April, 1901, p. 101.

Myzus fragariae Theobald, Entomologist, Vol. XLV, No. 591, August, 1912, p. 223. *New synonymy*.

This is the species referred to by most American writers on aphids, probably including Davis (1910e), as *M. rosarum* Kaltenbach. It is not that species, however, because *rosarum*, according to the descriptions of Kaltenbach (1843) and Theobald (1926), has slightly swollen cornicles and differs in other respects. As shown under the discussion of *C. minor* (Forbes), this form is entitled to specific rank, and *fragae-folii* (Cockerell) seems to be the oldest available name. The viviparous females are well described by Theobald (1926) and the sexual forms by Davidson (1914a).

Although *fragae-folii* was originally described from material taken on *Fragaria*, we believe that the same species also occurs on *Rosa* and *Potentilla*. At any rate, we have been unable to separate certain material taken in Illinois on these hosts; specimens from all three plants agree with typic specimens of *fragae-folii* loaned to us by the U. S. National Museum.

Myzus fragariae Theobald is placed in the synonymy of *fragae-folii* because of determinations of Theobald, who named certain of our slide mounts from *Potentilla* as *fragariae*. These specimens seem to us to be identical with specimens of *fragae-folii*.

Data associated with our material are as follows: Antioch (June 15), Galena (June 26), Havana (June 21), Ogden (July 8), Oregon (June 28), Pekin (June 20), Urbana (May 28, 31, July 10, Sept. 11, Oct. 22, Nov. 11), 1928; Beach (July 13), Edwardsville (Aug. 11), Galena (July 10), Lewis-town (May 4), Macomb (May 5), Urbana (April 22), 1929; Oregon (May 16), Starved Rock State Park (May 13), Urbana (May 20, June 13, July 12, Nov. 16, 20, 21), 1930. Collected from *Rosa rugosa*, *Rosa* sp., *Potentilla monspeliensis*, *Potentilla* sp., and *Fragaria* sp. Mating sexual forms were found on November 11.

CAPITOPHORUS GILLETTEI THEOBALD

Fig. 4

Capitophorus gillettei Theobald, The Plant Lice or Aphididae of Great Britain, Vol. I, London, 1926, p. 238.

This species (Fig. 4) has been previously recorded from Illinois by Davis (1910b) under the name of *Phorodon galeopsidis* Kalt. It over-winters on *Elaeagnus* sp., from which it migrates in spring or early summer to *Polygonum* sp., where it remains until time to remigrate in fall to *Elaeagnus*. All forms except the oviparous female have been described by Theobald in the original description.

The data associated with our Illinois viviparous specimens are as follows: Catlin (Sept. 27), Champaign (Oct. 16), Danville (Sept. 18), Elizabethtown (Oct. 12), Golconda (Oct. 13), Muncie (Oct. 6), 1928; Catlin (May 17), Edwardsville (Sept. 11), Urbana (Oct. 7-14), 1929; Oakwood (Oct. 22), 1930. Collected on *Elaeagnus* sp., *Polygonum hydropiper*, *Polygonum* sp., and *Euphorbia marginata*. The record from *Euphorbia* represents a capture of alates which were probably there as a result of drifting. The Illinois localities and dates of the Davis (1910) records are as follows: Oak Park (Sept. 11-27 and Oct. 10, 12, 27, 1909), and Urbana (Aug. 11, 1909).

CAPITOPHORUS MINOR (FORBES)

Siphonophora minor Forbes, Thirteenth Report of the State Entomologist on the Noxious and Beneficial Insects of the State of Illinois, 1884, p. 101.

In view of the fact that we have found two species of *Capitophorus* on strawberry in Illinois, and miscellaneous descriptions of species from this host in literature, a decision regarding the correct name to use for this species has been beset with difficulty. Through the kindness of Professor Davis and Mr. Mason, slides with types of *Myzus porosus* Sanderson (1900), *Myzus fragaefolii* Cockerell (1901), and *Macrosiphum fragariae* var. *immaculata* Riley (1875) were sent to us for examination. A determination of one of our slides as *Capitophorus fragariae* Theobald (1912), by Dr. Theobald, has also aided.

Our study of these typic slides shows that the *Myzus porosus* Sanderson belongs in the group for which we are using the generic name of *Myzus*. It is similar to a species which we have taken on rose and which we were considering as new until we saw these typic slides. Hence, this species, originally described from strawberry, does not enter into the synonymy of *Capitophorus*.

The typic slide of *M. fragaefolii* var. *immaculata* Riley, also described from strawberry, is in such poor condition that it is doubtful if the species can ever be placed. The frontal projections of the head are sufficient to show it is a *Macrosiphum*, and the cornicles are reticulate. This name, therefore, is also removed from consideration.

Typic slides of *Myzus fragaefolii* Cockerell, with both alate and apterous specimens, prove this species to be a true *Capitophorus*. The apterous forms have the entire body covered with numerous capitate or globose hairs, thus differing from *Capitophorus minor* (Forbes). The alates are very similar to *minor*, but apparently differ in secondary sensoria of third antennal segment. Since we have seen two cotypic slides of *fragaefolii* in two collections, one slide of which is in very

poor condition and not associated with apterous forms, we are designating a slide in the collection of the United States National Museum as the *lectotypic slide*. Data associated with this slide are as follows: "Jerome, Arizona, December 17, 1900, on strawberry, type of *Myzus fragaefolii* Cockerell, slide 9337."

A determination of a slide in our possession as *C. fragariae* Theobald (1912), by Theobald, indicates that *fragariae* is a synonym of *fragaefolii* (Cockerell) and not of *minor* (Forbes). This is also indicated by his description of the apterous forms.

The *Siphonophora minor* Forbes, with capitate hairs restricted to head and anal regions of the apterous forms, remains as a valid species. Slide No. 3158 in the Survey collection is the *lectotypic slide*.

Since the male and apterous oviparous female have not previously been described, descriptions of these forms are here presented.

Records associated with our Illinois material are as follows: Normal (June 21), 1883; Kankakee (June 29, July 15), Muncie (Nov. 22), Urbana (July 10), 1928; Oakwood (Oct. 17), Savoy (April 18), Urbana (April 17, May 22), 1929; Urbana (April 8, May 20), 1930. All specimens collected on *Fragaria* sp. Sexual forms taken at Oakwood (Oct. 17), 1929.

ALATE MALE

Average length from vertex to tip of anal plate, .71. Head dark brownish; thorax dusky brown with some yellowish; abdomen yellowish, with brownish spots on dorsum and lateral portions; cornicles, cauda, and anal plate, dusky. Antennae uniform brown. Femora yellowish at the base, remaining portion brown; tibiae light brownish, with the apical portions darker. Veins brown, posterior margin of wing in vicinity of anal vein brown. Genitalia dark brown.

Average width of head across eyes, .31. Comparative lengths of antennal segments as follows: III— .44 to .49, average .47; IV— .27 to .31, average .28; V— .26 to .31, average .29; VI— .10 to .13, average .11 plus .49 to .60, average .54. Secondary sensoria present on the third, fourth, and fifth antennal segments, confined largely to one side of segment, those on third more scattered than those on fourth and fifth, distributed as follows: III— 16 to 22, average 20; IV— 6 to 8; V— 4 to 8, average 7. Primary sensorium with about four marginal sensoria at the side. Beak reaching to middle of mesothoracic coxae. Second fork of media closer to margin of wing than to first fork. Cornicles .19 long, straight, slightly imbricated, but not reticulated. Cauda .08 long, with about three hairs on a side.

APTEROUS OVIPAROUS FEMALE

Average length from vertex to tip of anal plate, 1.20. Body yellowish with a slight brownish tinge on the head. Cornicles, cauda, anal plate, and legs pale yellowish except tarsi, which are dusky. Antennae brownish except for extreme base of third segment and small ring-like areas at the apical portions of the third, fourth, and fifth segments, which are yellowish. Capitate hairs present on vertex of head, absent or very poorly developed on the second and third antennal segments, numbering about 2 on the first, fairly abundant on posterior regions of abdomen, but rarely found on other parts of the body. Average width of head across eyes, .30. Comparative lengths of antennal segments as follows: III— .33 to .37, average .35; IV— .17 to .24, average .21; V— .17 to .26, average .22; VI— .10 to .13, average .11 plus .49 to .66, average .54. Secondary sensoria absent. Beak reaching to about the middle of the metathoracic coxae. Cornicles .33 long, in shape similar to those of viviparous female. Cauda .16 long, with about two hairs on a side. Basal half of tibiae swollen, with about 35 sensoria.

Allotype.—Alate male; Slide No. 8408, Oakwood, Illinois, October 17, 1929, on *Fragaria* sp., (Frison and Ross). On slide with oviparous females. *Morphotype*.—Apterous oviparous female; Slide No. 8407, same data as allotype. On slide with male and oviparous female.

CAPITOPHORUS PAKANSUS new species

FIGS. 119, 163, 257, 258

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.50. Head and thorax essentially green shading to brown, the brown dominating on dorsum and venter and the green on the lateral portions; abdomen yellowish-green with a median brownish rectangular patch on the dorsum. Cornicles lighter in color than the abdomen for about half their length, remaining portion light fuscous; cauda and anal plate concolorous with the greenish part of the abdomen. First and second antennal segments concolorous with head, third antennal segment light yellowish-green at extreme base, remaining portions of third antennal segment and the two following segments dark brown, sixth antennal segment brown but much lighter, especially the terminal filament. Coxae somewhat fuscous, trochanters and bases of femora pale greenish, remainder of femora and fourth-fifths of tibiae pale yellowish-brown, apices of tibiae and tarsi dark brown. Beak greenish except for the extreme tip, which is brownish. Stigma slightly fuscous; veins brownish, the anal vein darkest, posterior margin of wing in the vicinity of the anal vein also brownish.

Head and appendages.—Average width of head across eyes, .37. Antennal segments with comparative lengths as follows: III— .37 to .43, average .40; IV— .26 to .30, average .27; V— .11 to .26, average .20; VI— .07 to .09, average .08 plus .57 to .60, average .58. Secondary sensoria (Fig. 257) present on the third and fourth antennal segments and sometimes on the fifth. The secondary sensoria distributed as follows: III— 37 to 44, IV— 18 to 20; V— 0 to 2. Sensoria widely scattered on the third and fourth antennal segments, the third segment being somewhat tuberculate in appearance. Hair on the antennae exceedingly scarce, exceptionally short and fine although blunt at the tip. Antennal tubercles very poorly developed, the first antennal segment gibbous on the inner margin but no more so than in the genus *Myzus*. Beak slender, particularly the terminal segment, extending to the coxae of the metathoracic pair of legs.

Thorax and appendages.—Stigma long, narrow, and sharply pointed; second fork of media closer to the margin of the wing than it is to the first fork. Brownish areas at the apices of the tibiae distinctly swollen; hairs on the legs not capitate but pointed at the tip, increasing in length from the base to the apex of the segment, and declinate.

Abdomen.—Cornicles (Fig. 119) subequal to, or very slightly longer than, the third antennal segment, averaging .43 in length, of almost uniform thickness throughout their length except that they are slightly thicker at their apices; without a distinct flange. Anal plate normal; cauda (Fig. 163) short, about as long as the base of the sixth antennal segment, wide and blunt but smaller than the cauda of a typical species of the subgenus *Anuraphis*.

ALATE MALE

Size and general color.—Average length from vertex to tip of anal plate, 1.68. Head and thorax essentially greenish shading to brown, the brown dominating on dorsum and venter and the green on lateral portions. Abdomen, instead of having a single median spot on the dorsum, has three oblong transverse spots anterior to the cornicles. Antennae brownish with the exception of the extreme base of the third antennal segment and the terminal process, which are lighter. Legs and cornicles very similar in color to the same structures of the alate viviparous female. Cauda and anal plate more fuscous than the abdomen. Wings similar to the wings of the alate viviparous female. Opercula dark brown.

Head and appendages.—Average width of head across eyes, .37. Antennal segments with comparative lengths as follows: III— .40 to .43; average .41; IV— .27 to .31, average .29; V— .26 to .30, average .27; VI— .07 to .09, average .08 plus .54 to .59, average .55. Secondary sensoria (Fig. 258) scattered, on third, fourth, and fifth segments; so little variation in

their numbers that averages are not given; on one specimen distributed as follows: III—42; IV—23; V—15. Antennal tubercles, first antennal segments, and the beak similar to the same structures in the alate viviparous female.

Thorax and appendages.—Similar to those of the alate viviparous female.

Abdomen.—Cauda, anal plate, and cornicles essentially similar to the same structures of the alate viviparous female; cauda about one-fourth the length of the cornicles, averaging .09 in length, with fine hair on posterior margin. Opercula with numerous short hairs.

Holotype.—Alate viviparous female; Urbana, Illinois, October 17, 1929, on *Inula royaleana*, (Frison and Ross). Slide No. 10843. *Allotype.*—Alate male; same data as for *holotype*. Slide No. 10844. *Paratypes.*—Thirty-one slides of alate viviparous females, males and pupae. Same data as for *holotype* except some specimens collected on October 15. Slides Nos. 10845-10864 and others unnumbered.

This species is extremely closely allied to *Capitophorus inulae* (Walker) of Europe and may eventually be shown to be the same. It differs from *inulae* as described in rather meager descriptions in having comparatively longer antennae, the fourth antennal segment longer than the fifth instead of equal as stated by Van der Goot, and the comparative length of the cauda in relation to the length of the cornicles—the cauda being about one-sixth the length of the cornicles rather than one-fourth the length of the cornicles. It differs from *Capitophorus similis* Van der Goot, another closely allied species, in the lack of black spots at the bases of the cornicles, the relatively larger number of sensoria, and comparative lengths of fourth and fifth antennal segments.

On one slide there is a specimen of an apterous viviparous female which is apparently immature and in such condition that it is not described.

This species was exceedingly numerous under the larger leaves of a few specimen plants of *Inula royaleana* in the floricultural gardens of the University of Illinois.

CAPITOPHORUS PATONKUS new species

FIGS. 82, 128, 169, 272, 274

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.50. Head, thorax, and abdomen with numerous spatulate hairs. Head yellowish green, with fuscous area about ocelli. First and second antennal segments concolorous with head; remaining antennal segments fuscous or black except extreme basal portion of third, which is a yellowish green. Thorax, abdomen, cauda, anal plate an apple green; cornicles at base concolorous with abdomen, gradually shading to brown or fuscous at apex. Legs concolorous with body except that apices of tibiae, all of tarsi, and dorsal portions of femora are brownish or black. Beak greenish, with terminal segment dark brown or black. Wings with costal margin (costal, subcostal, and base of radial veins) slightly greenish, rest of veins distinctly dark brown. Eyes black. Adult with hoary appearance in life due to capitate hairs.

Head and appendages.—Average width of head across eyes, .43. Antennal segments with comparative lengths as follows: III— .57 to .69, average .62; IV— .53 to .60, average .57; V— .50 to .56, average .53; VI— .14 to .17, average .15 plus .80 to 1.00, average .91. Secondary sensoria (Fig. 274) confined to the third and fourth antennal segments, sometimes sensoria

lacking on fourth segment, numbering from 13 to 18 and averaging 15 on third segment, numbering from 0 to 5 and averaging 2 on fourth segment, arranged in an irregular row. Primary sensorium on sixth segment with a group of small marginal sensoria at one side. Beak sometimes extending as far as coxae of metathoracic legs, but usually less than this distance; terminal segment extremely pointed. Head with antennal tubercles well developed (Fig. 82), with four capitate hairs on the anterior median portion.

Thorax and appendages.—Fore wing with stigma rather short and bluntly pointed; second fork of media closer to margin of wing than to first fork, most veins not reaching margin of wings, posterior margin thickened and dark where anal vein reaches wing.

Abdomen.—Cornicles (Fig. 128) shorter than cauda, averaging .16 in length, sides straight and but slightly tapering from base to apex, which is without conspicuous flange; imbricated entire length. Cauda (Fig. 169) gradually tapering from base to rounded apex, averaging .24 in length, with two sharply pointed curved hairs on each side.

APTEROUS VIVIPAROUS FEMALE (VIRGOGENIA)

Size and general color.—Average length from vertex to tip of anal plate, 1.31. Head, thorax, and abdomen with numerous heavy spatulate hairs. Head and first two antennal segments yellowish green; thorax, abdomen, anal plate, and cauda an apple green except that dorsum of abdomen has a darker green medial and a lateral stripe on each side; cornicles essentially concolorous with abdomen except that apex is slightly fuscous. In life the entire body has a hoary appearance due to the bulbous pale setae. Third antennal segment yellowish green at extreme base, remaining portion of segment and following segments essentially dusky brown to almost black. Legs yellowish-green, with the exception that apices of the tibiae, all of tarsi, and sometimes dorsal portions of the femora are dusky brown. Beak yellowish-green, except last two segments, which are dusky or brownish. Eyes black.

Head and appendages.—Average width of head across eyes, .43. Antennal segments with comparative lengths as follows: III— .39 to .60, average .52; IV— .27 to .57, average .40; V— .30 to .40, average .35; VI— .09 to .13, average .12 plus .36 to .76 average .58. Secondary sensoria (Fig. 272) two to six, on third antennal segment, never farther removed from the base of the segment than the length of the second segment of the hind tarsus exclusive of claws. Beak varying in length, in some specimens reaching to the coxae of the metathoracic pair of legs and in others reaching only to mesothoracic coxae. Hair on antennae not spatulate, exceedingly short, and not equaling the width of the segment.

Abdomen.—Cornicles exceedingly short for a species of *Capitophorus*, averaging .10, about as long as base of sixth antennal segment or one-half the length of the cauda, tapering somewhat to the tip, which is without a flange; indistinctly imbricated. Cauda long, averaging .21, distinctly constricted beyond base, with two non-spatulate hairs on a side and a single median hair a little posterior to the base of the last lateral pair. Anal plate rounded, not reaching to constricted portion of the cauda, four non-spatulate hairs on rounded posterior margin.

APTEROUS OVIPAROUS FEMALE

Size and general color.—Average length (two specimens) from vertex to tip of anal plate, 1.61. Head, thorax, and abdomen with numerous spatulate hairs. Head, thorax, and most of abdomen colored as in apterous viviparous females. Cornicles, cauda, anal plate, and patch ventral to anal plate, dusky brown. First and second antennal segments dusky brown, darker than the head, in color, remainder of antennae either uniformly dark brown or with the third antennal segment somewhat lighter than the others. Legs darker than in the viviparous female; femora concolorous with body at the base, remaining portions light dusky green, to almost brownish dorsally; tibiae dusky greenish-yellow, apical portion, and especially portion

covered by sensoria on hind tibiae, darker and somewhat brownish; tarsi brownish.

Head and appendages.—Average width of head across eyes, .44. Antennal segments with comparative lengths (two specimens) as follows: III— .43 to .44; IV— .30 to .34; V— .31; VI— .10 plus .53. Secondary sensoria restricted to an area near the base of third antennal segment equal to the length of the hind tarsi exclusive of claws; from two to three in number, arranged in a straight row. Beak similar to that of the apterous viviparous female.

Thorax and appendages.—Posterior tibiae slightly swollen near base for about one-fourth their length, swollen area with from twelve to eighteen sensoria.

Abdomen.—Cornicles essentially shaped as in apterous viviparous female but uniformly dusky, averaging .08 in length; cauda and anal plate also similar to the same structures in apterous viviparous female but dusky throughout length.

ALATE MALE

Size and general color.—Length of single specimen from vertex to tip of anal plate, 1.31. In color entirely unlike that of apterous viviparous female (may be due to poor preparation), being a very deep brown, darkest on the head, thorax, and posterior region of the abdomen; cornicles dusky brown, not as dark as rest of body; cauda darker than the cornicles and brownish black. Antennae uniformly deep brown with the exception of the extreme base of the third segment and apical one-fourth of the terminal filament, which are lighter. Legs brown with the exception of the bases of the femora, particularly fore femora, which are dusky yellow; apices of tibiae, knees of femora, and tarsi somewhat darker than the rest. Hairs on inner sides of tibiae longer, distinctly more spine-like than remaining hairs on tibiae. Wings dark, but their color is probably somewhat accentuated by the very dark brown veins and the dark stigma.

Head and appendages.—Antennal segments of single specimen with comparative lengths as follows: III— .54; IV— .57; V— .44; VI— .16 plus 1.06. Secondary sensoria present on third, fourth, and fifth segments; small, usually confined to one side of the segment, irregularly arranged except on fifth segment where they are somewhat more regular; they number as follows: III— 28; IV— 26; V— 17. The dusky brown beak reaches the coxae of the mesothoracic pair of legs, its extreme tip is darker than the rest.

Thorax and appendages.—Stigma of fore wings comparatively narrow and not sharply pointed; second fork of media is closer to the margin of the wing in one wing and closer to the first fork of the media in the other. Posterior margin of fore wing much thickened near point of connection with anal vein.

Abdomen.—Cornicles of uniform thickness throughout; feebly though distinctly imbricated, with a poorly developed rim; subequal in length to the base of sixth antennal segment or the cauda. Cauda probably constricted near the base, but in the manner in which specimen is mounted on the slide this is merely suggested; with four lateral and two somewhat more dorsal hairs. Anal plate indistinct due to mounting of specimen. Opercula very dark brownish-black, covered with rather long hook-shaped hairs.

Holotype.—Alate viviparous female; Metropolis, Illinois, April 17, 1930, on *Achillea Millefolium*, (Frison and Ross). Slide No. 10786. *Allotype.*—Alate male; Urbana, Illinois, October 7, 1929, on *Achillea Millefolium*, (Frison and Ross). Slide No. 10787. *Morphotype.*—Apterous viviparous female (virgogenia); same data as holotype. Slide No. 10788. *Morphotype.*—Apterous oviparous female; Urbana, Illinois, November 5, 1929, on *Achillea Millefolium*, (Frison and Ross). Slide No. 10789. *Paratypes.*—Eighty-three slides of alate and apterous viviparous females, pupae, and nymphs; all collected in Illinois, on *Achillea Millefolium*, as follows: Metropolis, April 17, 1930; Starved Rock State Park, May 13, 1930; and Urbana, September 3, October 6, 7, 15 and 16, and November 5, 1929. Collectors T. H. Frison, F. C. Hottes, and H. H. Ross. Slides Nos. 10790-10842 and others unnumbered.

The combination of structural characters of this new species is such that we know of no very closely allied species within the genus. It is most easily separated from all other described *Capitophorus* by virtue of its extremely short cornicles. According to our observations, this species is at times abundant locally, but it is difficult to locate because its general color agrees so well with that of its host plant. A plant of *Achillea* found in Starved Rock State Park was so heavily infested by this species that many of the leaves were turning brown.

CAPITOPHORUS POAE (GILLETTE)

Rhopalosiphum poae Gillette, Canadian Entomologist, Vol. XL, No. 2, February, 1908, p. 61.

This species has been recorded from Aurora, Illinois, by Davis (1911b) under the name of *Rhopalosiphum poae*. It was not found by us in our collecting during 1928 to 1930 and apparently is not very abundant. Gillette mentions that it is capable of killing blue grass. Only the viviparous females have thus far been described.

Data associated with slides deposited in the Survey collection through the kindness of Professor Davis are as follows: Aurora, Nov. 14, 1910, and Rockford, Nov. 12, 1912. All specimens taken on *Poa pratensis*.

CAPITOPHORUS RIBIS (LINNAEUS)

FIGS. 34, 167

Aphis ribis Linnaeus, Systema Naturae, Editio Decima, 1758, p. 451.

The currant aphid, which causes a characteristic distortion or "puffiness" and reddish discoloration of the leaves (Fig. 34), was first



Fig. 34. Malformation of leaves of the red currant, *Ribes vulgare*, caused by the currant aphid, *Capitophorus ribis* (Linnaeus); Champaign, June 14, 1929.

definitely recorded from Illinois by Davis (1910e). The fruit of badly infested currant bushes often ripens prematurely and is poor in quality because of the falling of infested leaves. According to Gillette and Bragg (1917), Theobald (1926), and others, the currant aphid usually migrates in summer from its over-wintering host to such plants as *Galeopsis*, *Stachys*, *Polygonum*, and *Leonurus*. All forms have been described by several authors, including Gillette and Bragg (1917) and Theobald (1926).

Data associated with our viviparous specimens are as follows: Normal (May 29), 1884; Champaign (May 18), French Grove (June 4-9), 1886; Champaign (June 19), LeRoy (June 19-20), 1928; Arcola (May 10), Champaign (May 22), Galena (July 10), Lawrenceville (June 18), Macomb (May 26), Monticello (May 24), Putnam (May 5), Rock Island (July 9), 1929; Grand Detour (May 16), Rock Island (June 3), 1930. All specimens taken upon *Ribes Grossularia*, *Ribes nigrum*, *Ribes odoratum*, and *Ribes* sp.

CAPITOPHORUS TETRARHODUS (WALKER)

Aphis tetrarhoda Walker, The Annals and Magazine of Natural History, Vol. IV, Second Series, London, 1849, p. 42.

This species has not previously been reported from Illinois, unless the records of Davis (1910e) under the name of *Myzus rosarum* Walker apply to it. Only the viviparous females have been described (Theobald, 1926), and very little is known concerning the biology of this plant louse. Specimens taken out of doors at Urbana in November failed to continue to reproduce parthenogenetically in the greenhouse. Two of our specimens are of special interest in that in one a cornicle is entirely lacking and in a second specimen a cornicle is very aberrant. Dr. Theobald has kindly checked our determination of this species. The sexual forms are described here for the first time.

Data associated with our viviparous specimens are as follows: Urbana (June 6), 1928; and Urbana (Nov. 19, 26), 1930. Sexual forms and eggs have been taken Nov. 19-26, 1930. All collected on *Rosa* sp.

APTEROUS MALE

Length from vertex to tip of anal plate, 1.10. Body dark grayish brown, with greenish bands extending between the segments across the dorsum of the abdomen, and with the venter almost entirely greenish. Antennae, legs except base of femora, external genitalia, cornicles, cauda, and anal plate, dark brown. Extreme base of third antennal segment, basal fourth of femora, and area around base of cornicles, pale yellowish. Middle portion of hind tibiae lighter brown than the remainder.

Width of head across eyes, .34. Head with about 16 capitate hairs. Antennae with scattered capitate hairs, the comparative lengths of the segments as follows: III— .43, IV— .19, V— .17, VI— .09 plus .23. Secondary sensoria present on the third and fifth segments, and occasionally on the fourth, as follows: III— 20 to 26, average 22; IV— 0 to 1; V— 4 to 8, average 6. Body with a row of capitate setae along each lateral margin. Abdomen with four longitudinal dorsal rows of setiferous tubercles arranged segmentally, two on each side of the meson, the two mesal tubercles each with two capitate setae on the middle segments, the two lateral tubercles each with one seta. This pattern is reduced on the thorax. Cornicles and cauda as in other forms, respectively .19 and .10 in length.

APTEROUS OVIPAROUS FEMALE.

Length from vertex to tip of anal plate, 1.37. Body yellowish green; flagella of antennae, apices of front and middle tibiae, hind tibiae except

extreme base, tarsi, cornicles, cauda, and anal plate yellowish brown; eyes black.

Body with numerous capitate hairs, arranged in two lateral and four dorsal series, but not on such distinct tuberculate areas as in the male. Width of head across eyes, .33. Comparative lengths of antennal segments as follows: III— .24, IV— .10, V— .14, VI— .09 plus .19. Secondary sensoria absent. Cornicles and cauda as in other forms, respectively .20 and .13 in length. Hind tibiae .61 in length, swollen before middle, with about 70 distinct sensoria.

Allotype.—Apterous male; Slide No. 9796, Urbana, Illinois, November 24, 1930, on *Rosa* sp., (T. H. Frison). *Morphotype*.—Apterous oviparous female; Slide No. 9795, Urbana, Illinois, November 19, 1930, on *Rosa* sp., (T. H. Frison). On slide with oviparous females and nymphs

GENUS IDIOPTERUS DAVIS

Key to the Species of the Genus Idiopterus

1. Cornicles cylindrical and tapering towards apex, with basal one-third dark and remainder light in color....*nephrolepidis* Davis p. 292
- , Cornicles slightly swollen, rather uniformly dark in color.....
..... *violae* (Pergande) p. 292

IDIOPTERUS NEPHROLEPIDIS DAVIS

FIGS. 58, 66

Idiopterus nephrolepidis Davis, Annals of the Entomological Society of America, Vol. 11, No. 3, September, 1909, p. 199.

This species has not been taken in Illinois since it was originally described by Davis (1909c) from sword fern growing in a Chicago greenhouse. It is a species with beautifully marked wings and of special interest because of the variation exhibited in the radial and medial veins (Figs. 58, 66) of the fore wings. There is not much doubt that it is a species of tropical origin introduced into greenhouses. Besides the descriptions and illustrations of the viviparous females contained in the original description, there are articles by Essig (1911b), Baker (1919b), and Theobald (1926), which contain additional information and descriptive matter.

Data associated with the lectotypic slide (No. 3117) in the Survey collection are as follows: Chicago (May 2), 1908, on *Nephrolepis* sp., collected by J. J. Davis.

IDIOPTERUS VIOLAE (PERGANDE)

Rhopalosiphum violae Pergande, Canadian Entomologist, Vol. XXXII, No. 2, February, 1900, p. 29.

This species has been taken only once in Illinois, at Peoria, by Davis (1910e), who collected it on violets, its only known host. Besides the original description and a few records there is almost nothing in literature concerning this species. Baker (1919b) considers that *Neotoxoptera violae* Theobald (1915) from Africa is only an aberration of this species. As in *I. nephrolepidis* Davis, the radial and medial veins are variable and the wing veins are prominently outlined with

fuscous shading. The genera *Idiopterus*, *Microparsus*, and *Pentalonia* have been grouped together by several writers to form the subtribe Pentalonina.

Data associated with our viviparous specimens are as follows: Peoria (Sept. 24), 1910, on *Viola* sp., collected by J. J. Davis.

GENUS MACROSIPHUM PASSERINI

SURGENERA MACROSIPHUM PASSERINI, CATAMERGUS OESTLUND, ILLINOIA WILSON, AND MACROSIPHONIELLA DEL GUERCIO

Key to the Species of the Genus *Macrosiphum*

1. Apex of cornicles with closed reticulations (Fig. 120).....7
- Apex of cornicles smooth or imbricated, never with closed reticulations (Fig. 118).....2
- 2 Secondary sensoria on third antennal segment very irregularly arranged, not in a straight row (Fig. 296).....4
- Secondary sensoria on third antennal segment essentially in a straight row (Fig. 293).....3
3. Cauda more than one-half length of cornicles...*pisi* (Kaltenbach) p. 317
- Cauda about one-third the length of cornicles...*schranksi* Theobald p. 326
4. Fourth antennal segment with from 8 to 20 secondary sensoria.....*purpurascens* (Oestlund) p. 318
- Fourth antennal segment never with more than four secondary sensoria.....5
5. Fourth, fifth, and sixth antennal segments black or dark brown.....6
- Fourth and fifth antennal segments yellowish at base, dusky at apex.....*ribiellum* Davis p. 319
6. Tibiae almost uniformly brown or black; apical third of cornicles often slightly swollen.....*crataegi* (Monell) p. 304
- Tibiae not uniformly brown or black, apex darker; cornicles never swollen.....*dirhodum* (Walker) p. 304
7. Secondary sensoria on third antennal segment approximately in a straight row (Fig. 293).....8
- Secondary sensoria on third antennal segment not approximately in a straight row (Fig. 294).....21
8. Cornicles much shorter than length of third antennal segment.....9
- Cornicles approximately equal to, or longer than, length of third antennal segment.....14
9. Cornicles approximately as long as, or longer than, width of head through eyes.....10
- Cornicles shorter than width of head through eyes.....*granarium* (Kirby) p. 308
10. Fourth antennal segment almost twice as long as width of head through eyes.....11
- Fourth antennal segment shorter, or but slightly longer, than width of head through eyes.....13
11. Third antennal segment distinctly imbricated, anal and cubital conspicuously outlined with fuscous border.....*carpinicolens* Patch p. 301
- Third antennal segment not distinctly imbricated.....12
12. Cornicles black except for extreme base; anal and cubital veins of fore wing strongly outlined with fuscous border; extreme apical reticulated portion of cornicle slightly constricted....*venaefuscae* Davis p. 332
- Cornicles with basal half pale and apical half fuscous; anal and cubital veins not outlined with fuscous border; extreme apical reticulated portion of cornicle not constricted....*pallens* n. sp. p. 315

13. Secondary sensoria on third antennal segment numbering from 15 to 20; femora essentially pale greenish; in life with abdomen pale greenish.....*adianthi* (Oestlund) p. 296
- Secondary sensoria on third antennal segment numbering from 5 to 10; femora with apical half dark brown or black; in life with abdomen with brownish markings on a ground color of ruby red or yellow.....*sanguinarium* n. sp. p. 323
14. Anal and cubital veins of fore wings strongly outlined with a fuscous border15
- Anal and cubital veins of fore wings not outlined with a fuscous border17
15. Abdomen surrounding base of cornicles greenish; cauda approximately half the length of cornicles.....16
- Abdomen surrounding base of cornicles blackish or brownish; cauda considerably less than one-third the length of cornicles*coryli* Davis p. 303
16. Hind tibiae about five times as long as width of head through eyes; on wild geranium.....*geranii* (Oestlund) p. 307
- Hind tibiae about four times as long as width of head through eyes; on basswood, or linden.....*tilliae* (Monell) p. 331
17. Length of cornicles at most equal to length of third antennal segment18
- Length of cornicles considerably longer than third antennal segment.....*laevigatae* Essig. p. 314
18. Fourth antennal segment as long as, or longer than, the third.....*tilliae* (Monell) p. 331
- Fourth antennal segment shorter than the third.....19
19. Cornicles almost uniformly cylindrical, not bulging before reticulations at apex (Fig. 111); abdomen in life usually greenish or pink; developing on a great variety of plants but not naturally on *Liriodendron*.....20
- Cornicles slightly bulging just before reticulations at apex (Fig. 110); abdomen in life usually yellowish green; developing on *Liriodendron**liriodendri* (Monell) p. 314
20. Cornicles a deep black, hind tibiae usually uniformly deep black.....*pseudorosae* Patch p. 318
- Cornicles pale to dusky, hind tibiae usually pale to dusky with apices darker and contrasting.....*gei* (Koch) p. 306
21. Cornicles much shorter than width of head through the eyes.....22
- Cornicles about equal to, or longer than, width of head through the eyes25
22. Fourth antennal segment with five or more secondary sensoria, body rather uniformly reddish brown in color.*sanborni* Gillette p. 323
- Fourth antennal segment usually without any secondary sensoria but sometimes with one or two; body not reddish brown.....23
23. Cauda short, somewhat triangular in shape, about as long as combined length of first and second antennal segments.....*kickapoo* n. sp. p. 312
- Cauda more elongate and tapering, much longer than combined length of first and second antennal segments.....24
24. Cornicles much shorter than width of head; secondary sensoria on fourth antennal segment rarely exceeding thirty-five in number; fourth antennal segment scarcely longer than width of head.....*frigidicola* (G. & P.) p. 305
- Cornicles but slightly shorter than width of head; secondary sensoria on fourth antennal segment usually more than forty in number; fourth antennal segment much longer than width of head*ludoviciana* (Oestlund) p. 315
25. Fourth antennal segment with secondary sensoria.....*sonchellum* (Monell) p. 326
- Fourth antennal segment without secondary sensoria.....26

26. On ferns; general body color green; third antennal segment with about fifty secondary sensoria, cauda very short..... *ptericolens* Patch p. 318
- Not frequenting ferns; general body of various colors including green; third antennal segment with various numbers of sensoria; cauda short to long.....27
27. Cornicles equal to or longer than third antennal segment.....28
- Cornicles shorter than third antennal segment.....31
28. Segment anterior to cornicles with a lateral tubercle.....
- Segment anterior to cornicles without a lateral tubercle.....29
29. Reticulated area of cornicles about equal to length of basal portion of sixth antennal segment (Fig. 108); base of cornicles surrounded with a blackish or brownish area.....
- Reticulated area of cornicles much longer than length of basal portion of sixth antennal segment (Fig. 120); base of cornicles not surrounded with a blackish or brownish area.....30
30. Third antennal segment with less than forty secondary sensoria; fourth antennal segment much shorter than third.....
- Third antennal segment with more than forty secondary sensoria; fourth and third antennal segments about equal in length..... *erigeronensis* (Thomas) p. 304
31. Third antennal segment longer than the metathoracic femora.....
- Third antennal segment shorter than the metathoracic femora.....32
32. Fourth antennal segment averaging about as long or longer than third antennal segment.....33
- Fourth antennal segment averaging much shorter than third antennal segment.....34
33. Anal and cubital veins distinctly outlined with a border of fuscous; area of cornicles with closed reticulations about one-fifth of total length; cauda light green; cornicles without dark area surrounding base..... *venaefuscae* Davis p. 332
- Anal and cubital veins not outlined with a border of fuscous; area of cornicles with closed reticulations about one-third of length; cauda dark brown or black; cornicles with dark area surrounding base..... *illini* n. sp. p. 309
34. Cornicles much shorter than length of fifth antennal segment; abdomen yellowish green or pea green, dark cornicles strongly contrasting with body, pulverulent in life.....
- Cornicles about as long as, or longer than, length of fifth antennal segment; abdomen greenish, brownish or reddish.....35
35. Abdomen dominantly colored some shade of green.....36
- Abdomen dominantly colored some shade of brown or red.....38
36. Hind tibiae with basal one-fifth light brown, middle three-fifths yellowish or yellowish-green, and apical one-fifth dark brown or black.....
- Hind tibiae almost uniformly dark brown or black, or at least with basal third dark brown or black and middle third not strongly contrasting with base and apical thirds.....37
37. Third antennal segment seldom with more than 25 secondary sensoria, these sensoria rather narrowly scattered and not especially tuberculate (Fig. 297)..... *pseudorosae* Patch p. 318
- Third antennal segment seldom with less than 35 secondary sensoria, these sensoria widely scattered and very tuberculate (Fig. 308)..... *anomalae* n. sp. p. 298
38. Body of species essentially shades of red.....39
- Body of species essentially shades of brown.....40

39. Third antennal segment seldom with more than 25 secondary sensoria, these sensoria rather narrowly scattered and not prominently tuberculate (Fig. 297).....*pseudorosae* Patch p. 318
- Third antennal segment seldom with less than 35 secondary sensoria, these sensoria widely scattered and prominently tuberculate (Fig. 308).....*rudbeckiae* (Fitch) p. 320
40. Hind femora at most with basal one-third light colored and contrasting with remaining dark portion; hind tibiae uniformly dark colored; antennal segments, legs, head, and body with numerous stout spine-like setae, many of which may be capitate; about crown of dandelion.....*taraxaci* (Kaltenbach) p. 329
- Hind femora with basal half light colored and contrasting with dark apical half, rarely with proportions less; hind tibiae uniformly dark or with dark apical portion contrasting with basal or mesal portions; spine-like setae less numerous and more slender, sometimes capitate; on stems and leaves of upper parts of plants.....41
41. Color in life deep blackish red; cauda dark, about concolorous with abdomen; species apparently restricted to *Helenium*; coefficient A* averaging 4.5.....*tardae* n. sp. p. 329
- Color in life brownish; cauda light or yellowish in color; not restricted to *Helenium*; coefficient A averaging more than 5.0.....42
42. Restricted to *Impatiens*.....*impatiensicolens* Patch p. 312
- Common on a large number of plants, particularly Compositae.....43
43. Cornicles averaging shorter in length; coefficient A averaging slightly more than 5; most often taken on *Bidens*.....*chrysanthemi* (Oestlund) p. 302
- Cornicles averaging longer than the preceding; coefficient A averaging about 6; not yet recorded from *Bidens* but common on many plants.....*ambrosiae* (Thomas) p. 298

MACROSIPHUM ADIANTI (OESTLUND)

Siphonophora adianti Oestlund, Geological Survey of Minnesota, Fourteenth Report, 1886, p. 26.

This species, not previously reported from Illinois nor recorded since it was described from Minnesota, was abundant on the undersides of the divisions of the fronds of ferns of the genus *Aspidium* on side walls of the various canyons in Starved Rock State Park. Alate forms seem to be uncommon, and the two specimens secured by us were reared from pupae. Dr. Oestlund has confirmed our identification of this species and agreed that the statement concerning length of cornicles in the original description was in error.

In view of the fact that many details are omitted in the original description, a redescription is presented of the previously known apterous viviparous female. A description is given, also, of the alate form which had not been previously discovered.

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.41. Color of head light dusky yellow with brownish area around ocelli, color of thorax and abdomen pale yellowish green; cornicles and cauda concolorous with abdomen. First and second antennal segments concolorous with head, third brown with exception of extreme base which is light yellowish, remaining segments lighter in color. Femora pale yellowish green with the extreme apical portions fuscous; tibiae greenish with apical por-

* Coefficient A equals length of hind tibiae plus length of cornicle, divided by width of head.

tions fuscous; tarsi fuscous. Stigma smoke-colored; veins brown, anal and cubital veins darkest and bordered with brownish suffusions; posterior margin of wing in vicinity of anal vein brownish. Beak greenish yellow with the last two segments brownish.

Head and appendages.—Average width of head across eyes, .49. Antennal segments with the following comparative lengths: III— .71 to .74, average .72; IV— .39 to .44, average .41; V— .43; VI— .14 plus .91. Secondary sensoria (Fig. 293) with wide margins, confined to the third antennal segment, arranged in a straight row and numbering from 15 to 20, averaging 17. Beak reaching to mesothoracic pair of coxae. Width of head through eyes averaging .48.

Thorax and appendages.—Stigma of fore wings quite pointed. Second fork of media considerably closer to margin of wing than to the first fork, all veins failing to reach margin of wing.

Abdomen.—Cornicles (Fig. 101) .49 long, straight; apical area covered by closed reticulations equal to about one-fifth their length, remaining portion imbricated. Cauda (Fig. 165) .21 long, not constricted, with about four hairs on a side. Anal plate rounded.

Morphotype.—Alate viviparous female; Starved Rock State Park, Illinois, May 13, 1930, on fern. (Frison and Ross). Slide No. 10571.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.45. Entire body light yellowish-green. Anal plate concolorous with abdomen; cauda somewhat lighter in color than abdomen. Cornicles very light yellowish-green, almost white, at the base but somewhat fuscous at extreme apex. Beak yellowish-brown, the tip brownish. First and second antennal segments essentially concolorous with head, beginning with the third antennal segment and extending to apex of antennae gradually shading from dusky yellow to dark brown, the apices of third and fourth segments darker than rest of segments and contrasting. Coxae, trochanters, and basal portions of femora essentially concolorous with body; apical portion of femora and tibiae light yellowish-green but gradually becoming more and more brown until at apices of tibiae color is dark brown; tarsi dark brown.

Head and appendages.—Average width of head across eyes, .46. Antennal segments with comparative lengths as follows: III— .59 to .64, average .61; IV— .30 to .36, average .34; V— .36 to .39, average .38; VI— .10 to .11, average .11 plus .71 to .83, average .79. Secondary sensoria limited to the third antennal segment, small, arranged in a straight row and limited to the basal half of the segment, number varying from 3 to 7 and averaging 5. Hair on the antennae exceedingly scarce, fine and short. Beak stout, reaching about to the coxae of the metathoracic legs.

Thorax and appendages.—The hairs on the basal portions of the tibiae are exceedingly fine and short; they increase in length toward the apex, where they are just slightly shorter than the width of the segment.

Abdomen.—Cornicles straight, comparatively short for a species of *Macrosiphum*, averaging about .45 in length; with from 3 to 5 indistinct rows of closed reticulations at the apex; flange at the apex poorly developed; imbrications present but exceedingly faint. The cauda averaging .16 in length, not constricted, stout, conical, with four hairs on a side; like the cornicles, it is short for a species of *Macrosiphum*. Anal plate as normal for the genus.

Data associated with our specimens are as follows: Starved Rock State Park (Aug. 14, Sept. 10), 1929, and (May 13), 1930.

This species is easily separated from the related *M. ptericolens* Patch (also found on ferns in Illinois) by the fact that the cornicles are only slightly fuscous at the apex, whereas in *ptericolens* they are very dark for most of their length; by the absence of a constriction of the cornicle before the apex; by its smaller size; and by the reduced number of the secondary sensoria.

MACROSIPHUM AMBROSIAE (THOMAS)

Siphonophora ambrosiae Thomas, Bulletin Illinois State Laboratory of Natural History, Vol. I, No. 2, June, 1878, p. 4.

This common and widely distributed species in Illinois (Fig. 35) was described by Thomas (1877) from specimens collected at Sioux City, Iowa, but was not recorded by him from Illinois. The species is not listed by Davis (1911b), but his host records for *M. rudbeckiae* (Fitch) indicate it was included with the latter.

Cotypic specimens of this species were found among the Thomas material and mounted on slides. Slide No. 8179 has been selected as the *lectotypic* slide and Sildes Nos. 8180 and 8181 labeled as *paratypic* slides. All typic material is in poor condition but recognizable. Data associated with the typic slides are as follows: Sioux City, Iowa, September 3, 1877 (original description states September 1).

Illustrations are given of the cauda (Fig. 184), cornicle (Fig. 114), and third antennal segment (Fig. 302) of the alate viviparous female on the lectotypic slide and the third antennal segment (Fig. 301) of the apterous viviparous female on the same slide.

Data associated with our viviparous specimens are as follows: Carbon-dale (June 4), Champaign (July 9), Danville (June 15), Elizabethtown (Oct. 12), Havana (June 21), LeRoy (June 20), Mahomet (Oct. 2), Mattoon (June 10), Morton (July 22), Mt. Carroll (June 25), Muncie (Oct. 6), Oakwood (July 8, Sept. 17), Oregon (June 27), Quincy (June 6), Rock Island (June 24), Starved Rock State Park (June 12, 13), Urbana (July 10, Aug. 2, Sept. 10, Oct. 7, 22), 1928; Beach (Aug. 29), Cairo (June 22), Champaign (May 28), Choat (Sept. 28), Edwardsville (Sept. 11), Farmer City (Sept. 22), Grayville (June 19), Homer (June 19), Jonesboro (June 23), Mahomet (Aug. 17), Mitchell (June 25), Oakwood (Sept. 22, Oct. 13), Starved Rock State Park (Sept. 10), Urbana (Sept. 17, Oct. 28), 1929; Starved Rock State Park (May 13), 1930. Collected on *Achillea Millefolium*, *Actinomeris* sp., *Ambrosia trifida*, *Ambrosia* sp., *Aster* sp., *Cirsium* sp., *Eupatorium urticaefolium*, *Helianthus* sp., *Lactuca* sp., *Oenothera biennis*, *Prenanthes alba*, *Prenanthes* sp., *Rudbeckia hirta*, *Solidago* sp., *Sonchus* sp., *Taraxacum officinale*, and *Xanthium canadense*. Sexual forms collected at Elizabethtown (Oct. 12), 1928, on *Xanthium canadense* and at Urbana (Oct. 28), 1929, on *Cirsium* sp.

MACROSIPHUM ANOMALAE new species

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.66. Head, with exception of areas around simple eyes which are brownish, light green; thorax and abdomen light green. Cauda concolorous with abdomen; cornicles concolorous with abdomen at base for a distance about equal to the length of the first antennal segment, remaining portion fuscous or often almost black. First and second antennal segments dusky brown; remaining segments dark brown except that the base of the third segment is yellowish for a distance equal to the length of the second segment, and that the apical half of the terminal filament is yellowish-white or at least lighter than the basal portion. Coxae, trochanters, and basal halves of femora essentially concolorous with body, remaining portion brownish, the brown most extensive on the dorsal portions; tibiae yellowish at extreme base, remaining portion almost if not entirely uniformly brown; tarsi brown. Stigma of fore wings only slightly clouded with fuscous, veins light brown in color and thin. Beak concolorous with body, except for the two terminal segments, which are brownish.

Head and appendages.—Average width of head across eyes, .49. Antennal segments with comparative lengths as follows: III— .60 to .91, average .75;



Fig. 35. *Macrosiphum ambrosiae* (Thomas) on flower stems of the dandelion, *Taraxacum officinale*; Urbana, July 23, 1929.

IV— .34 to .57, average .48; V— .31 to .59, average .45; VI— .11 to .17, average .14 plus .41 to .86, average .55. Secondary sensoria (Fig. 308) limited to the third antennal segment, varying from thirty-five to fifty-one, large, with wide veins, and although scattered are nevertheless most numerous on one side of the segment. Beak extends to the coxae of the third pair of legs or slightly beyond.

Thorax and appendages.—Stigma narrow and pointed at tip; second fork of media usually closer to the margin of the wing than it is to first fork. Hairs on the tibiae distinctly spine-like, numerous and lighter in color than the tibiae.

Abdomen.—Cornicles (Fig. 116) about four times the length of the base of the sixth antennal segment, averaging about .49, being about subequal to the fourth antennal segment, tapering slightly to the tip, with a very poorly developed flange, area covered with closed reticulations about equal to one-fifth the length of the cornicles. Cauda (Fig. 180) long in comparison to the length of the cornicles, extending approximately as far as the tips of the cornicles, slender, sharply pointed, and only moderately constricted, usually four hairs on a side.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.92. Head, thorax, and abdomen light green. First and second antennal segments concolorous with head, except that gibbous portion of first segment is often dusky brown; third segment concolorous with second up to where the secondary sensoria begin, then gradually blending to dusky brown at the apex; fourth and fifth segments varying from entirely brown to a condition with basal half yellowish and apical half brownish, sixth segment brownish with terminal filament lighter than basal portion. Femora as in the alate viviparous female with the exception that the brown is less extensive; tibiae as in the alate viviparous female or light yellowish at the base, quickly replaced by brown which in turn is replaced by yellowish beyond the middle and then by brown at the apex; tarsi brown. Beak, cauda, and cornicles colored as in the alate viviparous female.

Head and appendages.—Average width of head across eyes, .47. Antennal segments with comparative lengths as follows: III— .71 to .89, average .81; IV— .39 to .59, average .48; V— .34 to .54, average .44; VI— .11 to .19, average .14 plus .44 to .64, average .53. Secondary sensoria similar in structure and position to those of the alate viviparous female, numbering from 28 to 41 and averaging 35. Beak reaches to, or slightly beyond, the coxae of the third pair of legs.

Thorax and appendages.—Except for the lack of wings, similar to the alate viviparous female.

Abdomen.—Cornicles and cauda similar in shape to those of the alate viviparous female except that they are longer, cornicles averaging .58 and cauda .46, although retaining about the same relative proportions.

Holotype.—Alate viviparous female; Urbana, Illinois, August 29, 1929, on *Aster novae-angliae*, (H. H. Ross.) Slide No. 10242. *Morphotype.*—Apterous viviparous female; Urbana, Illinois, August 22, 1929, on *Aster novae-angliae*, (H. H. Ross.). On slide with three other specimens of apterous viviparous females. Slide No. 10243. *Paratypes.*—Forty-nine slides of alate and apterous viviparous females, pupae and nymphs; all collected in Illinois by T. H. Frison, F. C. Hottes, H. H. Ross, and A. R. Park, on *Aster novae-angliae* and *Aster* sp. The localities and dates are as follows: Oregon (June 27), Pekin (June 20), and Urbana (July 30), 1928; Ogden (May 26), and Urbana (July 1, August 18 and 29), 1929. Slides Nos. 10244-10277 and others unnumbered.

This species is suggestive of *Macrosiphum crigeronensis* (Thomas), from which it may be distinguished by its comparatively shorter cornicle in relation to the third antennal segment, and by the reticulated area of the cornicle being considerably less in extent than the reticulated area of *crigeronensis*.

This new species congregates near the top of the flower stalks of its host plant in much the same manner as *crigeronensis*.

MACROSIPHUM CARPINICOLENS PATCH

Macrosiphum carpinicolens Patch, Maine Agricultural Experiment Station, Bull. 282, December, 1919, p. 209.

This species has never been reported from Illinois; in fact, we know of no records of its occurrence except from Maine. We have found it to be particularly partial to the young and tender shoots of its host, the blue beach. Our determination of the apterous viviparous female of this species has been verified by Dr. Patch, who compared our specimens with types.

Data associated with our viviparous specimens are as follows: Starved Rock State Park (July 6), 1929; Golconda (April 15) and Oakwood (May 9), 1930. Sexual forms taken at Oakwood (Oct. 17), 1929. All collected on *Carpinus caroliniana*.

This species was originally described by Dr. Patch from the apterous viviparous female only. We have included here the descriptions of several forms which to our knowledge have not before appeared in literature.

ALATE VIVIPAROUS FEMALE

Size and general color.—Length, 1.86. Head light brownish, thorax and abdomen pale greenish. Antennae black except first two segments and base of third, which are concolorous with head. Cornicles with basal one-fourth greenish, remaining portion black or dark brown with a greenish cast. Cauda and anal plate concolorous with abdomen. Femora yellowish green with apical portion dark brown; tibiae brown with apical portions almost black; tarsi black or very dark brown. Veins of wings, especially anal and cubital veins, deep brown bordered with brownish.

Head and appendages.—Average width of head across eyes, .51. Antennal segments with the following comparative lengths: III—1.04; IV—1.00; V—.86 VI—.23 plus 1.36. Secondary sensoria (Fig. 292) confined to third antennal segment, arranged in a straight row and numbering from 5 to 10; not extending beyond middle of segment. Third antennal segment with characteristic imbrications peculiar to species. Beak extending just beyond mesothoracic coxae.

Thorax and appendages.—Stigma and fore wings quite sharply pointed. Second fork of media variable in position, in one case lacking. All veins ending in brownish suffusions.

Abdomen.—Abdomen with a pair of small lateral tubercles just anterior to cornicles. Cornicles .86 long (Fig. 102), straight, a little more than apical sixth reticulated; remaining portions of cornicles imbricated. Apex of cornicle with a poorly developed flange. Cauda (Fig. 170) only slightly constricted and about .37 long, with three hairs on a side.

ALATE MALE

Size and general color.—Average length, 1.35. Color essentially the same as that of alate viviparous female. Genitalia brownish.

Head and appendages.—Average width of head across eyes, .49. Antennal segments with the following proportions: III—.90 to .97, average .93; IV—.93 to .96, average .95; V—.71 to .86, average .78; VI—.17 to .21, average .18 plus .64 to 1.36, average 1.10. Secondary sensoria usually confined to third and fifth antennal segments, one specimen with two sensoria on fourth. The absence of sensoria on the fourth antennal segment together with their presence on the fifth is very unusual but apparently constant. Sensoria on third antennal segment irregularly arranged although more abundant on

one side, numbering from 38 to 47, averaging about 40; sensoria on fifth segment numbering from 17 to 21, averaging about 19; all segments imbricated. Primary sensorium on sixth antennal segment with a group of about 6 marginal sensoria at one side. Wings similar to those of alate viviparous female. Cornicles averaging .47 in length, otherwise as in the alate viviparous female. Cauda averaging .17 long, not constricted, with about four hairs on a side.

APTEROUS OVIPAROUS FEMALE

Average length 1.97. Essentially the color as described for alate viviparous female. Average width of head across eyes, .43. Comparative lengths of antennal segments as follows: III— .67 to .80, average .75; IV— .60 to .79, average .70; V— .57 to .66, average .63; VI— .19 to .21, average .20 plus .79 to 1.00, average .90. Third antennal segment with a single secondary sensorium near base. All segments imbricated. Cornicles .56 long. Cauda .21 long. Hind femora very much swollen and with about 300 sensoria.

APTEROUS VIVIPAROUS FEMALE (FUNDATRIX)

Average length, 2.50. Color essentially as in alate viviparous female, except in life a much darker reddish green. Average width of head across eyes, .54. Antennal segments with the following comparative lengths: III— .69 to .81, average .75; IV— .57 to .59, average .58; V— .50 to .57, average .53; VI— .21 to .23, average .22 plus .64. Third antennal segment with a single sensorium near base, less imbricated than that of other forms. Beak reaching to middle of mesothoracic coxae. Prothorax with lateral tubercles, differing in this respect from the other forms. Cornicles .56 long; cauda (Fig. 166) .21 long. Otherwise as in alate viviparous female.

Morphotype.—Alate viviparous female; Slide No. 8900, Oakwood, Illinois, May 9, 1930, on *Carpinus caroliniana*, collected by T. H. Frison. On slide with nymphs. *Allotype*.—Alate male; Slide No. 8470, Oakwood, Illinois, October 17, 1929, on *Carpinus caroliniana*, collected by Frison and Ross. *Morphotype*.—Apterous oviparous female; Slide No. 8474, same data as allotype. On slide with oviparous females. *Morphotype*.—Apterous viviparous female (fundatrix); Slide No. 8899, Golconda, Illinois, April 15, 1930, on *Carpinus caroliniana*, collected by Frison and Ross.

MACROSIPHUM CHRYSANTHEMI (OESTLUND)

Siphonophora chrysanthemi Oestlund, Fourteenth Annual Report of the Geological and Natural History Survey of Minnesota, 1886, p. 22.

This species has not been reported previously from Illinois. Our determination of it has been verified by Dr. Oestlund. Soliman (1927) has given technical descriptions of the viviparous forms. It is very closely allied to *M. ambrosiae* (Thomas), and future biological studies may prove them to be forms or varieties of the same species. The sexual forms considered by us as this species, however, appear to differ from sexual forms of *ambrosiae* in having fewer secondary sensoria. Descriptions of the alate male and the apterous oviparous female of this species are given here since they have not been described elsewhere.

Data associated with our viviparous specimens are as follows: Elizabethtown (Oct. 12), 1928; Decatur (Sept. 21, Oct. 19), Jonesboro (Sept. 28), Kappa (Sept. 9), Mahomet (Sept. 4), Mt. Vernon (Sept. 27), Oakwood (Oct. 13), 1929. Sexual forms have been collected as follows: Elizabethtown (Oct. 12), Mahomet (Oct. 6), 1928; Decatur (Oct. 19), Oakwood (Oct. 13), and Urbana (Oct. 24), 1929. Both viviparous and sexual forms collected on *Bidens* sp., *Bidens vulgata*, *Eupatorium urticifolium*, *Prenanthes alba*, and *Solidago* sp.

ALATE MALE

Size and general color.—Average length, 1.91. Head and thorax rather dark dusky brown, thorax with a greenish cast. Abdomen greenish with lateral brownish spots on dorsum and similar spots posterior to the cornicles. Cornicles dark brownish black, cauda varying from greenish to dusky. Antennae light brownish green to dark brownish black. Genitalia dark blackish brown. Coxae, trochanters, and base of femora light yellowish; remainder of legs uniformly dark brown. Beak dusky brown with yellowish markings between segments. Stigma smoke-colored; veins light brown.

Structure.—Average width of head across eyes, .56. Comparative lengths of antennal segments as follows: III— .79 to 1.00, average .86; IV— .64 to .94, average .77; V— .53 to .77, average .67; VI— .11 to .17, average .15 plus .66 to 1.31, average 1.03. Secondary sensoria present on third, fourth, and fifth antennal segments, irregularly arranged on the third and in a more or less regular row on the fourth and fifth; average numbers as follows: III— 45; IV— 9; V— 10. Primary sensorium on sixth antennal segment with about six marginal sensoria at one side. Beak reaching to base of metathoracic coxae. Cornicles .49 long, straight; apical one-third with closed reticulations. Cauda .25 long, only slightly if at all constricted, with from 5 to 7 hairs on a side.

APTEROUS OVIPAROUS FEMALE

Average length from vertex to tip of anal plate, 2.22. Color of head, thorax, and abdomen greenish or yellowish brown. Cornicles dark brown; cauda yellowish green to light brownish. Antennae brownish except for yellowish base of third segment. Legs yellowish except for apical portions of femora, tibiae, and tarsi, which are dark brown. Average width of head across eyes, .53. Comparative lengths of antennal segments as follows: III— .64 to .74, average .69; IV— .41 to .54, average .49; V— .41 to .50, average .46; VI— .09 to .17, average .13 plus .61 to .86, average .75. Secondary sensoria confined to third antennal segment, irregularly arranged, restricted to one side of segment, usually not extending beyond basal half of segment, varying in number from 7 to 13 and averaging 10. Beak reaching to mesothoracic coxae. Cornicles .56 long, with slightly less than one-third of the apical portion reticulated. Cauda .33 long, not constricted, with from 6 to 7 hairs on a side. Hind tibiae very much swollen, with about 100 sensoria.

Allotype.—Alate male; Slide No. 8575, Oakwood, Illinois, October 13, 1929, on *Bidens* sp., (T. H. Frison). On slide with alate viviparous female. *Morphotype.*—Apterous oviparous female; Slide No. 7719, Elizabethtown, Illinois, October 12, 1928, on *Bidens* sp., (Frison and Hottes). On slide with apterous oviparous females.

MACROSIPHUM CORYLI DAVIS

Macrosiphum coryli Davis, Canadian Entomologist, Vol. XLVI, February, 1914, p. 48.

Specimens from Chicago, Illinois, formed part of the material from which this species was originally described. This species, according to our observations, is partial to the more tender terminal leaves and shoots of hazelnut growing in somewhat shaded situations. It is rather solitary in habit and is not as gregarious as many species of the genus. Technical descriptions of the viviparous forms only are given by Davis.

Data associated with viviparous specimens in our collection are as follows: Carbondale (June 4), Havana (June 20), Morton (July 22), Urbana (July 10), 1928; El Paso (July 5), Hardin (June 25), Herod (June 21), Kappa (Aug. 14), Rock Island (July 7), Starved Rock State Park (Sept. 10), 1929. All collected on *Corylus americana*.

MACROSIPHUM CRATAEGI (MONELL)

Siphonophora crataegi Monell, Bulletin of the United States Geological and Geographical Survey of the Territories, Vol. V, No. 1, January 22, 1879, Art. 1, p. 20.

This comparatively rare species, often somewhat difficult to place generically because of slightly swollen cornicles suggestive of *Amphorophora*, was first recorded from Illinois by Davis (1911b). It feeds in small numbers upon the undersides of the leaves of *Crataegus* and apparently is never abundant enough to cause damage and attract attention. Davis (1911b) has recorded it from Chicago and figured the antenna of the wingless viviparous female. Patch (1914b) has described the alate viviparous female. A description of the apterous oviparous female is appended because this sexual form has not been recorded or described previously.

Data associated with our series of viviparous specimens are as follows: Bloomington (Aug 12), 1884; Oakwood (Sept. 17), Urbana (July 10), 1928; Highland Park (July 13), 1929. An oviparous female was taken at Urbana, Oct. 11, 1929. All collected on *Crataegus* sp.

APTEROUS OVIPAROUS FEMALE

Length from vertex to tip of anal plate, 1.86. Color essentially similar to that of apterous viviparous female. Average width of head across eyes, .43. Comparative lengths of antennal segments as follows: III— .60, IV— .50, V— .46, VI— .13 plus .59. Secondary sensoria absent, segments feebly imbricated. Beak reaching to about mesothoracic coxae. Width of head through eyes, .43. Cornicles .57 long, with the apical half slightly swollen; flange at apex present. Cauda .21 long, not constricted, with two hairs on a side. Posterior tibiae with basal halves very much swollen and with about 150 sensoria, which extend beyond the swollen portion of the tibiae.

Morphotype.—Apterous oviparous female; Slide No. 8517, Urbana, Illinois, October 11, 1929, on *Crataegus* sp. (Frison and Ross).

MACROSIPHUM DIRHODUM (WALKER)

Aphis dirhodum Walker, Annals and Magazine of Natural History, Vol. III, 1849, p. 42.

This species has not been reported previously from Illinois. Our specimens agree well with the description as published by Theobald (1926). All forms have been described. It over-winters on rose and migrates to wheat, oats, and various other grasses for the summer months.

Alate viviparous specimens taken at Urbana (Oct. 21, Nov. 5), 1929, and males at Urbana (Nov. 5), 1929. All collected on cultivated *Rosa* sp.

MACROSIPHUM ERIGERONENSIS (THOMAS)

Siphonophora erigeronensis Thomas, Bulletin Illinois State Laboratory of Natural History, Vol. I, No. 2, June, 1878, p. 7.

Specimens from Carbondale, Illinois, provided the material from which this species was described. It is quite common in the state and is found on the flower stalks and upper parts of the stems of its hosts. The descriptions of the alate male and the apterous oviparous female, both previously undescribed, are given here.

Slide No. 5157 in the Survey collection has been selected as the *neotypic* slide since the types of this species have not been recovered. Data associated with this slide are as follows: Carbondale, Illinois, June 4, 1928, on *Erigeron* sp., collected by Frison and Hottes.

Data associated with our viviparous specimens are as follows: Cairo (June 3), Carbondale (June 4), Champaign (July 18), Elizabethtown (May 29), Herod (May 29), Marshall (May 25), Metropolis (June 1), Mt. Carmel (May 26), Muncie (Oct. 6), Oregon (June 28), Starved Rock State Park (June 12), St. Joseph (Aug. 5), Urbana (Aug. 27), 1928; Decatur (June 12), Granite City (June 25), Kankakee (July 14), Kansas (June 17), Mahomet (Aug. 17), Oregon (July 11), Rock Island (July 7), Starved Rock State Park (July 5, 6, Aug. 14, Sept. 10), Urbana (Oct. 14), 1929; Urbana (May 19), 1930. Males and oviparous females were collected at Urbana (Oct. 14), 1929. All collected on *Aster* sp., *Erigeron annuus*, *Erigeron canadensis*, *Erigeron philadelphicus*, *Erigeron* sp., *Solidago canadensis*, and *Solidago* sp.

ALATE MALE

Size and general color.—Average length from vertex to tip of anal plate, 1.27. Head and thorax very dark greenish brown; abdomen green with cornicles, cauda, anal plate, and genitalia dark brown. Antennae dark brown with the first and second segments and extreme base of third segment light greenish brown. Femora with basal third yellowish green, remaining portion dark brown; tibiae brown and darkest at apices; tarsi the same. Stigma brownish with posterior margin darkest. Veins brown bordered with very light brownish suffusions. Beak dusky green with two apical segments brownish.

Structure.—Average width of head across eyes, .41. Antennal segments with the following proportional lengths: III— .57 to .74, average .64; IV— .40 to .57, average .47; V— .37 to .50, average .44; VI— .11 to .16, average .14 plus .59 to .71, average .65. Secondary sensoria present on third, fourth, and fifth antennal segments, irregularly arranged, on fifth segment inclined to be present on apical half of segment, distributed as follows: III— 31 to 45, average 41, IV— 8 to 38, average 21, V— 12 to 13. Primary sensorium on sixth antennal segment with about six marginal sensoria. Cornicles .32 long, apical one-third covered with closed reticulations, remaining portion imbricated, flange at apex poorly developed. Cauda .21 long.

APTEROUS OVIPAROUS FEMALE

Length from vertex to tip of anal plate, 2.14. Color essentially as in apterous viviparous female. Average width of head across eyes, .46. Comparative lengths of antennal segments as follows: III— .69 to .74, average .71; IV— .40 to .43, average .42; V— .37 to .41, average .39; VI— .13 to .14, average .14 plus .57. Secondary sensoria (Fig. 296) confined to third antennal segment and rarely extending beyond basal half of segment; irregularly arranged but confined largely to one side of the segment, averaging 13, greatest variation from average being 4. Beak reaching metathoracic coxae. Cornicles .87 long, apex covered with closed reticulations for a little more than one-fourth the length of the cornicles, remaining portion faintly imbricated. Cauda .36 long, scarcely constricted, with about five hairs on a side. Hind tibiae swollen above apical half, with about 60 sensoria.

Allotype.—Alate male; Slide No. 8488, Urbana, Illinois, October 14, 1929, on *Erigeron* sp., (Frison and Park). On slide with males. *Morphotype.*—Apterous oviparous female; Slide No. 8493, same data as allotype. On slide with oviparous females.

MACROSIPHUM FRIGIDICOLA (GILLETTE AND PALMER)

Macrosiphoniella frigidicola Gillette and Palmer, Annals of the Entomological Society of America, Vol. XXI, No. 1, March, 1928, p. 3.

This is the first published record of this species since it was described, and the first record of it outside of Colorado. Because of its

protective coloration it is very difficult to locate on its hosts. All forms of this species were included in the original description. Specimens of our material have been compared with paratypic material by Professor Palmer and found to be identical.

Data associated with our viviparous specimens are as follows: Urbana (Aug. 20, 25, Oct. 6, 7), 1929. All collected on *Achillea Millefolium*, *Artemisia abrotanum*, and *Artemisia pedemontana*.

MACROSIPHUM GEI (Koch)

- Siphonophora gei* Koch, Die Pflanzenlause Aphiden, 1857, p. 171, no. 16.
Siphonophora euphorbiae Thomas, Bulletin Illinois State Laboratory of Natural History, Vol. I, No. 2, June, 1878, p. 6. *New synonymy*.
Siphonophora euphorbicola Thomas, Bulletin Illinois State Laboratory of Natural History, Vol. I, No. 2, June, 1878, p. 6. *New synonymy*.

Hundreds of bulletins and short articles have been written concerning this cosmopolitan plant louse because of its economic importance as an enemy of the potato and spinach crops and the rôle it plays in the transmission of plant diseases. It has attracted the attention of the geneticists because of the existence of both pink and green forms or varieties. Patch (1915c) and Shull (1925) have shown that parthenogenetic females of each variety produce offspring which remain in color true to the stock from which they came. This extensive literature, most of which has been associated with the name of *M. solanifolii* (Ashmead), can not be reviewed here. First definitely recorded from Illinois by Davis (1911b) the name of *M. asclepiadis* Cowen. We do not believe that *curcubitae* (Thomas), the types of which are lost, is a valid species. It probably is a synonym of *M. gei*.

The rose is evidently the favorite winter or primary host of this species, but it is known to over-winter on a few other plants. Summer generations are found on a large number of hosts. Good descriptions of all forms are given by Patch (1911a and 1915c), Smith (1919), and Theobald (1926).

Cotypes of *Siphonophora euphorbiae* Thomas and *Siphonophora euphorbicola* Thomas have been recovered. Although this cotypic material is in very poor condition, there is no doubt that the specimens involved are identical with *M. gei*. Slide No. 8771 is a cotypic slide of *euphorbiae* Thomas and Slides Nos. 8772-8773 are cotypic slides of *euphorbicola*; all in the Survey collection.

Data associated with our viviparous specimens are as follows: Carbondale (June 4), Catlin (Sept. 27), Elizabethtown (May 31, Oct. 12, 22), Galena (June 25, 27), Havana (June 20, 22), Mahomet (Oct. 6), Metropolis (June 1), Mounds (June 2), Mt. Carmel (May 26), Oakwood (Sept. 17), Oregon (June 28), Paris (Nov. 28), Quincy (June 6), Shawneetown (May 27), St. Joseph (Aug. 5), Urbana (May 26, 28, 31, June 6, July 10, Aug. 6), 1928; Cairo (June 22), Carbondale (Sept. 28), Centralia (Sept. 26, 28), Collinsville (Sept. 11), Decatur (June 12), Edwardsville (Sept. 11), Evanston (Oct. 3), Jerseyville (June 25), Mahomet (Sept. 26), Makanda (Sept. 28), Monticello (Oct. 1), Mt. Vernon (Sept. 28), Normal (Aug. 14), Oakwood (Oct. 17), Rock Island (July 7, 9), Seymour (June 13), Urbana (Sept. 25, Oct. 7, 9, 15, 17), 1929; Golconda (April 15), Metropolis (April 17), Olive Branch (April 19), Urbana (Aug. 18), 1930. Specimens collected on *Amaranthus paniculatus*, *Amaranthus retrofractus*, *Amaranthus* sp., *Anthemis cotula*, *Apium* sp., *Apocynum* sp., *Artemisia* sp., *Asclepias* sp., *Calendula* sp., *Capsicum dulce*, *Chenopodium* sp., *Convolvulus* sp., *Cryptotaenia*

canadensis, *Cucurbita marima*, *Eupatorium urticacifolium*, *Euphorbia marginata*, *Euphorbia* sp., *Helianthus* sp., *Ipomoea Batatas*, *Lactuca* sp., *Lagenaria vulgaris*, *Lathyrus* sp., *Ligustrum vulgare*, *Ligustrum* sp., *Lycopersicon esculentum*, *Pastinaca sativa*, *Pentstemon* sp., *Pisum sativum*, *Polygonatum* sp., *Polygonum Muhlenbergii*, *Polygonum* sp., *Polymnia* sp., *Rosa* sp., *Rumex* sp., *Saxifraga splendens*, *Scrophularia leporilla*, *Senecio vulgaris*, *Solanum melongena*, *Solanum tuberosum*, *Spinacea olivacea*, *Trifolium repens*, and *Ulmus fulva*. Sexual forms taken in 1929 at Urbana (Oct. 17), on *Iris* sp., and at Oakwood (Oct. 17), on *Scrophularia* sp.

MACROSIPHUM GERANII (OESTLUND)

Nectarophora geranii Oestlund, Geological and Natural History Survey of Minnesota, Bulletin No. 4, 1887, p. 80.

This species has not been reported previously from Illinois. It occurs on the stems and undersides of the leaves of wild geranium. Specimens of our material were compared by Professor Oestlund with specimens considered by him as this species (the actual types are lost). The sexual forms are unknown. It is closely related to *M. gei* (Koch) but may be readily separated because of the heavily shaded anal and cubital veins of the fore wings. The descriptions of the alate viviparous female and the stem mother, never having been published, are added here.

Data associated with our viviparous specimens are as follows: Starved Rock State Park (June 13), 1928; Golconda (April 15), 1930. All collected on *Geranium maculatum*, or *Geranium* sp.

ALATE VIVIPAROUS FEMALE

Average length from vertex to tip of anal plate, 2.23. Head and extreme base of third antennal segment yellowish green; mesothorax yellowish, shaded lightly with brown; prothorax, metathorax, abdomen, anal plate, and basal half of cauda apple green; apical half of cauda yellowish green. First and second antennal segments yellowish brown; flagellum except extreme base dark brown. Cornicles black. Coxae and trochanters greenish white; femora greenish white, with apical fifth dark brown; tibiae and tarsi dark brown. Beak concolorous with head, tip brown. Wings hyaline, stigma and costa whitish yellow, veins black, cubital and anal veins margined with fuscous. Eyes brownish.

Width of head across eyes, .56. Comparative antennal lengths as follows: III—.79 to .89, average .84; IV—.71 to .79, average .74; V—.67 to .74, average .71; VI—.16 to .20, average .18 plus .93 to 1.11, average 1.01. Secondary sensoria restricted to third antennal segment, numbering 5 to 8, average 6, arranged in a straight row and confined to basal half of segment. Flagellum beyond sensoria distinctly imbricated, entire antennae with scattered, weak setae. Cornicles .85 in length, slightly sinuate, with a distinct flange at apex, the apical fifth with large, closed reticulations, the remainder moderately imbricate. Cauda .37 in length, constricted at middle, basal half subconical, apex portion narrow, but with extreme tip rounded.

APTEROUS VIVIPAROUS FEMALE (FUNDATRIX)

Length from vertex to tip of anal plate, 2.81. Head, thorax and abdomen a uniform shiny green (pea-green). Cauda and anal plate concolorous with abdomen. Eyes black. Cornicles at immediate base greenish, remainder black. Coxae, trochanters, and most of femora greenish; femora near apices slightly brownish; tibiae pale brownish green with black at apices for a distance about equal the tarsi; tarsi black. First and second antennal segments concolorous with head, third antennal segment light brownish but approaching black at tip; remainder of flagellum dark brownish or black. Beak concolorous with head at base, gradually becoming darker, and tip blackish.

Nymphs.—About as stem mothers except not a shiny green, but a soft, more pruinose green.

Width of head across eyes, .56. Average antennal lengths as follows: III— .91; IV— .62; V— .60; VI— .18 plus .83. Secondary sensoria usually absent, sometimes one present near base of third antennal segment. Third segment smooth, not imbricated, remainder of flagellum imbricated. Cornicles and cauda as in alate viviparous female, respectively .95 and .42 in length, the cauda less inclined to be constricted near middle.

Morphotype.—Alate viviparous female; Slide No. 9014, Golconda, Illinois, April 15, 1930, on *Geranium maculatum*. (Frison and Ross). *Morphotype*.—Apterous viviparous female (fundatrix); Slide No. 9019, same data as above. On slide with nymphs.

MACROSIPHUM GRANARIUM (Kirby)

Aphis granaria Kirby, Transactions of the Linnean Society of London, 1798, Vol. IV, p. 238.

The English grain aphid is a widely distributed and common plant louse in Illinois (Fig. 16) and sometimes becomes a serious pest of cereals. It was first reported from the state by Thomas who mentions that it did considerable damage in 1866. In Illinois this aphid overwinters both in the egg stage and as viviparous females on grasses and autumn-sown cereals. Both green and pink forms are found, the pink ones being mainly responsible for the production of the sexual forms.

The literature of economic entomology contains many articles concerning the habits of this plant louse. Good technical descriptions of all forms may be found in the publications of Phillips (1916) and Theobald (1926). Records of *cercalis* (Kaltenbach) from Illinois by Pergande (1904) refer to this species.

Data associated with our viviparous specimens are as follows: DuQuoin (Sept. 7), Normal (June 19), 1883; Carmi (May 30), McHenry (July 31), Urbana (June 19), 1884; Urbana (May 21), 1885; Urbana (June 25), 1889; Roodhouse (July 16), 1891; Champaign (July 21), 1894; Beech Ridge (May 22), Lewistown (June 26, 28), 1907; Bloomington (July 5), Carbondale (June 21), Farmer City (July 5), Galena (July 10), Grayville (June 19), Herod (June 21), Homer (June 17), Jonesboro (June 23), Kankakee (July 14), LaSalle (July 5), Lawrenceville (June 18), Newton (June 17), Olney (June 18, 19), Oregon (July 11), Rock Island (July 7), Seymour (June 13), Sparta (June 24), Starved Rock State Park (July 6), Ullin (June 21), 1929; Gray's Lake (June 21), 1930. All collected on *Avena sativa*, *Trifolium pratense*, *Triticum aestivum*, and *Zea Mays*.

MACROSIPHUM GRAVICORNIS Patch

Macrosiphum gravicornis Patch, Maine Agricultural Experiment Station, Bulletin 282, December, 1919, p. 213.

This species has not previously been reported from Illinois. It has similar habits and hosts to the allied species *M. crigeronensis* (Thomas), from which it is easily separated because of differences in comparative antennal lengths. Dr. Patch, who described the viviparous and oviparous females, kindly checked the determinations of some of our specimens. A description of the previously unknown male is presented here.

Data associated with our viviparous specimens are as follows: Galena (June 25, 27), Havana (June 21), Herod (May 29), Kankakee (June 29), Metropolis (May 31), Mt. Carroll (June 25), Oakwood (Sept. 17), Oregon

(June 27, 28), Pekin (June 20), Quincy (June 6), Rock Island (June 24), Starved Rock State Park (June 12), 1928; Beach (Aug. 29), Edwardsville (Sept. 11), Elizabethtown (June 20), Urbana (May 22), 1929. Specimens collected on *Aster* sp., *Erigeron philadelphicus*, *Erigeron* sp., *Lactuca*, sp., *Solidago canadensis*, and *Solidago* sp. Sexual forms taken on *Solidago* sp. at Oakwood, Oct. 17, 1929.

ALATE MALE

Average length from vertex to tip of anal plate, 1.20. General color as in alate viviparous female. Genitalia dark brown. Average width of head across eyes, .43. Comparative lengths of antennal segments as follows: III— .64 to .83, average .72; IV— .36 to .50, average .45; V— .36 to .50, average .43; VI— .11 to .14, average .12 plus .67 to .90, average .77. Secondary sensoria distributed as follows: III— 56 to 59, average 57; IV— 9 to 15, average 11; V— 4 to 12, average 7; sensoria on third segment somewhat tuberculate, covering most of segment, those on fourth and fifth segments usually in a more or less regular row, those of fifth segment usually nearer apical portion of segment. Beak reaching to, or sometimes beyond, middle of mesothoracic coxae. Cornicles .37 long, with about the apical third reticulated, remaining portion slightly imbricated. Cauda .20 long, constricted near middle, and with about 4 hairs on a side.

Allotype.—Alate male; Oakwood, Illinois, October 17, 1929, on *Solidago* sp., (Frison and Ross). On Slide No. 8733 with another male.

MACROSIPHUM ILLINI new species

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 2.27. Head and thorax chestnut brown blending to yellowish-brown at lateral margins. Abdomen lemon-yellow on dorsum with brownish patches on lateral margins; cauda and cornicles dark brown to almost black; area immediately around base of cornicles yellowish, but this area is surrounded by a brownish area much larger than patches on sides of abdomen anterior to cornicles. First antennal segment concolorous with the head, second segment somewhat lighter than the first, third segment concolorous with second for about length of second segment at base and then becoming dark brown or black, remaining segments mostly shades of brown with basal portions of segments lightest, particularly basal portion of fourth segment. Basal portions of femora light yellowish and the apical portion dark brown; tibiae mostly yellowish except for trace of brown near articulation with femora and a brown area at apex about three times the length of the tarsi; tarsi dark brown. Wings with veins light yellowish brown, the stigma of fore wings dark brown. Beak with basal portion concolorous with head and apical half dark brown.

Head and appendages.—Average width of head across eyes, .54. Antennal segments with comparative lengths as follows: III— .93 to 1.03, average .99; IV— .87 to 1.04, average .98; V— .84 to 1.00, average .93; VI— .17 to .24, average .21 plus 1.29 to 1.86, average 1.71. Secondary sensoria limited to the third antennal segment (Fig. 300); while scattered, they are confined largely to the basal half and one side of this segment; in number they range from 24 to 32. The beak extends to the coxae of the third pair of legs.

Thorax and appendages.—Stigma of fore wings sharply pointed; second fork of media of fore wing is closer to the margin of wing than to first fork; veins delicate.

Abdomen.—Four pairs of poorly developed lateral tubercles situated in center of lateral brownish areas, no lateral tubercles posterior to the cornicles. The cornicles (Fig. 103) are a little more than two times the length of the cauda and are reticulated at apex for one-third of their length; cornicles neither swollen or constricted; the length varies from .31 to .43 and averages .36. The cauda (Fig. 171) is comparatively short for the size of this aphid and about three times the length of the second segment of the hind tarsus; its sides are straight, without any constriction, and with five to six hairs on a side; their length varies from .75 to .93 and averages .82. Anal plate but little wider than the base of cauda.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 2.70. Pure lemon-yellow in color except the following which are brownish or blackish: apices of femora and tibiae, tarsi, tip of beak, area on third segment where secondary sensoria are concentrated, remainder of antennae beginning near middle of fourth segment, cornicles, area on abdomen surrounding and near base of cornicles, and cauda.

Head and appendages.—Average width of head across eyes, .55. Antennal segments with comparative lengths as follows: III— .97 to 1.42, average 1.05; IV— .86 to 1.04, average .96; V— .86 to .97, average .93; VI— .20 to .24, average .21 plus 1.79 to 1.00, average 1.47. The small secondary sensoria (Fig. 277) are restricted to the third segment and are concentrated in a small area removed from the base of the segment by a distance which is much less than one-half the length of the segment; the area free from sensoria occupies approximately the apical half of the segment. The beak extends to the coxae of the third pair of legs.

Abdomen.—Apparently without lateral tubercles and lateral brownish patches lacking except for large ones around base of cornicles. Cornicles, cauda and anal plate as in the alate viviparous female.

APTEROUS OVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 3.00. General color characters of the body similar to those of the apterous viviparous female.

Head and appendages.—Average width of head across eyes, .53. Antennal segments with comparative lengths as follows: III— .94 to 1.00, average .97; IV— .83 to .83, average .83; V— .84 to .86, average .85; VI— .15 to .15, average .15 plus 1.43. Secondary sensoria on third antennal segment as in the apterous viviparous female.

Thorax and appendages.—Similar to apterous viviparous female except that hind tibiae, partly basal half, are considerably swollen and thickly covered with sensoria (Fig. 303).

Abdomen.—Abdomen and structures found on abdomen as in apterous viviparous female.

ALATE MALE

Size and general color.—Average length from vertex to tip of anal plate, 1.43. Head, thorax, abdomen, cornicles, cauda, and legs colored as in the alate viviparous female. The antennae differ in that they are almost entirely dark excepting base of third segment, which is somewhat yellowish for a distance equal to the width of the second segment at its base.

Head and appendages.—Average width of head across eyes, .44. Antennal segments with comparative lengths as follows: III— .87 to .93, average .89; IV— .89 to .93, average .91; V— .81 to .91, average .87; VI— .16 to .17, average .17 plus .96 to 1.64, average 1.33. The secondary sensoria (Fig. 285) are arranged as follows: III— 28 to 43, average 35; IV— 18 to 29, average 23; V— 10 to 19, average 14. The secondary sensoria are quite widely scattered over the surface of the third segment; on the fourth they are not confined to a row but are more numerous on one side of the segment than the other and show a slight tendency to favor the apical two-thirds of the segment; on the fifth segment they are arranged in a slightly irregular row. The beak reaches almost to the coxae of the metathoracic pair of legs.

Thorax and appendages.—Thorax and appendages similar to those of the alate viviparous female.

Abdomen.—Abdomen with lateral tubercles as in the alate viviparous female. Cornicles twice the length of cauda and about one-half the length of third antennal segment, closed reticulations covering a distance equal to about one-third of the length of the cornicle. Cauda dusky brown.

Holotype.—Alate viviparous female; Jonesboro, Illinois, June 23, 1929, on *Helianthus* sp., (Frison and Hottes). Slide No. 10121. *Allotype.*—Alate male, Decatur, Illinois, October 5, 1929, on *Helianthus* sp., (Hottes). Slide No. 10122. *Morphotype.*—Apterous viviparous female; Urbana, Illinois, August 25, 1929, on *Helianthus* sp., (Frison and Hottes). Slide No. 10123.

Morphotype.—Apterous oviparous female; Herod, Illinois, October 12, 1929, on *Helianthus* sp., (Frison and Hottes). Slide No. 10124. *Paratypes*.—One hundred and two slides of males, oviparous females, apterous and alate viviparous females, pupae and nymphs; all collected in Illinois by T. H. Frison, F. C. Hottes, and H. H. Ross from species of wild or cultivated *Helianthus*. The localities and dates are as follows: Herod (October 12), 1928; Decatur (September 21 and October 5), Edwardsville (September 11), Hardin (June 25), Herod (June 29), Jonesboro (June 23), Metropolis (September 28), Nameoki (June 25), Oakwood (July 22 and October 13), Oregon (July 11), Rock Island (July 7), Savanna (July 9), Starved Rock State Park (July 6), St. Joseph (August 27), Urbana (October 7 and 9), 1929. Slides Nos. 10125-10193 and others unnumbered. Also two paratypic slides from Washington, D. C., on *Helianthus tuberosa*, and Lafayette, Indiana, Sept. 19, 1915, on sunflower, (J. J. Davis).

This handsomely colored species was first found at Herod, Illinois, on October 12, 1928. It was again found there the following year and subsequent collecting has shown it to occur in all parts of the state on wild *Helianthus* sp. It is evident from our experience with this species that it almost always frequents the undersides of the lowermost and larger leaves of its host, this habit perhaps being responsible for its escaping the notice of previous investigators. Although individuals of this species are not solitary in habit, we have never found them forming colonies of individuals as large as those formed by the closely related species of *M. ambrosiae* (Thomas) and *M. rudbeckiae* (Fitch). Our collecting is sufficient, too, to demonstrate that this new species in Illinois does not have such cosmopolitan tastes as *ambrosiae* and *rudbeckiae*, and as far as we have been able to discover, it is restricted to wild or cultivated species of *Helianthus*. The difference in the color of the cauda will separate *illini* from *ambrosiae* and *rudbeckiae*; in *illini* the cauda is dark brown or black, whereas in *ambrosiae* and *rudbeckiae* it is yellowish or pale and never dark or black.

The general outlines of the life history of this species conform to those of other species of the genus *Macrosiphum* in Illinois. The alate and apterous viviparous females, nymphs, and pupae were collected during June, July, August, September, and October. The sexual forms, males and oviparous females, have been found in October only and mating pairs were collected at Oakwood on October 13, 1929.

This species is named in honor of the past and present students of the University of Illinois, collectively referred to as the "Illini." The name itself comes from a tribe of valiant Indians who once inhabited the territory that is now Illinois.

MACROSIPHUM ILLINI var. CRUDAE new variety

ALATE AND APTEROUS VIVIPAROUS FEMALES

Structurally identical with the typical form of *illini*. Differs in having the basic color bright green instead of yellow.

Holotype.—Alate viviparous female; Decatur, Illinois, October 21, 1929, on *Helianthus* sp., (F. C. Hottes). Slide No. 10200. *Morphotype*.—Apterous viviparous female; same data as holotype. Slide No. 10201. *Paratypes*.—Six slides, containing alate and apterous females; same data as holotype. Slides Nos. 4786, 10202-10205, 10718.

MACROSIPHUM ILLINI VAR. SANGAMONENSIS new variety

ALATE AND APTEROUS VIVIPAROUS FEMALES

Structurally identical with the typical form of *illini*, but differing in having the basic color bright red instead of yellow.

Holotype.—Alate viviparous female; Decatur, Illinois, October 21, 1929, on *Helianthus* sp., (F. C. Hottes). Slide No. 10194. *Morphotype*.—Apterous viviparous female; same data as holotype. Slide No. 10195. *Paratypes*.—Four slides, containing alate and apterous viviparous females and nymphs; same data as holotype. Slides Nos. 10196-10199.

MACROSIPHUM IMPATIENSICOLENS PATCH

Macrosiphum impatiensicolens Patch, Maine Agricultural Experiment Station, Bulletin 282, December, 1919, p. 210.

This species has never been previously reported from Illinois. We have had considerable difficulty in separating this plant louse from species belonging to the *ambrosiae* complex, and in our key have been forced to key it out on the basis of host plant. We have held it as a distinct species because specimens of our material have been determined as *impatiensicolens* by Dr. Patch. According to the original description and some of our material, the secondary sensoria on the third antennal segment average fewer in number than in *ambrosiae*. Possibly future biological studies will prove that the Illinois material we are recording as *impatiensicolens* is the same species as *ambrosiae*.

Data associated with our viviparous specimens are as follows: Mt. Carroll (June 25), Rock Island (June 24), Starved Rock State Park (June 12, 13), 1928; Jonesboro (June 23), Starved Rock State Park (Aug. 14, Sept. 10), 1929. Specimens collected on *Impatiens* sp.

MACROSIPHUM KICKAPOO new species

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.91. Head and thorax chiefly light greenish brown; anterior margin of head, areas around ocelli, and dorsum of meso- and metathorax darkest; ventral areas of head and prothorax lightest, translucent greyish. Dorsum of abdomen pellucid green, with three or four lateral light dusky brown patches anterior to cornicles; base of cornicles surrounded by a narrow whitish ring which in turn is surrounded by a dusky brown area, the two areas connected posteriorly by a transverse dusky band; posterior to this are two transverse dusky bands, the anterior band broad, the posterior band narrow and shorter. Cornicles pellucid greenish brown; cauda and anal plate light yellowish brown. First and second antennal segments concolorous with head; remaining antennal segments uniformly dusky brown except extreme base of third segment, which is lighter in color. Eyes reddish black. Coxae concolorous with thorax; trochanters and basal halves of fore femora yellowish, remainder of fore femora shading gradually to blackish brown; femora of middle and hind legs with only their extreme basal portions yellowish, remaining portions blackish brown; tibiae darkest at the knees, then gradually shading to dusky yellowish at about the middle and continuing this color to within a distance from the apex equal to the length of the tarsi, this short apical portion dark brownish; tarsi dark brown, first segment lighter than second. Fore wing with stigma light yellowish; veins of wings dark brown, anal and cubital veins much the stoutest and darkest and lightly bordered with brownish; posterior margin of wing where it meets anal vein suffused with brownish. Beak luteous with the exception of the extreme tip of the last segment which is dark brown.

Head and appendages.—Average width of head across eyes, .50. Antennal segments with comparative lengths as follows: III— .66 to .73, average .70; IV— .50 to .60, average .56; V— .53 to .64; average .58; VI— .16 to .19, average .17 plus .97 to 1.00, average .99. The secondary sensoria (Fig. 294) are entirely or almost all restricted to the third antennal segment, distributed about in a straight row and almost the entire length of the segment beginning at a distance from the base about equal to the length of the second antennal segment and ending very near the end of the segment; occasionally a secondary sensorium on the fourth segment; sensoria large, numbering from 16 to 20 and with an average of 18. The beak is short, failing to reach the coxae of the mesothoracic pair of legs.

Thorax and appendages.—Stigma of fore wing quite narrow and sharply pointed; second fork of media usually closer to the margin of the wing than it is to the first fork, but in a few specimens the reverse is true. The hind tarsi, exclusive of claws, are not quite equal to the length of the cauda.

Abdomen.—Cornicles (Fig. 109) with sides straight and tapering but slightly to the apex which is without a rim; apical one-fourth covered with closed reticulation, remaining portion strongly imbricated; in length they are a little more than twice the length of the hind tarsi exclusive of claws and average about .29. Cauda (Fig. 172) short, stout, non-constricted, about equal to the base of the sixth antennal segment in length or an average length of .18 with four pairs of hairs on a side.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.90. Entire body and appendages pellucid whitish green except the following parts: sixth antennal segment, tarsi, extreme tip of beak and reticulated apical portion of cornicles, all dusky brown; eyes dark reddish-black.

Head and appendages.—Average width of head across eyes, .47. Antennal segments with comparative lengths as follows: III— .64 to .79, average .72; IV— .39 to .50, average .44; V— .41 to .51, average .48; VI— .14 to .16, average .14 plus .81 to 1.00, average .88. Secondary sensoria limited to the third antennal segment, never farther removed from the base of the segment than one-half the length of the cornicles; numbering from one to three, two being the more common number. The beak may reach as far as the coxae of the metathoracic pair of legs but generally extends just to the mesothoracic pair of coxae or slightly beyond.

Thorax and appendages.—The hind tarsi are a little shorter than one-half the length of the cornicles, or subequal to the length of the base of the sixth antennal segment.

Abdomen.—Cauda similar to that of alate viviparous female except it has three hairs on a side. Cornicles and anal plate similar to the same structures of the alate viviparous female.

APTEROUS OVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 2.11. This form in color and markings is practically identical with the apterous viviparous female.

Head and appendages.—Average width of head across eyes, .46. Antennal segments with the following proportions: III— .61 to .66, average .64; IV— .41 to .51, average .46; V— .44 to .50, average .47; VI— .13 to .14, average .14 plus .77 to .90, average .83. Other characters as in apterous viviparous females.

Thorax and appendages.—Posterior tibiae but slightly swollen with numerous sensoria on basal half which are difficult to count owing to clearness of legs. Otherwise as in apterous viviparous female.

Abdomen.—Similar to the apterous viviparous female, with the exception of apical modifications and cauda which is much shorter and stouter.

ALATE MALE

Size and general color.—Average width of head across eyes, .49. Average length from vertex to tip of anal plate, 1.35. Color and markings almost

identical with the alate viviparous female, differing only in that the lateral spots on the abdomen are more nearly confluent and that there is less brown on the posterior region of the abdomen since the white extends farther back on the dorsum than the base of the cornicles.

Head and appendages.—Antennal segments with the following comparative lengths: III— .43 to .71, average .59; IV— .33 to .50, average .43; V— .36 to .54, average .45; VI— .11 to .14, average .12 plus .69 to 1.01, average .88. Secondary sensoria found on third, fourth, and fifth antennal segments; varying greatly in size, those on fourth and fifth segments being uniformly small while those on third segment vary from large to small, the smaller sensoria outnumbering the large ones on third segment. Sensoria are distributed as follows: III— 26 to 35, generally more than 30; IV— 7 to 11; V— 7 to 16, generally more than 9. On the fourth and fifth segments the sensoria are nearly in a straight line; on the third segment they are scattered although confined largely to one side of the segment and often quite crowded and close together.

Thorax and appendages.—Similar to alate viviparous female.

Abdomen.—Essentially as in alate viviparous female. Male genitalia dark dusky brown.

Holotype.—Alate viviparous female; Starved Rock State Park, Illinois, August 14, 1929, on *Polygonatum* sp., (Frison and Hottes). Slide No. 10313. *Allotype.*—Alate male; Same data as for holotype. Slide No. 10314. *Morphotype.*—Apterous viviparous female; Same data as for holotype. On slide with two other apterous viviparous females. Slide No. 10315. *Morphotype.*—Apterous oviparous female; Starved Rock State Park, Illinois, September 10, 1929, on *Polygonatum* sp., (Frison and Ross). On slide with male and two other oviparous females. Slide No. 10316. *Paratypes.*—Twenty-eight slides of males, oviparous females, apterous and alate viviparous females, nymphs and pupae; collected on *Polygonatum* sp. by T. H. Frison, F. C. Hottes, and H. H. Ross, at Starved Rock State Park, Illinois, on August 14 and September 10, 1929, and May 13, 1930, and Seymour, Illinois, June 20, 1930. Slides Nos. 10317-10337 and others unnumbered.

This small *Macrosiphum* is not closely related to any of the previously described members of this genus. It is, however, closely allied to *M. sanguinarium* described as new in this paper. It differs from the latter species in the color of the abdomen, cornicles, and legs, and the alate viviparous females may be separated by the more numerous secondary sensoria on the third antennal segment.

The light coloration of this new species makes it easily detected on the lower sides of the green leaves of its host plant.

MACROSIPHUM LAEVIGATAE Essig

Macrosiphum laevigatae Essig, Pomona College Journal of Entomology, Vol. III, May, 1911, p. 548.

This pale yellowish green species, heretofore recorded only from California and Maine, was taken by us on the tender shoots of a species of *Salix* at Starved Rock State Park, July 6, 1929. Swain (1919) and Soliman (1927) have used the specific name of *californica* (Clarke) for this species, but the antennal measurements do not agree with the original description of Clarke (1903). The sexual forms are unknown.

MACROSIPHUM LIRIODENDRI (MONELL)

Siphonophora liriodendri Monell, Bulletin of the United States Geological and Geographical Survey of the Territories, Vol. V, No. 1, Art. 1, January 22, 1879, p. 20.

Davis (1909b) first reported this species from Illinois. It is very abundant on the undersides of the leaves of the tulip tree in all parts of the state. Good technical descriptions of all forms are given by Davis (1909b). The red color phase of this aphid was named *rufa* by Monell.

Data associated with our viviparous specimens are as follows: Champaign (June 26), Urbana (June 21, 24), 1886; Urbana (July 2), 1891; Champaign (July 30), 1894; Herod (Oct. 12), Urbana (Oct. 15, 23), 1928; Bloomington (July 5), Cairo (June 22), Decatur (June 12), Elizabethtown (June 20), Grayville (June 19), Jonesboro (Sept. 26), Metropolis (Sept. 28), Richmond (July 12), and Woodriver (June 25), 1929. Sexual forms have been collected as follows: Decatur (Oct. 20), Herod (Oct. 12), Urbana (Oct. 15), 1928; and Urbana (Oct. 9), 1929. All specimens collected on *Liriodendron Tulipifera*.

MACROSIPHUM LUDOVICIANAE (OESTLUND)

Siphonophora ludoviciana Oestlund, Fourteenth Annual Report of the State Geologist of Minnesota, March, 1886, p. 23.

This species has not previously been reported from Illinois. We have found it present in almost every patch of wormwood examined. It shows a decided preference for the terminal portions of the plant. The sexual forms are unknown. The viviparous forms are best described by Soliman (1927). Specimens of our material have been determined by Professor Oestlund as this species (actual types lost).

Data associated with our viviparous specimens are as follows: Benton (Sept. 26), Champaign (Aug. 13), Erie (July 9), Herod (Sept. 27), LeRoy (Aug. 14), Mattoon (Sept. 10), Rock Island (July 7), Urbana (Aug. 5), Vandalia (Sept. 28), Witt (Sept. 10), 1929; Metropolis (April 17), 1930. All specimens collected on *Artemisia* sp.

MACROSIPHUM PALLENS new species

ALATE VIVIPAROUS FEMALE

Size and general color.—Length from vertex to tip of anal plate, 1.89. Head, thorax and abdomen a pale yellow-green, except for small brownish areas immediately surrounding ocelli. Cornicles concolorous with abdomen for a little over one-half their length, apical half light fuscous; cauda and anal plate concolorous with abdomen. First antennal segment concolorous with the head except inner apical margin somewhat brownish, second and base of third segment for a distance equal length of second segment pale yellowish, remainder of antennae dark brownish. Coxae, trochanters, and basal half of femora concolorous with abdomen; apical portion of femora and remainder of legs brownish, particularly apices of femora, tibiae, and all of tarsi. Beak, except for brownish tip, concolorous with head. Stigma of fore wings delicately fuscous, veins light brown, posterior margin of wing brownish near junction with anal vein.

Head and appendages.—Average width of head across eyes, .47. Antennal segments with comparative lengths as follows: III— .90; IV— .87; V— .91; VI— .23 plus 1.43. Secondary sensoria (Fig. 289) limited to the third antennal segment, small, arranged in a straight row and extending along the entire length of the segment, numbering from 12 to 15. Hairs on the antennae exceedingly fine and short, arising from conspicuous translucent areas, and might easily be overlooked were it not for these areas. Primary sensorium on the sixth antennal segment apparently without marginal sensoria. Beak just failing to reach to the coxae of the metathoracic pair of legs.

Thorax and appendages.—Fore wing with the second fork of media closer to the margin of the wing than to the first fork. Medial and cubital veins failing to reach the margin of the wing.

Abdomen.—Cornicles (Fig. 112) long, tapering very gradually from base to apex; with three or four rows of closed reticulations at apex followed by faint imbrications; well-developed flange at apex; about one-half as long as terminal filament of sixth antennal segment and twice as long as cauda, measuring .61 in length. Cauda (Fig. 175) distinctly constricted near middle, measuring .29 in length, with three hairs on each side. Anal plate normal for genus.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 2.40. Entire body except appendages an immaculate light green. Cornicles, cauda, and anal plate lighter in color than the abdomen; cornicles with the extreme apex faintly fuscous. First and second antennal segments, and base of third segment to point where the sensoria begin, concolorous with the head; remainder of third and following antennal segments yellowish brown, with apical portions of each segment and the portion of the sixth segment around the primary sensorium somewhat darker. Coxae, trochanters, and basal half of femora essentially concolorous with the body, remainder of femora darker towards apex; tibiae light brownish except apices, which are concolorous with the dark brownish tarsi.

Head and appendages.—Average width of head across eyes, .50. Antennal segments with comparative lengths as follows: III— .80 to .99, average .89; IV— .80 to .93, average .88; V— .64 to .74, average .71; VI— .20 to .26, average .23 plus .93 to 1.39, average 1.21. Secondary sensoria small, arranged in a straight row and confined to about the basal one-third of the segment; varying from three to four in number, four being the more common number. Beak similar to that of the alate viviparous female.

Abdomen.—Cornicles similar to those of the alate viviparous female and averaging .73 in length. Cauda less constricted than in the alate viviparous female, with from three to four hairs on a side, averaging .38 in length.

Holotype.—Alate viviparous female; Galena, Illinois, July 10, 1929, on *Silphium integrifolium*, (Frison and Hottes). Slide No. 10206. *Morphotype.*—Apterous viviparous female; Galena, Illinois, July 10, 1929, on *Silphium integrifolium*, (Frison and Hottes). On slide with two apterous viviparous females and two nymphs. Slide No. 10207. *Paratypes.*—Four slides of alate and apterous viviparous females, nymphs and pupae. Galena, Illinois, July 10, 1929, on *Silphium integrifolium*, (Frison and Hottes), and Danville, Illinois, July 15, 1928, on *Ambrosia trifida*, (Hottes, Ross, and Park). Slides Nos. 10208-10211.

Mounted specimens of this species have a superficial resemblance to a number of green-colored species of *Macrosiphum*. This new species is very closely allied to *M. peltargonii* (Kalt.), but is distinguished by its pale whitish-green color in life, and by having the third, fourth, and fifth antennal segments subequal. It is also allied structurally to *M. shranki* Theobald, from which it may be distinguished by having fewer secondary sensoria on the third antennal segment, and the sensoria being in a row. The absence of marginal sensoria on the sixth antennal segment, the absence of marginal spots on the abdomen of the alate viviparous females, and the more uniformly green body in general and the brownish tibiae, are further differential characters. This species may be distinguished at once from *M. gei* (Koch) and *pisi* (Kalt.) by the poorly reticulated cornicles and the constricted cauda.

The specimens were found scattered here and there on the lower surfaces of the broad leaves of their host plant.

MACROSIPHUM PISI (KALTENBACH)

FIGS. 36, 37, 181

Aphis pisi Kalténbach, Monographie der Familien der Pflanzenläuse, Aachen, 1843, p. 23.

The cosmopolitan pea aphid (Figs. 36 and 37) is one of the commonest and most widely distributed aphids in Illinois. Since it is often a serious pest of peas, clovers, and other legumes, it has received much attention from economic entomologists. This species was first recorded from Illinois (Carbondale) by Thomas (1879).

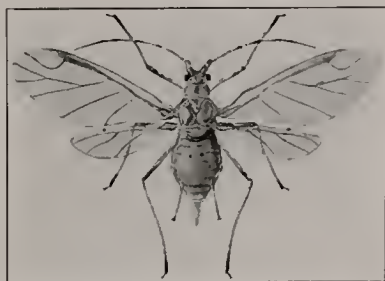
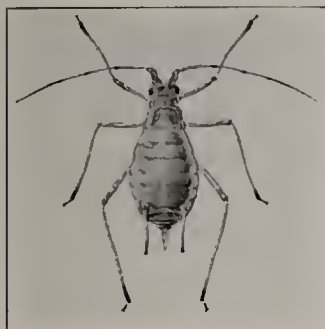


Fig. 36. (Left) Apterous viviparous female of the pea aphid, *Macrosiphum pisi* (Kaltenbach). (After Folsom: Ill. Ent. Rep. 25.)

Fig. 37. (Right) Alate viviparous female of the pea aphid, *Macrosiphum pisi* (Kaltenbach). (After Folsom: Ill. Ent. Rep. 25.)

Davis (1915) and Theobald (1926) have given very complete descriptions of all forms of this plant louse and much information concerning its biology. The article by Folsom (1909) contains data relating to the life history of the pea aphid in Illinois and an especially good discussion of its natural enemies. The following summarized statement of the life history of this species is quoted from Davis:

"The life history of the pea aphid is quite simple, for it does not have a true alternate host like some species of plant-lice. As has been noted, it attacks leguminous plants primarily, some of which are annuals, others perennials. Clovers, particularly red and crimson clovers, serve as hosts for this insect the entire year, and it is on these plants that it usually passes the winter, either as eggs or as viviparous females, although during the summer months the migrants also pass to other leguminous crops, such as sweet pea, garden and field peas, and vetches, and on these they multiply very rapidly, oftentimes destroying large acreages. In the latitude of LaFayette, Ind., the species winters both as living viviparous females, usually wingless, and as eggs. Farther north it may winter exclusively in the egg stage, although our observations are not complete on this point, while farther south, in the latitude of Tennessee, the sexual forms which lay the overwintering eggs are rare, the insect ordinarily passing the winter as living plant-lice, both wingless and winged forms being able to withstand the lower temperatures in that latitude. Still farther south we know only the viviparous females and our observations lead us to believe that the species may reproduce viviparously indefinitely in localities where the winters are quite mild."

Data associated with our viviparous specimens are as follows: Harvey (Sept. 15), 1907; Albion (May 26), Antioch (June 15), Bement (July 17), Cairo (June 2), Carbondale (June 4), Champaign (July 9), Elizabethtown (May 31), Galena (June 25), Havana (June 21, 22), Herod (May 29), Jacksonville (May 11), Kankakee (June 24), Marshall (May 25), Metropolis (June 1), Mounds (June 2), Mt. Carmel (May 26), Muncie (Oct. 6), Oakwood (May 21), Oregon (June 29), Pekin (June 20), Quincy (June 7), Rock Island (June 23), Shawneetown (May 27), Starved Rock State Park (June 13), Urbana (May 29), 1928; Cairo (June 22), Edwardsville (Sept. 11), Elizabethtown (June 20), Farmer City (July 5), Galena (July 10), Grayville (June 19), Hardin (June 25), Homer (June 17), Kansas (June 17), Olney (June 18), Oregon (June 11), Orleans (April 15), Richmond (July 12), Seymour (June 13), Springfield (May 2), and Urbana (July 22), 1929.

Specimens collected on *Carex* sp., *Celastrus* sp., *Lathyrus* sp., *Medicago sativa*, *Melilotus alba*, *Melilotus officinalis*, *Pisum sativum*, *Polygonum Muhlenbergii*, *Solanum dulcamara*, *Trifolium pratense*, *Trifolium procumbens*, *Trifolium repens*, *Trifolium* sp., and *Vicia* sp.

MACROSIPHUM PSEUDOROSAE PATCH

Macrosiphum pseudorosae Patch, Maine Agricultural Experiment Station, Bulletin 282, December, 1919, p. 206.

Although *Macrosiphum pseudorosae* has not previously been reported from Illinois, it is widely distributed throughout the state. No doubt it has been confused with the related *M. gei* (Koch). *Nectarophora pallida* Oestlund (1887) may be this species, but if so the name is preoccupied by *pallida* (Walker) and hence is not available. Like *M. gei*, this aphid has pink and green forms. The sexual forms have not as yet been described.

Data associated with our viviparous specimens are as follows: Havana (June 21), Herod (May 31), Kankakee (July 15), Starved Rock State Park (June 12), 1928; Decatur (Sept. 21), Herod (Sept. 27), Kappa (Sept. 9), Mahomet (Aug. 7, 17), Oakwood (Aug. 4, Oct. 17), Rock Island (July 7), Starved Rock State Park (Sept. 10), 1929; Grand Detour (May 16), Starved Rock State Park (May 13), 1930. Specimens collected on *Aruncus sylvestris*, *Gaura biennis*, *Gaura* sp., *Geum canadense*, *Impatiens*, *Oenothera biennis*, *Potentilla* sp., and *Rosa* sp.

MACROSIPHUM PTERICOLENS PATCH

Macrosiphum ptericolens Patch, Maine Agricultural Experiment Station, Bulletin 282, December, 1919, p. 210.

This species has never been recorded outside of Maine. We have found apterous viviparous females at Galena, July 10, 1929, on the fronds of *Asplenium Filix-femina*, which we take to be this species. It was originally described from alate viviparous females. Dr. Patch has seen specimens of our material and writes they "are probably this species."

MACROSIPHUM PURPURASCENS (OESTLUND)

Nectarophora purpurascens Oestlund, Geological and Natural History Survey of Minnesota, Bulletin No. 4, 1887, p. 81.

This species has not previously been reported from Illinois. It has the peculiar habit of producing the sexual forms early in the year and later in the season it is to be found in the egg stage only. It is a

leaf feeding species frequenting meadow rue. The male and oviparous forms of this species have never been described, and their descriptions are presented here.

Data associated with our viviparous specimens are as follows: Galena (June 25), Herod (May 29), Oakwood (May 12, 21), Oregon (June 28), Quincy (June 6, 16), Starved Rock State Park (June 13), 1928; Urbana (June 1), 1929; Oakwood (May 9), 1930. Sexual forms were collected at Quincy (June 16), 1928, and at Urbana (June 1), 1929. All specimens collected on *Thalictrum* sp.

ALATE MALE

Average length from vertex to tip of anal plate, 1.35. Color essentially similar to that of alate viviparous female. Comparative lengths of antennal segments as follows: III— .71 to .83, average .77; IV— .53 to .56, average .55; V— .43; VI— .14 plus .83. Secondary sensoria distributed as follows: III— 94, IV— 41, V— 23; sensoria on third and fourth segments covering entire segment, those on fifth segment confined largely to one side of the segment. Cornicles .37 long, cauda .14 long, both structures similar in shape to those of the alate viviparous female. Genitalia dark brown.

APTEROUS OVIPAROUS FEMALE

Average length from vertex to tip of anal plate, 1.74. General color essentially similar to that of apterous viviparous female. Average width of head across eyes, .50. Comparative lengths of antennal segments as follows: III— .51 to .63, average .56; IV— .30 to .53, average .40; V— .29 to .34, average .31; VI— .11 to .14, average .12 plus .44 to .50, average .47. Secondary sensoria confined to third antennal segment, numbering 9 to 16, averaging 12. Cornicles .58 long, cauda .27, not constricted. Hind tibiae with the basal two-thirds swollen and with about 65 sensoria.

Allotype.—Alate male; Slide No. 6542, Urbana, Illinois, June 1, 1929, on *Thalictrum* sp., (T. H. Frison). On slide with oviparous females and nymphs. *Morphotype*.—Apterous oviparous female; Slide No. 5109, Quincy, Illinois, June 16, 1928, on *Thalictrum* sp., (Frison and Hottes). On slide with alate viviparous female, oviparous females and nymphs.

MACROSIPHUM RIBIELLUM DAVIS

Macrosiphum ribiellum Davis, Canadian Entomologist, Vol. LI, No. 10, Oct., 1919, p. 231.

The ornamental currant aphid is common and generally distributed throughout Illinois. It was first reported from Illinois (Chicago) by Davis (1909b) under the name of *M. cynosbati* (Oestlund), which was a misidentification. All forms of this plant louse have been well described by Davis (1909b, 1919). Quaintance and Baker (1917) have briefly chronicled the seasonal history as follows:

"This species usually occurs on the ornamental currants. The eggs hatch in the spring and numerous generations of wingless forms are produced. By August these are present in large numbers on the tender terminal twigs and to a less extent on the undersides of the leaves. Winged forms appear in September or earlier and ants are found attending the insects. Early in October the orange, wingless, egg-laying females may be found mating with the winged males and the eggs are laid shortly afterward."

A cotypic slide (No. 4535) of this species has been deposited in the Survey collection through the kindness of Professor J. J. Davis.

Data associated with our viviparous specimens are as follows: Urbana (July 26, Aug. 2), 1928; Chicago (July 14), El Paso (July 5), Galena (July 10), Lawrenceville (June 18), Macomb (May 4), Rock Island (July 9), and Woodriver (June 25), 1929. Sexual forms were taken at Urbana (Nov. 5), 1929. All collected on *Ribes odoratum* and *Ribes* sp.

MACROSIPHUM ROSAE (LINNAEUS)

Aphis rosae Linnaeus, Systema Naturae, Editio Decima, 1758, p. 452.

The rose aphid has been doubtedly recorded by Thomas (1879) from Illinois and positively so by Davis (1911b). It is common and



Fig. 38. A colony of *Macrosiphum rubbeckiae* (Fitch) on golden glow, *Rudbeckia laciniata* var. *hortensia*; Champaign, June 10, 1929.

generally distributed throughout the state both out of doors and in greenhouses on wild and cultivated roses. Patch (1919) states that it is "not known to migrate and does maintain a continuous residence upon the rose." Theobald (1926), however, lists a few other plants as hosts of this species. This species has pink and green varieties in common with *M. gei* and *M. pseudorosae*. It is partial to the tender shoots and leaves of the rose.

Good descriptions of all forms are given by Theobald (1926) and of the viviparous forms by Essig (1911b) and Soliman (1927).

Data associated with our viviparous specimens are as follows: Carbondale (June 4), Galena (June 27), Kankakee (June 29), Marshall (May 25), Oregon (June 28), Pekin (June 20), Quincy (June 6), Rock Island (June 23), St. Joseph (June 17), Urbana (May 23, Oct. 1), 1928; Casey (June 17), Chrisman (June 6), Edwardsville (Sept. 11), Granite City (June 25), Homer (June 17), Starved Rock State Park (July 6), Urbana (Nov. 5), Witt (Sept. 10), 1929; Edgebrook, in greenhouse (Feb. 28), and Oregon (May 16), 1930. Oviparous females were collected at Urbana (Nov. 5), 1929. All collected on *Rosa* sp.

MACROSIPHUM RUBBECKIAE (FITCH)

FIG. 38

Aphis rubbeckiae Fitch. Fourth Annual Report of the Regents of the University, on the Condition of the State Cabinet of Natural History, State of New York, January 14, 1851, p. 86.

This large vermilion aphid (Fig. 38) is very common and widespread throughout Illinois. Very few clumps of golden glow

escape being attacked by it, and the stems are frequently covered for much of their length with these aphids standing head downwards. It was first recorded from Illinois by Thomas (1879). Our records indicate that it is not a true migratory species.

The best descriptions of the viviparous forms are those by Essig (1911a) and Soliman (1927). Weed (1888) has described sexual forms under the name of *rudbeckiae*, but his discussion indicates he may have had two species confused.

Data associated with our specimens are as follows: Normal (June 22), 1903; Albion (May 26), Cairo (June 2), Carbondale (June 4), Danville (July 15), East Dubuque (June 26), Elizabethtown (May 29), Havana (June 21), Herod (May 29, 31), Homer Park (Oct. 23), Jacksonville (June 18), Kankakee (June 29), LeRoy (June 20), Marshall (May 25), Metropolis (May 31), Mt. Carroll (June 25), Neoga (June 10), Oakwood (May 21, 25), Oregon (June 27), Pekin (June 20), Quincy (June 6), Rock Island (June 24), Shawneetown (May 27), Starved Rock State Park (June 13), Urbana (June 14, Oct. 5), 1928; Beach (July 13), Jerseyville (June 25), Kansas (June 17), Monticello (May 24), Newton (June 16), Oakwood (Oct. 17), and Putnam (May 5), 1929. Specimens collected on *Ambrosia* sp., *Eupatorium urticifolium*, *Helianthus* sp., *Hieracium venosum*, *Rudbeckia laciniata* var. *hortensia*, *Silphium perfoliatum*, *Solidago canadensis*, *Solidago nemoralis*, *Solidago* sp., and *Sonchus* sp. Sexual forms taken at Homer Park (Oct. 23), 1928, and Oakwood (Oct. 17), 1929, on *Rudbeckia* sp.

MACROSIPHUM RURALIS new species

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 2.90. Head, thorax, and abdomen essentially green, but head and particularly the mesothorax often brownish green and abdomen a very dark green. Cornicles dark brown to black and often with a greenish tinge, particularly near apex; cauda dark brown to black except area covered by anal plate, which is concolorous with abdomen; anal plate concolorous with abdomen. Antennae with first, second, and very base of third segment almost concolorous with head, except that inner margin of first segment dark brown; remainder of third and following segments dark brown to almost black. Coxae and trochanters light green; basal halves of femora pale whitish green, remainder of femora and following segments dark brown or black. Beak with basal part concolorous with thorax; apical two-thirds dark brown, except for a narrow light-colored band on the long middle segment. Eyes dull reddish brown. Stigma of fore wings dark brown, veins fine, posterior margin of wing brownish near junction with anal vein.

Head and appendages.—Average width of head across eyes, .60. Antennal segments with comparative lengths as follows: III—1.00 to 1.29, average 1.13; IV—.99 to 1.16, average 1.09; V—.91 to 1.09, average 1.02; VI—.23 to .26, average .24 plus 1.57 to 1.69, average 1.61. Secondary sensoria (Fig. 286) restricted to the third antennal segment, chiefly confined to one side of the basal two-thirds of the segment, irregular in arrangement, numbering from 13 to 27 and averaging about 18. Beak extending to or slightly beyond the hind coxae.

Thorax and appendages.—Stigma of fore wings rather narrow and sharply pointed at apex; second fork of media closer to margin of wings than to first fork.

Abdomen.—With four pairs of small lateral tubercles, the pair just anterior to the cornicles being the largest, no lateral tubercles posterior to cornicles. Cornicles (Fig. 115) rather long, base nearly twice as wide as middle or apex, varying in length from 1.13 to 1.29 and averaging 1.21; closed reticulations at apex occupying about one-fourth of length; flange feebly developed. Cauda (Fig. 185) about one-half the length of the cor

nicles, varying in length from .50 to .66 and averaging .61; but slightly constricted near base; with about seven hairs on a side. Anal plate rounded and not much wider than base of cauda.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 2.93. General color of body and appendages similar to alate viviparous female except as follows: femora mostly light yellowish green, with only apical one-fourth or less dark brown.

Head and appendages.—Average width of head across eyes, .61. Antennal segments with comparative lengths as follows: III— .97 to 1.19, average 1.10; IV— .69 to 1.13, average .95; V— .64 to 1.00, average .90; VI— .20 to .24, average .22 plus .76 to 1.51, average 1.09. Secondary sensoria restricted to basal one-third of third antennal segment, beginning about length of second antennal segment from base and continuing irregularly on one side of segment; varying from 5 to 17 in number and averaging about 10. Otherwise similar to alate viviparous female.

Thorax and abdomen.—Except for lack of wings, similar to alate viviparous female.

APTEROUS OVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 2.76. Colored essentially as the apterous viviparous female.

Head and appendages.—Average width of head across eyes, .53. Antennal segments with comparative lengths as follows: III— .89 to 1.03, average .95; IV— .69 to .96, average .88; V— .71 to .89, average .82; VI— .17 to .23, average .20 plus .81 to 1.46, average 1.26. Secondary sensoria restricted to the third antennal segment, grouped basally on one side of the segment beginning about the length of second antennal segment from base and continuing for a distance equal to one-half or more of the segment, numbering from 8 to 18 and averaging about 10. Otherwise as apterous viviparous female.

Thorax and appendages.—Similar to apterous viviparous female except as follows: basal half of tibia swollen and covered with numerous sensoria, one specimen with about 250 sensoria.

Abdomen.—Cornicles, cauda, and anal plate essentially as in apterous viviparous female except average lengths are smaller.

ALATE MALE

Size and general color.—Average length from vertex to tip of anal plate, 1.85. Colored essentially as in the alate viviparous female.

Head and appendages.—Average width of head across eyes, .53. Antennal segments with comparative lengths as follows: III— .80 to .93, average .85; IV— .77 to .89, average .82; V— .69 to .83, average .77; VI— .17 to .20, average .19 plus 1.29 to 1.43, average 1.36. Secondary sensoria present on third, fourth, and fifth antennal segments, with average distribution as follows: III— 36; IV— 15; V— 14. Sensoria on third segment concentrated chiefly on one side of segment though irregularly arranged; on fourth and fifth segments in a more regular row; scattered along almost entire length of segments, except more numerous on basal half of third segment. Beak extending to or beyond coxae of hind legs.

Thorax and appendages.—Similar to alate viviparous female.

Abdomen.—Essentially similar to that of alate viviparous female except for presence of dark brown hairy claspers; cornicles and cauda are shorter.

Holotype.—Alate viviparous female; Kappa, Illinois, August 14, 1929, on *Actinomeris alternifolia*, (Frison and Hottes). Slide No. 10050. *Allotype.*—Alate male; Oakwood, Illinois, October 13, 1929, on *Actinomeris alternifolia*, (Frison). Slide No. 10051. *Morphotype.*—Apterous viviparous female; Same data as for holotype. Slide No. 10052. *Morphotype.*—Apterous oviparous female; Decatur, Illinois, October 5, 1929, on *Actinomeris alternifolia*, (Hottes). Slide No. 10053. *Paratypes.*—Eighty-eight slides of alate and apterous viviparous females, oviparous females, males, pupae and

nymphs: all collected in Illinois by T. H. Frison, F. C. Hottes, and H. H. Ross, on *Actinomeris alternifolia* and once on *Helianthus* sp. The localities and dates are as follows: Elizabethtown (May 31), Herod (October 12), and Marshall (May 25), 1928; Choat (September 28), Decatur (September 22 and October 5), Herod (September 27), Kappa (August 14 and September 9-22), Oakwood (October 13), and Pana (August 10), 1929; Mounds (Horseshoe Lake—April 4) and Urbana (May 12), 1930. Slides Nos. 10054-10102 and others unnumbered.

This new species is very suggestive of specimens of *Macrosiphum ambrosiae* (Thomas) which are lighter and greener in color than normal. Mounted specimens, nevertheless, are easily separated from *ambrosiae* because of the dark cauda and the longer and more slender cornicles in addition to other finer characters. It is not altogether impossible that this new form is an off-shoot of *ambrosiae* which has been modified through host selection. With regard to our present paucity of knowledge of the limits of variation within this genus and the effects of host selection, it seems advisable to us to classify this new form as a new species.

All forms of this plant louse are found on the main stalks of the host plant, particularly near the top of the plant. In the case of plants heavily infested, the mature forms are often found beneath the leaves.

MACROSIPHUM SANBORNI GILLETTE

FIG. 106

Macrosiphum sanborni Gillette, Canadian Entomologist, Vol. XL, No. 2, February, 1908, p. 65.

The chrysanthemum aphid is one of the most common and destructive pests of chrysanthemum out of doors and in greenhouses. It was first recorded from Illinois by Davis (1911). The short, somewhat bottle-shaped cornicles are rather peculiar among the *Macrosiphum* and the species has been placed in the genus *Macrosiphoniella*, a complex which we have for the present considered as a subgenus. The best descriptions of the viviparous forms have been given by Gillette (1908) and Theobald (1926). To our knowledge the sexual forms have not been described.

Data associated with our viviparous specimens are as follows: Urbana (Dec. 3), 1906; Danville (Nov. 4), Decatur (Nov. 4), Elizabethtown (May 29, Oct. 12), Hutsonville (Nov. 29), Lawrenceville (Nov. 28), Neoga (June 10), Pekin (June 20), Quincy (June 5), Shawneetown (May 27), Urbana (Oct. 1), 1928; Cairo (June 22), Carbondale (June 21), Collinsville (Sept. 11), Grayville (June 19), Jonesboro (June 23), Oakwood (Nov. 7), 1929; Flora (Nov. 13), and Vandalia (Nov. 13), 1930. All collected on *Chrysanthemum* sp.

MACROSIPHUM SANGUINARIUM new species

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.72. Head and thorax, except intersegmental areas of thorax, which are ruby-red or yellow, a dark chocolate-brown. Abdomen with five rounded chocolate brown patches on each side anterior to cornicles; dorsum with transverse, segmentally arranged, chocolate-brown bars which become almost fused beginning with third segment and extending backwards to cauda;

remainder of body of abdomen ruby-red or yellowish. Cornicles variable, usually dark at base and with apical portions yellowish-white. Cauda ruby-red or yellowish. Anal plate brownish. Venter of body variable, either ruby-red to almost yellow with the mesosternum a chocolate-brown. Eyes reddish-brown. First and second segments concolorous with head, remainder yellowish-brown becoming almost black at apex and near primary sensoria. Coxae, trochanters, and extreme base of femora yellowish-white; remainder of femora brownish to black at apices; tibiae yellowish-white except the apices, which are black; tarsi black. Wings with stigma yellowish and veins light brown and delicate in structure. Beak concolorous with head at base, remainder yellowish-white except extreme tip is black.

Head and appendages.—Average width of head across eyes, .46. Antennal segments with comparative lengths as follows: III— .51 to .73, average .62; IV— .33 to .53, average .47; V— .43 to .56, average .50; VI— .17 to .21, average .18 plus .71 to 1.03, average .94. Secondary sensoria (Fig. 287) limited to the third antennal segment, arranged in a straight row, numbering from 5 to 10. They are not equally distributed throughout the length of the segment, usually failing to reach the end of the segment by a greater distance than the first sensorium is removed from the base of the segment. The hair on the antennae is very short and fine and not even equaling in length one-half the width of the segment. The beak just reaches the coxae of the mesothoracic pair of legs.

Thorax and appendages.—The fork of the fore wings is always closer to the margin of the wing than it is to the first fork.

Abdomen.—The cornicles (Fig. 105) taper very gradually from base to apex, they are very delicately reticulated for about one-third of their length, and in length they average a little less than three times the length of the cauda. The cauda is scarcely constricted if at all, and has from 3 to 4 hairs on a side. The measurements of the cornicles and cauda are as follows: length of cornicles, .30 to .50 with an average of .43; length of cauda, .11 to .21 with an average of .17.

APTEROUS VIVIPAROUS FEMALE (FUNDATRIX)

Size and general color.—Average length from vertex to tip of anal plate, 1.77. Head with the exception of frontal areas, thorax, abdomen, cauda, and anal plate with exception of apical margin, an orange or ruby-red with paler patches due to pale embryos showing through body wall. Frontal areas of head, first and second antennal segments, coxae, and trochanters pale yellowish-orange. Cornicles and apical margin of anal plate a translucent whitish. Femora and tibiae whitish, the apices of the tibiae slightly infuscate; tarsi greyish black. Antennae beyond second segment white, with minute rings at apices of fourth and fifth segments and all of sixth segment black. Beak whitish with extreme apex black. Eyes deep purplish-red.

Head and appendages.—Average width of head across eyes, .44. Antennal segments with comparative lengths as follows: III— .50 to .57, average .54; IV— .19 to .30, average .27; V— .26 to .36, average .32; VI— .14 to .19, average .17 plus .46 to .57, average .51. Secondary sensoria lacking or, if present, confined to a single sensorium on the third antennal segment. Primary sensorium on sixth segment with a group of about five marginal sensoria on one side. All antennal segments faintly imbricated and with sparse setae. Antennal tubercles rather shallow. Beak extending to a point in middle of meso- and metathoracic coxae.

Thorax and appendages.—Hairs on legs fine and short, those on the tibia considerably shorter than the width of the segment.

Abdomen.—Cornicles long, straight, without flange at apex, reticulated at apex for a distance about one-sixth of total length, remainder imbricated, averaging about .46 in length. Cauda non-constricted, with apical portion rather blunt, usually with three inwardly curved setae on each side, averaging about .21 in length. Anal plate normal.

APTEROUS VIVIPAROUS FEMALE (VIRGOGENIA)

Size and general color.—Average length from vertex to tip of anal plate, 1.58. Head pearly-white to light yellowish. In mounted material the thorax

and portion of abdomen anterior to cornicles and often entire abdomen dusky brown; in life this portion of the body is a bright, shining ruby-red the color probably being due to the red sap of the host plant; portion of abdomen posterior to cornicles often considerably lighter in color than the portion anterior to the cornicles. Cornicles and cauda uniformly yellowish-white. Antennae uniformly yellowish-white in most specimens; a few specimens have the apex of the fifth and all of the sixth antennal segments light-brownish or dusky. Coxae, trochanters, and femora with yellowish-white at base, the yellow becoming less intense towards the knees but never turning to brown, tibiae yellowish-white with a slightly dusky area at the apex about equal to the length of the tarsus; tarsi brownish. The beak is yellowish-brown tipped with darker brown at apex.

Head and appendages.—Average width of head across eyes, .39. Antennal segments with comparative lengths as follows: III— .46 to .71, average .58; IV— .36 to .50, average .41; V— .39 to .53, average .44; VI— .13 to .19, average .16 plus .71 to .89, average .44; VI— .13 to .19, average .16 plus .71 to .89, average .81. A single secondary sensorium is located on the third antennal segment at a distance from the base of the segment about equal to the length of the first antennal segment. The beak reaches about to the middle of the metathoracic pair of legs.

Thorax and abdomen.—Cornicles about three times as long as the tarsi. Cornicles, cauda, and anal plate are similar to these structures of the alate viviparous female. Length of cornicles, .39 to .53 with an average of .46. Length of cauda, .16 to .21 with an average of .18.

Nymph.—Light yellowish green with eyes reddish. Markedly contrasting in color with adults.

Holotype.—Alate viviparous female; Carbondale, Illinois, June 4, 1928, on *Sanguinaria canadensis*, (Frison and Hottes). Slide No. 10278. *Morphotype.*—Apterous viviparous female (fundatrix); Urbana, Illinois, May 3, 1930, on *Sanguinaria canadensis*, (Frison and Ross). Slide No. 10279. *Morphotype.*—Apterous viviparous female (virgogenia); Carbondale, Illinois, June 4, 1928, on *Sanguinaria canadensis*, (Frison and Hottes). Slide No. 10280. *Paratypes.*—Forty-one slides of alate and apterous viviparous females, pupae, and nymphs collected in Illinois on *Sanguinaria canadensis*, as follows: Anna, May 8, 1925 (Frison); Carbondale, June 4 (Frison and Hottes), Quincy, June 6 (Frison and Hottes), Oakwood, July 8 (Hottes and Ross), Danville, August 4 (Hottes and Ross), and Urbana, May 3, 12 and 21 (Frison and Ross), 1928. Five slides of alate and apterous viviparous females, pupae, and nymphs from St. Paul, Minnesota, on *Sanguinaria canadensis*, as follows: June 19, June 22, July 26, 1926 (Hottes). Slides Nos. 10281-10312 and others unnumbered.

This distinctive species feeds on the under surface of the leaves of its host, the blood-root. Specimens on the same plant are quite solitary in habit and seem to prefer locations near the larger veins except the small nymphs.

Aside from its generic affinities with *Macrosiphum* as a whole, this new species has no near relatives among the described species of this genus known to us. It does, however, show characters suggestive of a close relationship with a new species (*M. kickapoo*) described in this paper. It may be separated from *kickapoo* on the basis of the reddish color of the anterior portion of the abdomen, by the lack of dusky cornicles and dusky posterior portion of abdomen, by differences in color of legs, and by the third antennal segment having considerably fewer secondary sensoria.

MACROSIPHUM SCHRANKI THEOBALD

Aphis urticae Schrank, Fauna Boica, 1801, p. 106. *Name preoccupied.*
Macrosiphum schranki Theobald, British Aphides, Vol. II, 1927, p. 403. *New name.*

This pale yellowish-green aphid has not previously been reported from Illinois. It was taken on the undersides of the leaves of pigweed. Good descriptions of the viviparous females and the male are given by Theobald (1926). The oviparous female is unknown.

Data associated with our viviparous specimens are as follows: Oregon (July 11), and Rock Island (July 7), 1929. Specimens collected on *Amaranthus* sp.

MACROSIPHUM SONCHELLUM (MONELL)

Siphonophora sonchella Monell, Bulletin of the United States Geological and Geographical Survey of the Territories, Vol. V, No. 1, 1879, Art. 1, p. 21.

This species has not previously been reported from Illinois; in fact, it has been mentioned only a few times in literature since it was first described by Monell and these records are doubtful. Through the kindness of Professor J. J. Davis we have been permitted to compare alate specimens of our material with typic specimens of *sonchella*. A description is given of the apterous viviparous female since it never has been described. Supplementary descriptive notes concerning the alate viviparous female, not covered by the original description, are also presented.

Data associated with our slides of this species are as follows: Marshall (May 25), 1928; Mahomet (Aug. 7), and Urbana (Aug. 21), 1929. Specimens collected on *Lactuca* sp.

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 2.07. We have no record as to color. Dark markings essentially as described by Monell in original description except that dark brown to blackish more nearly satisfies the color of the darker markings in place of black.

Head and appendages.—Average width of head across eyes, .53. Comparative lengths of antennal segments as follows: III—1.54; IV—.46 to .47, average .46; V—.46 to .47, average .46; VI—.13 plus .97 to 1.00, average .98. Secondary sensoria confined to third and fourth antennal segments, small and very tuberculate, on the third segment numbering from 95 to 108, averaging 101, dotting the entire segment, on fourth segment numbering from 5 to 7, arranged in a more or less straight row. Primary sensorium on sixth antennal segment with a group of about 6 marginal sensoria at the side. Hairs on antennae short and spine-like, those on third segment somewhat enlarged at tip. Beak reaching to mesothoracic coxae.

Thorax and abdomen.—Prothorax without lateral tubercles. Cornicles .63 long, straight, with slightly more than the apical one-fourth covered with closed reticulations, remaining portion imbricated. Cauda .43 long, not constricted, with about five hairs on a side. Anal plate rounded.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 2.62. General color of body shining, deep brownish-red. Antennae, except for extreme base of third segment, dark brown. Legs, cornicles, and cauda as in alate viviparous female.

Head and appendages.—Average width of head across eyes, .54. Antennal segments with the following comparative lengths: III—1.14 to 1.47,

average 1.33; IV— .33 to .54, average .45; V— .37 to .50, average .44; VI— .11 to .14, average .13 plus .59 to 1.07, average .86. Secondary sensoria (Fig. 298) confined to third and fourth antennal segments although often absent on the fourth; arranged as in alate viviparous female; numbering from 71 to 80, averaging 76, on the third segment and from 0 to 7 on the fourth.

Abdomen.—Cornicles .59 long, with an apical area equal to a little more than one-fourth their length, covered by closed reticulations, otherwise as in alate viviparous female. Cauda .48 long, with from three to six hairs on a side, otherwise as in alate viviparous female.

Morphotype.—Apterous viviparous female; Slide No. 7378, Marshall, Illinois, May 25, 1928, on *Lactuca* sp., (Frison and Hottes). On slide with alate and apterous viviparous females.

MACROSIPHUM TAPUSKAE new species

ALATE VIVIPAROUS FEMALE

Size and general color.—Length from vertex to tip of anal plate, 1.69. Head and most of thorax a greenish brown, prothorax slightly lighter in color. Abdomen and anal plate a light green except for a dark green dorsal band between and around bases of cornicles, which have basal one-fifth light green and remainder dark brown; cauda light yellowish green. First, second, and extreme basal portion of third antennal segments concolorous with head, remainder of segments brownish black. Coxae and trochanters a light green; femora with basal halves a light green gradually shading to dark brown at apex; tibiae with basal one-fifth light brown, middle three-fifths yellowish, and apical one-fifth dark brown; tarsi dark brown. Front wings with veins and edges of stigma black and conspicuous; body of stigma, base of costa and subcostal veins pale whitish-green; hind wings with veins delicately traced in brown. Beak with base concolorous with head, apex dark brown. Eyes red.

Head and appendages.—Average width of head across eyes, .50. Antennal segments with lengths as follows: III— .93; IV— .79; V— .64; VI— .17 plus 1.00. Secondary sensoria (Fig. 304) restricted to the third antennal segment, irregularly arranged but more abundant on one side than on the other, numbering 36 and 38. Fourth, fifth, and sixth antennal segments imbricated, all segments with a few hairs, not as long as width of segments, which are enlarged at tip. Primary sensoria on fifth and sixth segments, that on sixth segment with about seven small sensoria on one side. Beak reaching to middle of mesothoracic coxae.

Thorax and appendages.—The second fork of media closer to margin of wing than to first fork in one wing, in other wing media is forked only once; stigma rather narrow and bluntly pointed at extreme tip; veins not reaching margin of wings; posterior margin of fore wing thickened and dark where anal vein reaches margin of wing.

Abdomen.—Cornicles (Fig. 117) .86 in length, gradually tapering from base to a flangeless but somewhat dilated apex; base about twice the width of apex; closed reticulations at apex equal to about one-fourth total length, remainder of length imbricated. Cauda .39 in length, tapering to a blunt tip, lateral margins with from 2 to 4 hairs on a side. Anal plate normal.

APTEROUS VIVIPAROUS FEMALE (VIRGOGENIA)

Size and general color.—Average length from vertex to tip of anal plate, 2.14. Head, thorax, abdomen, cauda, and anal plate apple-green. Cornicles concolorous with abdomen except tip, which is black for a distance about equal to length of tarsus. First and second antennal segments brownish green; third antennal segment concolorous with first and second segments about to first sensorium, which is removed from the base by a distance equal to the length of the second segment of the hind tarsi exclusive of claws; remaining portion of third segment and remaining segments uniformly dark brown or black. Coxae, trochanters, and basal halves of femora concolorous with abdomen and remaining portions shading to dark brown; in some cases the brown extends further basally on the dorsum of the femora; tibiae

with basal four-fifths (hind legs) or three-fourths (fore and middle legs) brownish green, remaining apical portion dark brown. Beak essentially concolorous with venter of thorax except its distinctly dark brown terminal segment. Eyes red.

Head and appendages.—Average width of head across eyes, .51. Antennal segment with comparative lengths as follows: III— .87 to 1.00, average .93; IV— .67 to .79, average .73; V— .53 to .57, average .55; VI— .16 to .17, average .16 plus .81 to .86, average .83. Secondary sensoria (Fig. 299) restricted to the third antennal segment, small, numbering from 8 to 13, located on the basal two thirds of the segment beginning at a distance from the base of the segment about equal to the first antennal segment; arranged almost in a straight row and when seen from the side they are rather tuberculate. The hairs on the antennae are somewhat enlarged and blunt at the tip. The beak reaches to, or just beyond, the coxae of the meta-thoracic pair of legs.

Thorax and appendages.—The hairs on the tibiae are long (about equal to the width of the tibiae), distinctly spine-like except for tip, which is usually blunt; hind tarsi, exclusive of claws, subequal in length to reticulated portion of cornicles.

Abdomen.—Cornicles widest at base, then gradually tapering towards apex except that apex is flared; apical half with imbrications poorly developed, closed reticulations of apical portion covering a distance equal to the hind tarsi of hind legs; averaging .82 in length. Cauda (Fig. 176) heavy, bluntly pointed, almost straight at the sides, with four pairs of lateral hairs, over twice as long as the length of the base of the sixth antennal segment or about one-half the length of the cornicles; averaging .38 in length. Anal plate short and wide.

APTEROUS VIVIPAROUS FEMALE (FUNDATRIX)

Similar to summer apterous viviparous female except for averaging slightly larger.

APTEROUS OVIPAROUS FEMALE

The oviparous female is essentially an exact counterpart of the apterous viviparous female and therefore no detailed description of this form will be given. Average length from vertex to tip of anal plate, 1.80. Average width of head across eyes, .47. Comparative lengths of antennal segments are as follows: III— .73 to 1.00, average .84; IV— .57 to .64, average .60; V— .46 to .50, average .49; VI— .11 to .17, average .15 plus .57 to .79, average .70. Secondary sensoria number from 8 to 11 and average 8.5. Sensoria on the hind tibiae occupy a little less than two-fifths of the total length of the tibiae, beginning at a distance from the base equal to the length of the hind tarsi; number varying from 15 to 38; area occupied by sensoria slightly swollen. Cauda is inclined to have more hairs than the apterous viviparous form.

Holotype.—Alate viviparous female; Metropolis, Illinois, April 17, 1930, on *Achillea Millefolium*, (Frison and Ross). Slide No. 10219. *Morphotype.*—Apterous viviparous female (virgogenia); Urbana, Illinois, October 7, 1929, on *Achillea Millefolium*, (Frison and Ross). Slide No. 10220. *Morphotype.*—Apterous viviparous female (fundatrix); Grayville, Illinois, April 15, 1930, on *Achillea Millefolium*, (Frison and Ross). Slide No. 10221. *Morphotype.*—Apterous oviparous female, Urbana, Illinois, October 16, 1929, on *Achillea Millefolium*, (Frison and Ross). On slide with two other oviparous females. Slide No. 10222. *Paratypes.*—Twenty-two slides of apterous viviparous females, oviparous females and nymphs; all collected in Illinois, on *Achillea Millefolium*, by T. H. Frison and H. H. Ross, as follows: Urbana (October 7, 15 and 16), 1929; Anna (April 19), Grayville (April 15), Harrisburg (April 16), Metropolis (April 17), Starved Rock State Park (May 13), 1930. Slides Nos. 10223-10241 and others unnumbered.

This new species superficially suggests certain other green species of *Macrosiphum* which have reticulated cornicles. It may be distinguished from these forms by the row of minute secondary sensoria on

the third antennal segment of the apterous viviparous female and the irregularly arranged sensoria of the alate female.

Because of a similarity in the green coloration of both host and insect, and its preference for the leaves close to the ground, this species is difficult to find. Another factor helping to explain why this species has been previously overlooked is its pronounced solitary habit. A good way to collect this species is to jar the leaves of the plant and then collect the aphids on the ground directly beneath the lower leaves.

MACROSIPHUM TARAXACI (KALTENBACH)

Aphis taraxaci Kaltenbach, Monographie der Familien der Pflanzenläuse, Aachen, 1843, p. 30.

As far as we are aware, this dark-colored aphid has not been previously recorded from Illinois. It occurs on the stems and leaves near the crown of its host, the dandelion. The sexual forms are unknown. Theobald (1926) and Soliman (1927) have given good technical descriptions of the viviparous females.

Data associated with our viviparous specimens of this species are as follows: LeRoy (June 20), Urbana (May 23, June 7), 1928; Champaign (May 28), Monticello (May 24), Starved Rock State Park (July 6), and Urbana (May 22), 1929. All specimens collected on *Taraxacum officinale*.

MACROSIPHUM TARDAE new species

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 2.17. Head, thorax, and abdomen uniformly dark blackish-red. Cornicles almost black, cauda concolorous with abdomen. Antennae brown; basal portion, except base of third segment, darkest. Legs dark reddish-brown shading to black with the exception of coxae and basal third of femora which are more yellowish-brown. Beak essentially concolorous with the head, apex somewhat darker. Fore wings with stigma brownish; veins light yellowish-brown, particularly yellowish near base; posterior margin of wing brownish near junction with anal vein.

Head and appendages.—Average width of head across eyes, .53. Antennal segments with comparative lengths as follows: III— .71 to .78, average .75; IV— .50 to .59, average .54; V— .44 to .64, average .46; VI— .14 to .23, average .17 plus .57 to .63, average .59. Secondary sensoria (Fig. 288) restricted to the third antennal segment, not uniformly distributed except for grouping on one side of segment, numbering from 28 to 40 and usually with more than 30. The beak extends to the coxae of the metathoracic legs.

Thorax and appendages.—Stigma of fore wings rather narrow and sharply pointed at apex; second fork of media in relation to first fork of media and margin of wings quite variable, but the second fork usually closer to margin of wings than to first fork.

Abdomen.—No lateral tubercles. Cornicles (Fig. 107) rather short and stout in comparison with most species of this genus, about equal to the length of the fourth antennal segment, varying from .47 to .57 and averaging .55 in length; usually reticulated at apex for about one-third of their length; flange slightly developed. Cauda (Fig. 182) about one-half as long as cornicles, varying from .28 to .36 and averaging .32 in length; slightly constricted in middle; with three to five pairs of hairs on a side. Anal plate rounded, extending almost to middle of cauda.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 2.37. General color of body and appendages as in alate viviparous female.

Head and appendages.—Average width of head across eyes, .51. Antennal segments with comparative lengths as follows: III— .60 to .80, average .70; IV— .46 to .54, average .50; V— .29 to .48, average .38; VI— .10 to .17, average .14 plus .47 to .57, average .55. Secondary sensoria restricted to the third antennal segment; varying in number from 11 to 20, the most common number being less than 15; sensoria difficult to distinguish because of dark color of segment and large bases of stout setae; beginning to appear about the length of the second antennal segment from base and usually extending little if any beyond middle of segment. Beak extending to coxae of meta-thoracic legs.

Abdomen.—Cornicles considerably longer than fourth antennal segment, about as long as those of alate viviparous females, varying from .53 to .60 and averaging .57; much wider at base than those of alate viviparous females and bent slightly outwardly where reticulations begin; reticulated for at least one-third its length from apex; flange weakly developed. Cauda somewhat longer in proportion to cornicles than in the alate viviparous females, constricted near middle, with four to six hairs on a side. Otherwise as in alate viviparous female.

APTEROUS OVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 2.14. Head, thorax, and abdomen dark blackish-red; lateral portions sometimes slightly lighter in color, particularly so in the region around the thorax. Mounted specimens show the red replaced by brown. Cornicles almost black; cauda and anal plate dark dusky-brown. First and second antennal segments either concolorous with the head or darker; remainder of antennae dark blackish-brown, except that the third segment is usually somewhat lighter before first secondary sensorium. Femora with basal half yellowish-brown, abruptly shading to dark dusky-brown at their apex; tibiae dusky-brown, often darker near the base and apex; tarsal segments blackish. Beak fuscous with apical segments darkest.

Head and appendages.—Average width of head across eyes, .53. Antennal segments with comparative lengths as follows: III— .64 to .97, average .74; IV— .43 to .57, average .50; V— .36 to .51, average .45; VI— .14 to .17, average .16 plus .50 to .66, average .58. Secondary sensoria confined to the basal three-fourths of third segment, numbering from 13 to 19, averaging about 17, scattered along one side of the segment, large and with wide rims. The beak extends beyond the mesothoracic pair of coxae and may reach to or beyond the coxae of the metathorax.

Thorax and appendages.—Hind tarsi, exclusive of claws, subequal to the length of the base of the sixth antennal segment. Hind tibiae with basal two-thirds of segment swollen, this area covered with a variable number of sensoria which are very difficult to count; sensoria may exceed 60 in number.

Abdomen.—Cornicles tapering slightly from base to apex, sides nearly straight; reticulated at apex for a little less than one-third of their length, the reticulated area being equal to the length of the hind tarsal segments exclusive of claws; flange weakly developed. Cauda about two-thirds as long as the cornicles, about subequal to the length of the fourth antennal segment, or about three times as long as the base of sixth antennal segment; slightly constricted near middle; with five to eight hairs on a side. Anal plate similar to anal plate of the apterous viviparous female.

ALATE MALE

Size and general color.—Average length from vertex to tip of anal plate, 1.62. Head, thorax, and abdomen brownish with a greenish tinge. Cornicles dusky green to dark brownish-black; cauda yellowish green; anal plate yellowish brown to dark brown. First and second antennal segments concolorous with head, remaining segments varying in color from light dusky green to dark brown. Femora with slightly less than basal half greenish yellow, remaining portion dark brown to black; tibiae dark brown, sometimes basal and middle area greenish yellow; tarsi dark. Hairs and bases of hairs on antennae and legs yellowish, contrasting to ground color of these

structures. Stigma brownish; veins near base yellowish brown, otherwise brownish, fine. Beak essentially concolorous with head except terminal segments more brownish.

Head and appendages.—Average width of head across eyes, .49. Antennal segments with comparative lengths as follows: III— .67 to .71, average .70; IV— .49 to .64, average .54; V— .43 to .57, average .49; VI— .14 to .14, average .14 plus .64 to .71, average .66. Secondary sensoria present on third, fourth, and fifth antennal segments, with average distribution as follows: III— 48; IV— 8; V— 8. Sensoria on third segment quite concentrated on one side of segment though irregularly arranged; on fourth and fifth segments in a more regular row, sensoria varying from small to large, but slightly tuberculate; distributed on third segment for almost its entire length except small area at base and apex, and on fourth and fifth segments starting just before middle and continuing almost to end of segments. The beak extends to the coxae of the metathoracic pair of legs.

Thorax and appendages.—Second fork of the media of fore wing much closer to the margin of the wing than it is to the first fork. Otherwise as in alate viviparous female.

Abdomen.—Cornicles tapering slightly from base to apex, with sides almost straight; in length two and one-half times as long as the base of sixth antennal segment, averaging about .36; reticulated for about one-fourth of their length, the remaining portion being distinctly imbricated. Cauda about three-fifths as long as the cornicles, constricted near middle, with from four to six hairs on a side. Anal plate rounded, extending to constricted part of cauda.

Holotype.—Alate viviparous female; Beach, Illinois, August 29, 1929, on *Helenium autumnale*, (Frison and Hottes). Slide No. 9984. *Allotype.*—Alate male; Seymour, Illinois, October 16, 1929, on *Helenium autumnale*, (Frison and Ross). Slide No. 9985. *Morphotype.*—Apterous viviparous female; same data as for holotype. Slide No. 9986. *Morphotype.*—Apterous oviparous female; same data as for allotype. Slide No. 9987. *Paratypes.*—Seventy-eight slides of alate and apterous viviparous females, oviparous females, males, pupae, and nymphs; all collected in Illinois by T. H. Frison, F. C. Hottes, and H. H. Ross from *Helenium autumnale*. The localities and dates are as follows: Mahomet (October 2), 1928; Beach (August 29), Kappa (September 9), Oakwood (October 17), and Seymour (July 20, August 6-21, September 16, October 7), 1929. Slides Nos. 9988-10036 and others unnumbered.

This *Macrosiphum*, because of its dark blackish-red color, superficially suggests in life *Macrosiphum sanborni* Gillette. A closer examination, however, enables one to immediately separate these two species on the basis of differences in cornicles and cauda.

All stages of this species are found on the stalks near the flower head and directly under the heads of the flowers. Often they are so concealed by the flower heads that their presence is easily overlooked.

MACROSIPHUM TILIAE (MONELL)

Siphonophora tiliae Monell, Bulletin of the United States Geological and Geographical Survey of the Territories, Vol. V, No. 1, January 22, 1879, Art. 1, p. 20.

This species, whose host is basswood, was first reported from Illinois (Chicago) by Davis (1911). According to our records the species is widely distributed throughout Illinois. It exhibits a fondness for the tender new shoots, particularly those around the base of the tree. Davis (1914) has given good descriptions of all forms.

Data associated with our viviparous specimens are as follows: Normal (May 29), 1884; Quincy (June 6), 1928; Chicago (July 13), Galena (July

10), Lisle (July 14), Rock Island (July 9), Starved Rock State Park (July 5), Urbana (July 2), Waukegan (July 13), 1929; and Carbondale (April 18), 1930. All collected on *Tilia americana*.

MACROSIPHUM VENAEFUSCAE DAVIS

Macrosiphum venaefuscae Davis, Canadian Entomologist, Vol. XLVI, No. 2, March, 1914, p. 77.

This species has not previously been recorded from Illinois. Our specimens were taken on common dock and were found on the undersides of the larger leaves close to the ground. According to Davis (1914), this species occurs in summer on *Polygonum* and the eggs are laid on *Rumex*. Good descriptions of all forms are given in the original description.

We do not agree with Theobald (1926) in placing this species in the synonymy of *M. gei* (Koch). In habitus this species is very suggestive of *M. gei* (Koch) but it may be separated on the alate viviparous females by the larger number of secondary sensoria on the third antennal segment, their irregular arrangement, and also by the fact that the third antennal segment is shorter than the fourth. In the apterous viviparous forms the third antennal segment is either equal to or shorter than the fourth segment—a condition not found in *M. gei* (Koch).

We have taken this species, viviparous females, only once at Urbana on Oct. 1, 1928, on *Rumex crispus*. A cotypic slide (No. 9466) of this species has been deposited in the Survey collection through the kindness of Professor J. J. Davis.

MACROSIPHUM ZINZALAE new species

ALATE VIVIPAROUS FEMALE

Size and general color.—Length from vertex to tip of anal plate, 2.46. Head and thorax dark dusky-green. Abdomen green with large dusky brown spots posterior to base of cornicles, and three pairs of very light and sometimes very small lateral dusky brown spots anterior to cornicles. Cornicles greenish black. Cauda yellowish green to yellowish brown, considerably lighter in color than the abdomen. Anal plate concolorous with abdomen. First and second antennal segments concolorous with head, remaining segments greenish brown except base of third which is lighter. Femora with basal halves pale yellowish green, apical halves greenish brown, darkest apically; tibiae dusky brownish at base gradually darkening towards apex, which is almost black; tarsi brown. Beak yellowish with the last segment brown. Stigma of fore wings light dusky brown; veins of wings the same, with just a suggestion of a border; posterior margin of fore wings in vicinity of anal vein brownish.

Head and appendages.—Average width of head across eyes, .60. Comparative lengths of antennal segments as follows: III—1.06 to 1.19, average 1.13; IV—1.04 to 1.23, average 1.14; V—.87 to .99, average .94; VI—.21 plus 1.21 to 1.29, average 1.24. Secondary sensoria (Fig. 291) confined to third antennal segment, tuberculate, irregularly arranged and varying greatly in size, numbering from 56 to 62, averaging 59. Primary sensorium on sixth antennal segment with a group of six small marginal sensoria on one side. Beak unusually long, extending well beyond metathoracic coxae, terminal segment one-third longer than base of sixth antennal segment.

Thorax and appendages.—Prothorax without lateral tubercles. Stigma of fore wings long and comparatively narrow, rather pointed at apex; second fork of media closer to margin of wing than to the first fork; all veins failing to reach margin of wing. Tibiae of legs with coarse spine-like hair.

Abdomen.—Cornicles (Fig. 120) 1.14 long, gently tapering from base to apex which is curved outwardly; flange present; apex covered with closed reticulations for from one-third to a little more than one-quarter the length of the cornicle. Cauda (Fig. 186) .53 long, usually not constricted but sometimes slightly so, with eight to ten hairs on a side. Cauda normal.

APTEROUS VIVIPAROUS FEMALE (VIRGOGENIA)

Size and general color.—Average length from vertex to tip of anal plate, 2.71. Color essentially that of the alate viviparous female with these differences: head and thorax more greenish and less dusky; lateral spots on the abdomen lacking; femora yellowish green except for brownish apical portions.

Head and appendages.—Average width of head across eyes, .54. Comparative lengths of antennal segments are as follows: III—1.07; IV—1.03; V—.86; VI—.19 plus 1.14. Secondary sensoria (Fig. 290) restricted to third antennal segment, quite small and for the most part tuberculate; mostly confined to one side of segment; in numbers varying from 30 to 40; area free from sensoria at apical end equal to twice the length of base of sixth antennal segment. Primary sensorium on sixth antennal segment with group of about five marginal sensoria to one side. Beak with apical segment extending beyond metathoracic coxae.

Thorax and appendages.—Prothorax without lateral tubercles.

Abdomen.—Cornicles 1.10 long, in shape similar to those of alate viviparous female, apical two-sevenths covered by closed reticulations, portion of cornicles immediately anterior to reticulated area feebly imbricated, remainder smooth. Cauda .61 long, slightly constricted with about eight hairs on each side.

Holotype.—Alate viviparous female; Urbana, Illinois, May 12, 1930, on *Polymnia canadensis*, (H. H. Ross). Slide No. 10212. *Morphotype*.—Apterous viviparous female; same data as holotype. On slide with nymphs. Slide No. 10213. *Paratypes*.—Four slides containing alate viviparous females and nymphs, same data as holotype, and two slides containing apterous viviparous females and nymphs, same locality and host, May 3, 1930 (Frison and Ross). Slides Nos. 10214-10218 and one other unnumbered.

The alate form of this species runs in Soliman's key (1927) to *M. media* Swain, from which it may be separated by the much longer beak, the more numerous secondary sensoria on the third antennal segment, and the different proportional lengths of the antennal segments. The apterous form keys to *M. albifrons* Essig from which it differs by the much longer beak, the coloration of the legs, the absence of hairs on the legs, and the comparative lengths of the antennal segments. This species feeds on the undersides of the leaves along the midrib.

GENUS MICROPARSUS PATCH

MICROPARSUS VARIABILIS PATCH

FIG. 96

Microparsus variabilis Patch, Entomological News, Vol. XX, No. 8, October, 1909, p. 338.

This species is here recorded from Illinois for the first time. It tightly curls the leaves of *Desmodium* and lives on the stems and undersides of the leaves of *Amphicarpa*. According to Patch (1909) the entire life cycle is passed upon *Desmodium*. Our collecting indi-

cates that the entire life cycle can also be passed upon *Amphicarpa*. The wing venation is somewhat variable.

Data associated with our viviparous specimens are as follows: Charleston (Aug. 24), 1910; Oakwood (Sept. 17), 1928; Edwardsville (Sept. 11), Mattoon (Sept. 10), 1929. Sexual forms have been taken at Decatur (Oct. 5), Edwardsville (Sept. 11), and Mattoon (Sept. 10), 1929. All forms collected both on *Desmodium* sp. and *Amphicarpa monoica*.

GENUS MYZUS PASSERINI

(SUBGENERA MYZUS PASSERINI, NEOMYZUS VAN DER GOOT AND KAKIMIA HOTTES AND FRISON)

Key to the Species of the Genus Myzus

1. Cornicles much longer than width of head through eyes.....2
- Cornicles in length about equal to, or less than, width of head through the eyes.....3
2. Fore wing with second fork of media closer to margin of wing than to first fork; cubitus and anal veins distinctly outlined with a fuscous border; secondary sensoria on fourth antennal segment ranging from 5 to 8; alate and apterous forms with dorsum of abdomen uniformly a shade of green.....
..... *porosus* Sanderson p. 340
- Fore wing with second fork of media closer to first fork than to margin of wing or midway between them; cubitus and anal veins not distinctly outlined with fuscous border; secondary sensoria on fourth antennal segment ranging from 0 to 3; alate and apterous forms with dorsum of abdomen often with some dark markings, particularly apterous forms.....
..... *circumflexus* (Buckton) p. 335
3. Cornicles distinctly swollen.....4
- Cornicles not swollen.....8
4. Alate viviparous females [alate form of *scrophulariae* (Thomas) not known]5
- Apterous viviparous females.....6
5. Fore wings with veins distinctly outlined with a fuscous border; antennal tubercles projecting forward; minute brownish species
..... *monardae* (Williams) p. 339
- Fore wings with veins not outlined with a fuscous border; antennal tubercles converging; medium-size species, usually with dark dorsal abdominal patch on lighter background.....
..... *persicae* (Sulzer) p. 339
6. Cornicles longer than width of head across eyes; first antennal segment with mesal margin very little produced, broadly and evenly rounded; yellowish-green forms.....
..... *persicae* (Sulzer) p. 339
- Cornicles subequal to width of head across eyes; first antennal segment with mesal margin considerably produced, somewhat angulate towards apex of segment; brownish forms.....7
7. Cornicles with outer margin almost straight and with inner margin convex, the swelling therefore asymmetrical; flagellum of antennae longer than length of body from vertex to tip of anal plate.....
..... *monardae* (Williams) p. 339
- Cornicles with both margins convex, producing a symmetrical swelling; flagellum of antennae slightly shorter than length of body from vertex to tip of anal plate.....
..... *scrophulariae* (Thomas) p. 343
8. Fourth antennal segment without secondary sensoria.....9
- Fourth antennal segment with secondary sensoria.....11

9. Fore wing with at least anal vein distinctly outlined with fuscous margin.....**plantagineus** Passerini p. 340
 —. Fore wings with no veins distinctly outlined with fuscous margin.....10
 10. Primary sensorium on basal portion of sixth antennal segment about equal in size to one or two of surrounding sensoria; cornicles distinctly imbricated throughout; blackish and brownish form.....**cerasi** (Fabricius) p. 335
 —. Primary sensorium on basal portion of sixth antennal segment conspicuously larger than small surrounding sensoria, which are uniform in size; cornicles not distinctly imbricated throughout; dark dorsal abdominal patch on lighter background**persicae** (Sulzer) p. 339
 11. Fifth antennal segment with few secondary sensoria (0 to 5).....12
 —. Fifth antennal segment with sensoria more numerous (7 to 20).....14
 12. Cornicles much longer than fifth antennal segment.....
 **lactucae** (Schrank) p. 338
 —. Cornicles shorter than fifth antennal segment.....13
 13. Cornicles and cauda of equal length.....**houghtonensis** (Troop) p. 338
 —. Cornicles distinctly longer than cauda..**essigi** Gillette & Palmer p. 337
 14. Fifth antennal segment with more than fifteen secondary sensoria; tibiae uniformly brown or dark....**heucherae** (Thomas) p. 337
 —. Fifth antennal segment with less than fifteen secondary sensoria; tibiae with extreme apex much darker than remaining portion**thomasi** n. sp. p. 343

MYZUS CERASI (FABRICIUS)

FIG. 39

Aphis cerasi Fabricius, Systema Entomologiae, 1775, p. 734.

The black cherry aphid, a well-known and cosmopolitan species (Fig. 39), is at times of considerable economic importance to cherry growers. It is very widely distributed in Illinois and was first reported from the state by Thomas (1879). Many articles have been written concerning it, but conclusive evidence that it is at least partially migratory has been obtained only recently (Ross, 1917, Wimshurst, 1925). *Galium* and *Lepidium*, in addition to cherry as an all year host, have been found to serve as summer hosts of this species in North America. Technical descriptions of all forms may be found among others in Gillette (1908b) and Theobald (1926).

Data associated with our viviparous specimens are as follows: Normal (May 24), 1883; Normal (May 13, July 18), 1884; Carbondale (June 2), Mattoon (June 10), Mt. Carmel (May 26), Oregon (June 28), Quincy (June 6), 1928; Catlin (May 17), Effingham (June 18), Jerseyville (June 25), Kansas (June 17), Monticello (May 24), Oakwood (July 22, Oct. 17), Rock Island (July 9), Starved Rock State Park (July 5, Aug. 14), Urbana (May 14, June 7), 1929. All collected on *Prunus avium* and *Prunus persica* except for small specimens taken on *Galium* sp. at Oakwood (Oct. 17), 1929.

MYZUS CIRCUMFLEXUS (BUCKTON)

Siphonophora circumflexa Buckton, Monograph of the British Aphides, Vol. I, 1876, p. 130.

This species, first recorded from the state by Davis (1911), is predominately a greenhouse species. The fact that it is not overly particular as to the host upon which it feeds makes it a species of con-

siderable economic importance. According to Theobald (1926), a sexual reproduction may continue in greenhouses for years without the appearance of the sexual forms, which have not as yet been described. If recent synonymy is correct, and it seems to be, Gillette (1908) has redescribed this species under the name of *Myzus vincae*. The majority of specimens of this species have a horseshoe-shaped brownish area on the dorsum of the abdomen.



Fig. 39. Characteristic grouping of the black cherry aphid, *Myzus cerasi* (Fabricius), on under sides of leaves of new growth on the cherry, *Prunus avium*; Urbana, June 7, 1929.

Data associated with our viviparous specimens are as follows: Evanston (May 6), 1927; Carbondale (June 4), Chicago (June 14), Kankakee (June 29), Starved Rock State Park (June 13), 1928; Urbana (Oct. 15), 1929. Collected on *Anchusa myosotidiflora*, *Chrysanthemum*, *Fuchsia* sp., *Geranium* sp., *Ipomoea maxima*, *Lilium* sp., and *Streptocarpus*.

MYZUS ESSIGI GILLETTE & PALMER

Myzus aquilegiae Essig, University of California Publications in Entomology, Vol. I, No. 7, July 20, 1917, p. 314. *Name preoccupied.*

Myzus cssigi Gillette & Palmer, Annals of the Entomological Society of America, Vol. XXII, No. 1, March, 1929, p. 30. *New name for aquilegiae* Essig.

We have found this species to be generally distributed throughout Illinois both upon *Aquilegia canadensis* and cultivated varieties of this genus. Since the sexual forms have not been described to our knowledge, their description is presented here.

Our Illinois records for this species are as follows: Havana (June 21), Herod (May 29), Mt. Carmel (May 26), Mt. Carroll (June 25), Oregon (June 27), Starved Rock State Park (June 12), and Urbana (May 23-24), 1928; Urbana (Oct. 15), 1929; Starved Rock State Park (May 13), 1930. Sexual forms were collected at Urbana on October 15.

ALATE MALE

Length from vertex to tip of anal plate, 1.24. Head and thorax dark blackish brown, abdomen dark green with lateral brownish spots, spot posterior to the cornicles largest. Cornicles dusky green, cauda concolorous with abdomen, anal plate brownish green. Antennae dark brown. Femora dark brown with base greenish yellow, fore femora lightest; tibiae and tarsi dark brown. Beak brownish. Genitalia dark brown tipped with black. Veins of wings dark brown.

Average width of head across eyes, .41. Comparative lengths of antennal segments as follows: III— .54, IV— .30, V— .34, VI— .11 plus .63. Secondary sensoria distributed as follows: III— 37, IV— 15, V— 7; scattered over entire third segment, somewhat crowded on one side of fourth segment, arranged in a somewhat irregular row on fifth segment. Beak reaching to mesothoracic coxae. Second fork of media closer to margin of wing than to first fork. Cornicles .23 long, typical for species. Cauda .11 long, very blunt at tip, with two hairs near extreme tip, unlike the cauda of the alate viviparous female.

APTEROUS OVIPAROUS FEMALE

Length from vertex to tip of anal plate, 1.40. Head and thorax light brownish yellow. Abdomen yellow with very minute lateral and dorsal brownish spots. Cornicles yellowish, cauda and anal plate yellowish with some indications of fuscous towards the outer margins. Femora yellowish with some light brown near apex; tibiae yellowish with traces of light fuscous towards apex; tarsi fuscous.

Average width of head across eyes, .39. Comparative lengths of antennal segments as follows: III— .47, IV— .33, V— .17, VI— .10, terminal filament incomplete. Secondary sensoria limited to the third antennal segment, numbering about 7, arranged in a somewhat irregular row. Beak reaching to metathoracic coxae. Cornicles .26 long, cauda .17 long, in shape similar to those of viviparous form.

Allotype.—Alate male; Slide No. 8998, Urbana, Illinois, October 15, 1929, on *Aquilegia* sp. (Frison and Ross). *Morphotype*.—Apterous oviparous female; Slide No. 8999, same data as allotype. On slide with nymphs.

MYZUS HEUCHERAE (THOMAS)

Siphonophora heucherae Thomas, Eighth Report of the State Entomologist on the Noxious and Beneficial Insects of the State of Illinois, 1879, p. 66.

Thomas described this species from specimens sent to him from Sauk City, Wisconsin, by Professor Bundy. Since that time it has been

reported from California by Davidson—apparently the only record of this species based on actual specimens to be published since the original description was made. This aphid has retained the primitive habit of producing the sexual forms early in the year (May and June) and hence spends the greater portion of the year in the egg stage.

All forms have been described in detail by Davidson (1915). Soliman is certainly correct in placing *heucherae* in the genus *Myzus* (*sens. lat*) instead of in *Macrosiphum*. Five cotypic slides (Nos. 3174-3175, 7163-7165) of this species are in the Survey collection.

Data associated with our viviparous specimens are as follows: Carbondale (June 4), Herod (May 29), Starved Rock State Park (June 13), 1928. Sexual forms taken at Starved Rock State Park (June 13), 1928. All collected upon *Heuchera* sp.

MYZUS HOUGHTONENSIS (TROOP)

FIGS. 124, 187, 273

Aphis houghtonensis Troop, Entomological News, Vol. XVII, No. 2, February, 1906, p. 59.

The gooseberry witch-broom aphid has been reported from Illinois by Davis (1910), but Baker (1919c) states that this record does not apply to this species. Our material has been compared with cotypic material loaned by the U. S. National Museum. Since other cotypic slides examined by us show a mixing of species, we have selected one slide of the U. S. National Museum material as a *lectotypic* slide. This slide has associated with it the following data: "9919 *houghtonensis* Troop. On gooseberry, LaFayette, Ind., May 20, 1905. J. Troop."

Good technical descriptions of all forms of this aphid are given by Baker (1919). DeLong and Mathewson (1925) have studied its development in relation to temperature and humidity and have come to the conclusion that these factors seem to have a definite effect upon the length of specific generations. According to DeLong and Jones (1926), a strain of plant resistant to attack offers the greatest promise as a method of control.

Data associated with our viviparous specimens are as follows: Havana (June 21), Kankakee (June 29), Oregon (June 27), Pekin (June 20), Rock Island (June 23), 1928; Homer (June 29), 1929; Rock Island (June 3), 1930. All collected on *Ribes Grossularia* and *Ribes* sp.

MYZUS LACTUCAE (SCHRANK)

Aphis lactucae Schrank, Fauna Boica, Vol. II, No. 1233, 1801, p. 120.

This species may have been recorded from Carbondale, Illinois, by Thomas (1879) under the name of "*Siphonophora lactucae* Linn.?" but his identification is questionable. The Davis record (1910) of *Macrosiphum lactucae* Schrank from cultivated lettuce in greenhouses in Illinois is this species. Through the kindness of Professor Davis, we were permitted to study the material upon which his record was based and to incorporate a slide mount in the Survey collection.

Theobald (1926) shows that this species migrates from its overwintering host, *Ribes*, to such plants as lettuce and endive to spend the

summer months. Technical descriptions of the adults are given among others by Davis (1910) and Theobald (1926).

Data associated with the viviparous specimens collected by J. J. Davis are as follows: Chicago (April 23, May 2), Niles Center (Nov. 2), 1908; Chicago (Dec. 1), 1910. All specimens collected on lettuce (*Lactuca*) in greenhouses or on celery (*Apium* sp.) out of doors.

MYZUS MONARDAE (WILLIAMS)

FIG. 86

Phorodon monardae Williams, University Studies, University of Nebraska, Vol. X, No. 2, March, 1911, p. 89.

Rhopalosiphum monardae Williams (Davis), University Studies, University of Nebraska, Vol. XI, No. 3, July, 1911, p. 36.

This species has not been previously recorded from Illinois. We have followed Davis (1911c) in giving Williams credit for the species, although Davis was the first to give a technical description of it. It tightly twists and curls the leaves of its host and is often associated with *Aphis monardae* Oestlund. The sexual forms are unknown.

Data associated with our viviparous specimens are as follows: Carbonate (June 4), Champaign (July 15), Kankakee (June 28, July 15), Pekin (June 20), Rock Island (June 23), 1928; Flora (June 18), Pleasant Plains (May 2), Savanna (July 9), Wayonet (July 6), 1929. Collected on *Monarda fistulosa* and *Monarda* sp.

MYZUS PERSICAE (SULZER)

FIG. 91

Aphis persicae Sulzer, Abgekürzte Geschichte der Insecten nach dem Linneischen System. Winterthur, H. Steiner u. Co., II 2, 1776, p. 105.

The green peach aphid feeds upon a great variety of food plants and is widely distributed throughout the world. It is a potential enemy of considerable economic importance, attacking truck crops, garden flowers, various plants grown in greenhouses, as well as peach trees. Thomas (1879) mentions *Myzus persicae* in such a way that it seems certain his record applies to Illinois specimens, though no definite locality is mentioned. The cotypes of *Rhopalosiphum tulipae* Thomas (Slide No. 7657), from Sauk City, Wisconsin, are this species, as Davis (1910) has stated.

It is not possible to review here the many papers that have been published concerning the control and destructiveness of the green peach aphid. The paper of Weed (1927) is interesting from biological considerations because it demonstrates so well the marked responses of aphids to changes in temperature and humidity. Although this species is definitely known to migrate from peach, plum, and other woody plants (winter hosts) to a great variety of summer hosts, it does produce sexual forms in greenhouses and on some plants commonly referred to as its summer hosts. Good technical descriptions of all forms are to be found in the publications of Gillette (1908b) and Theobald (1926). It is a variable species in color and certain structural characters. The

difference in the cylindrical cornicles of the spring migrant on peach and the somewhat swollen cornicles of the return migrants is rather unusual.

Data associated with our viviparous specimens are as follows: Urbana (Aug. 21), 1885; Urbana (June 20), 1898; Cairo (June 3), Carbondale (May 17, June 4), Champaign (May 23, June 19), Chicago (June 14), Decatur (Sept. 18), DesPlaines (May 20, Aug. 16, Sept. 19, Dec. 18), Herod (Oct. 12), Kankakee (June 29), Quincy (June 6), Shawneetown (May 27), Urbana (May 24, June 4, 6, July 10, 18, Sept. 26, Oct. 1, 19, Dec. 5), 1928; Batchtown (June 25), Catlin (May 17), Collinsville (Sept. 11), DesPlaines (Feb. 9), Effingham (June 18), Grayville (June 19), Kansas (June 17), Kappa (Oct. 3), Macomb (May 4), Melrose Park (Oct. 14), Oregon (July 12), Seymour (Oct. 16), Springfield (May 2), Urbana (May 11, 14, June 4, 21, July 24, Nov. 11, Oct. 9, 15, 21) 1929; Allendale (Oct. 8), Effingham (Nov. 13), Flora (Nov. 13), Urbana (Oct. 4, 13, 20), 1930. Collected on the following plants: *Apium*, *Aquilegia canadensis*, *Arctium* sp., *Aselepias* sp., *Beta vulgaris*, *Brassica oleracea*, *Brassica rapa*, *Brassica* sp., *Capsicum dulce*, *Catalpa speciosa*, *Convolvulus* sp., *Cyclamen* sp., *Dianthus* sp., *Helianthus* sp., *Ipomoea maxima*, *Ligustrum vulgare*, *Lycopersicon esculentum*, *Marsilea quadrifolia*, *Mimulus* sp., *Myosotis*, *Philadelphus coronarius*, *Piqueria trinervia*, *Portulaca oleracea*, *Prunus avium*, *Prunus Persica* (L.) Stokes, *Prunus serotina*, *Radicula Armoracia*, *Raphanus sativus*, *Ribes aureum*, *Salvia leucantha*, *Saxifraga splendens*, *Setaria viridis*, *Solanum melongena*, *Solanum tuberosum*, *Spinacea oleracea*, *Verbena* sp., and *Viola tricolor*.

Sexual forms collected as follows: Seymour (Oct. 16), Urbana (Oct. 21), 1929; Effingham (Nov. 13), Flora (Nov. 13), and Urbana (Oct. 13-20), 1930. Collected on *Ribes* sp., *Prunus avium*, *Prunus domestica*, *Prunus serotina*, and *Rosa* sp.

MYZUS PLANTAGINEUS PASSERINI

Myzus plantagineus Passerini, Gli Afidi, 1860, p. 35.

This species was redescribed and first recorded from North America by Davis (1910), who collected it on plantain at Urbana, LeRoy, and Aurora, Illinois. It has the habit of feeding near the base of the leaves at the crown of the plant and causes the leaves to crinkle and become distorted. Often the colonies are partially covered by "tents" of soil and bits of trash made by ants.

The sexual forms have not been described.

Data associated with our viviparous specimens are as follows: Rock Island (July 7), 1929; Rock Island (June 3), 1930. All collected on *Plantago* sp.

MYZUS POROSUS SANDERSON

Fig. 129

Myzus porosus Sanderson, Twelfth Annual Report of the Delaware College Agricultural Experiment Station, 1901, p. 205.

Because this species has been so rarely mentioned in literature since its description from material collected on strawberry, the writers almost made the mistake of describing as a new species the Illinois material from rose listed below. The fact that our material is *Myzus porosus* Sanderson has been substantiated by a study of cotypic specimens of *porosus*, kindly loaned to us by the United States National Museum. Since the original description of this little known species is very brief, detailed descriptions are presented here.

Miss Patch (1914) has figured the antennae of male and oviparous female specimens collected on *Fragaria* which she considers to be this species. It should be noted that her drawing shows a lack of secondary sensoria on the antennae of oviparous forms, whereas they average about four in number in the specimens from rose which we consider as *porosus*. The original description of the oviparous female, as well as cotypic specimens, reveal a condition similar to that stated in our description. Likewise, the males which we consider to be *porosus* have more sensoria than those considered as this species by Miss Patch. Variation may be responsible for these discrepancies, or we may be dealing with different forms.

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.73 mm. Prothorax and metathorax pale brownish-green; head and especially mesothorax brown, polished; abdomen, including anal plate, green. Cornicles translucent whitish-green, cauda chalky whitish-green. Eyes reddish-brown. Antennae with first two segments and extreme base of third slightly darker than head, remaining portion black. Coxae, trochanters, and basal two-thirds of femora translucent yellowish green; apical third of femora black; tibiae light brown, with a band at apex equal to about twice length of tarsi, black; tarsi black. Stigma and costa yellowish brown; veins and margin of front wing in vicinity of anal vein, black; anal vein and cubitus slightly margined with black. Beak with basal segment concolorous with head, second segment light brown and apex blackish.

Head and appendages.—Average width of head across eyes, .43. Antennal segments with comparative lengths as follows: III— .53 to .89, average .56; IV— .43 to .54, average .48; V— .36 to .46, average .42; VI— .11 to .17, average .13 plus .53 to .66, average .60. Secondary sensoria usually confined to segments three and four, but occasionally the fifth segment has a sensorium; arranged in straight rows; numbering from 14 to 21 and averaging 17 on third segment and from 7 to 8 on fourth segment. Beak extending to the mesothoracic coxae.

Thorax and appendages.—Stigma of fore wings long, narrow and pointed at apex; second fork of media closer to margin of wing than to first fork.

Abdomen.—Certain specimens show evidences of tubercles, but either these tubercles are not always present or they are so poorly developed that only specimens in certain positions show them. Cornicles (Fig. 129) moderately long, straight; base not greatly wider than apex; with a poorly developed rim; about equal in length to twice the length of cauda, ranging in length from .43 to .64 and with an average of .56; not reticulated but imbricated especially at apices. Cauda slightly constricted a little beyond the tip of anal plate, with from one to three hairs on a side, ranging from .23 to .33 and averaging .29 in length. Anal plate rounded at a point to the apex.

APTEROUS VIVIPAROUS FEMALE (VIRGOGENIA)

Size and general color.—Average length from vertex to tip of anal plate, 1.84 mm. Head, including first two segments of antennae and base of third, pale greenish brown. Thorax and abdomen green, prothorax shading into the greenish brown of the head. Antennae with segments three, four, and five yellowish-brown with a narrow black ring at apex; sixth segment entirely black. Eyes, legs, cornicles, and cauda as in alate viviparous female.

Head and appendages.—Average width of head across eyes, .44. Antennal segments with comparative lengths as follows: III— .61 to .71, average .65; IV— .41 to .51, average .45; V— .29 to .40, average .38; VI— .10 to .13, average .12 plus .46 to .53, average .51. Secondary sensoria confined to third antennal segment, almost in a straight line, varying in number from 7 to 10.

Thorax and abdomen.—Except for lack of wings similar to alate viviparous female. Cornicles varying from .54 to .71 and averaging .62 in length, cauda varying from .29 to .33 and averaging .30 in length.

APTEROUS OVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.85. Head light yellowish green, remainder of body a slightly deeper shade of green. Cornicles, cauda, and anal plate yellowish green with a slight brownish stain, cornicles particularly dusky toward apices. Basal portion of antennae concolorous with head, remaining portion gradually shading to brown. Coxae, trochanters, and basal halves of femora concolorous with body; dorsal apical portions of femora brown; fore and middle tibiae yellowish green except for brown apices; hind tibiae with swollen portion and apices brown; all tarsi brown. Beak concolorous with head and body except that apex is brown.

Head and appendages.—Average width of head across eyes, .44. Antennal segments with comparative lengths as follows: III— .47 to .54, average .51; IV— .34 to .40, average .37; V— .29 to .31, average .30; VI— .10 to .11, average .11 plus .43 to .47, average .35. Secondary sensoria restricted to the basal half of the third antennal segment, ranging in number from 2 to 5 and averaging about 4, arranged in a straight row. Beak extending to posterior margins of mesothoracic coxae. Antennal tubercle well developed.

Thorax and appendages.—Tibiae of hind legs considerably swollen where sensoria occur, sensoria numerous, 123 counted on one tibia.

Abdomen and appendages.—Cornicles averaging .62 in length, similar to those of alate viviparous female, not distinctly imbricated. Cauda constricted near middle, with from two to three hairs on a side, averaging .30 in length. Anal plate narrow.

ALATE MALE

Size and general color.—Average length from vertex to tip of anal plate, 1.28. Head and thorax dark greenish brown, abdomen green with lateral and posterior brownish markings. Cornicles, cauda, anal plate, and claspers brownish, particularly claspers. Antennae dark brown, extreme base of third segment lightest. Coxae, trochanters, and bases of femora yellowish green; tibiae with basal and apical portions brown, middle area lighter; tarsi brown. Beak concolorous with head at base and with tip brown. Veins dark, anal vein bordered with fuscous, stigma greyish.

Head and appendages.—Antennal segments with comparative lengths as follows: III— .60 to .64, average .62; IV— .40 to .50, average .45; V— .36 to .39, average .34; VI— .11 plus .59 to .64, average .62. Secondary sensoria located on third, fourth, and fifth segments, and in one specimen on sixth segment, distributed as follows: III— 26 to 33, average 27; IV— 16 to 20, average 18; V— 12 to 18, average 16; VI— 0 to 2. Sensoria on third segment irregularly arranged but confined largely to one side of segment; on fourth and fifth segments they are smaller than on third and confined to one side of segment. Marginal sensoria near primary sensorium on sixth segment apparently lacking. Beak reaching to middle of mesothoracic coxae.

Thorax and appendages.—Stigma of fore wings narrow and comparatively short. Second fork of media closer to margin of wing than first fork.

Abdomen.—Cornicles straight, imbricated throughout length, with a poorly developed flange at apex, averaging .33 in length. Cauda slightly constricted near middle, with from two to three hairs on a side, averaging .18 in length. Claspers dark brown and covered with hairs.

Our specimens, all collected from various forms of *Rosa*, have the following data associated with them: Cairo (June 2), Carbondale (June 4), DesPlaines (in greenhouse, May 20), Kankakee (June 29), Metropolis (June 1), Pekin (June 20), Quincy (June 6), Shawneetown (May 27), and Urbana (May 23-28, July 10), 1928; Cairo (June 22), Collinsville (Sept. 11), Decatur (June 12), Effingham (June 18), Springfield (May 2), and Urbana (Nov. 5), 1929; Decatur (June 10), Effingham (Nov. 13), Maywood (Nov. 3), Metropolis (April 17), Urbana (Nov. 21, Dec. 6, 12), 1930. Sexual forms were collected only on November 5, 1929, at Urbana.

This species, except for antennal tubercles, is suggestive of *Macrosiphum dirhodum* (Walker) which is recorded from the same host. In

the alate form it may be separated from this species by the presence of secondary sensoria on the fourth antennal segment, and from both *Macrosiphum rosae* (L.) and *Macrosiphum pseudorosae* Patch by the fact that the cornicles are not reticulated at the apices. The male is distinguished by the comparatively larger number of sensoria on the fourth segment, and the oviparous female by the presence of secondary sensoria on the third antennal segment. This form belongs to the subgenus *Ncomyzus* Van der Goot and may be the species referred to by Oestlund (1922, p. 139). It can be separated from its close ally, *circumflexus* (Buckton), the type of the subgenus *Ncomyzus*, by the characters given in the key.

MYZUS SCROPHULARIAE (THOMAS)

Phorodon scrophulariae Thomas, Eighth Report of the State Entomologist on the Noxious and Beneficial Insects of the State of Illinois, 1879, p. 72.

This species has remained virtually unknown since its original description, being referred to only twice in literature since then, once when it was recorded from Berkeley, California, by Clarke (1903) and again when the record of Thomas was mentioned by Davis (1910).

A eotypic slide of *scrophulariae* has been found in the Survey collection (Slide No. 2798, and Thomas' No. 75). It contains two apterous viviparous female specimens of *scrophulariae*, one of which is in good condition, and one specimen not this species. The data associated with this slide are: Carbondale, Illinois, April 13, 1878, on *Scrophularia nodosa*.

The species belongs in the genus *Myzus*, and on the basis of the apterous viviparous female, which is the only form known, keys out with *persicae* and *monardae*.

MYZUS THOMASI new species

FIGS. 261, 264

ALATE VIVIPAROUS FEMALE

Size and general color.—Length from vertex to tip of anal plate, 1.30. Head and thorax essentially light brown, somewhat greenish on lateral plates and prothorax; abdomen light green. Cornicles, cauda, and anal plate very light dusky brown. Antennae dusky brown, slightly lighter towards the apex and at extreme base of the third segment. Femora yellowish green at base, shading to dusky brown at apex; tibiae light dusky, with extreme apices brown; tarsi light brown. Stigma, costa, subcosta, veins, and posterior margin of wing in vicinity of anal vein, dusky; cubitus and anal vein darkest. Beak dusky, extreme apex dark.

Head and appendages.—Width of head across eyes, .41. Antennal segments with comparative lengths as follows: III— .60; IV— .41; V— .36; VI— .11 plus 1.03. Secondary sensoria (Fig. 261) located on third, fourth, and fifth antennal segments, distributed on unique specimen as follows: III— 38 to 48; average 45; IV— 22 to 23; V— 7 to 12, average 9. Sensoria on all segments more thickly distributed on one side of the segment than on the others; sensoria on the fifth segment in an almost straight row. Hair on antennae short and spine-like, pointing towards apex, not as long as diameter of segment. Beak extending almost to mesothoracic coxae.

Thorax and appendages.—Stigma long and unusually narrow; second fork of media closer to margin of wing than to first fork; tips of medial veins failing to reach margin of wings. Femora with scattered setae very similar to those on antennae; tibiae more strongly armed, especially toward apex; spines strong, numerous, and moderately declinate.

Abdomen.—Cornicles about one-fifth longer than the cauda and one-half as long as third antennal segment; distinctly imbricated throughout; the base distinctly the widest portion, the apex slightly swollen, giving the cornicle a sub-vasiform appearance; the extreme apex slightly constricted and bearing a distinct flange. Cauda with a narrow constriction near the middle, long and comparatively slender, its width only slightly greater than the width of the base of the cornicle, its sides almost parallel, gradually narrowing at apex to a rounded point; apical half with four or five slender scattered hairs. Anal plate normal in shape. Each segment with a pair of small, lateral tubercles. Hairs on body short and sparse.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of anal plate, 1.52. Body, except appendages, light green. First and second antennal segments concolorous with head, remaining segments varying from light greenish-yellow to brown, the brown becoming deeper towards apex. Femora greenish-yellow with their apices slightly infuscated with brown; tibiae light yellowish-brown, concolorous with apices of femora, apices of tibiae darker brown; tarsi brown. Cornicles concolorous with abdomen or slightly infuscate; cauda and anal plate concolorous with abdomen. Beak concolorous with head, slightly dusky at apex.

Head and appendages.—Width of head across eyes, .39. Antennal segments with the following comparative lengths: III— .57 to .59, average .58; IV— .36 to .41, average .39; V— .34; VI— .11 plus .69 to .71, average .70. Secondary sensoria (Fig. 264) present on third, fourth, and fifth antennal segments, distributed as follows: III— 23 to 33, average 27; IV— 5 to 7, average 6; V— 2. Sensoria on the third segment widely scattered, those on fourth arranged almost in a straight row. Beak extends to coxae of meta-thoracic legs.

Abdomen.—Cornicle about one-quarter longer than cauda and about equal to length of fourth antennal segment, similar in general shape to that of alate viviparous female, but more slender and less distinctly imbricated. Cauda slender, constricted near the middle, with two hairs on each side and one at apex. Anal plate normal.

Holotype.—Alate viviparous female; Rock Island, Illinois, July 9, 1929, on *Ribes* sp., (Frison and Hottes). On slide with nymphs, and specimens of *Aphis sanborni* Patch. Slide No. 10705. *Morphotype*.—Apterous viviparous female; same data as holotype. On slide with pupae and specimens of *Aphis sanborni* Patch. Slide No. 10706. *Paratype*.—One slide containing an apterous viviparous female and pupae, and specimens of *Aphis sanborni* Patch. Same data as holotype. Slide No. 10707.

This species may be readily separated from other species of the genus *Myzus* by the characters given in the key. The aggregate of characters of this species is such that it seems advisable to erect a new subgenus for it, *Myzus houghtonensis* (Troop), and *Myzus heucherac* (Thomas), for which we propose the name of *Kakimia*. The characterization of this new subgenus is as follows:

KAKIMIA new subgenus

Antennal tubercles poorly developed. Antennae with six segments, with numerous large round sensoria on the third, fourth, and often the fifth segments. Fore wings with media twice-branched, hind wings with both media and cubitus present. Anal plate rounded. Cornicles with base the widest portion, apex slightly swollen, thus giving cornicles a sub-vasiform appearance; apex with distinct flange. Cauda with narrow constriction near middle, long and comparatively slender, narrowing at apex to a rounded point.

Type of subgenus.—*Myzus (Kakimia) thomasi* new species.

GENUS PENTALONIA COQUEREL

PENTALONIA NIGRONERVOSA COQUEREL

FIGS. 74, 95

Pentalonia nigronervosa Coquerel, Annales Societé Entomologique de France, Ser. 3, 1859, Vol. VII, p. 259.

This species is here reported from Illinois for the first time. In this state it is a greenhouse species and undoubtedly an importation from tropical climates. Zeck and Eastwood (1929) have shown that this insect not only causes direct damage by sucking sap of the banana, but is a carrier of the virus of "bunchy top" of Manila hemp in the Philippines. Good descriptions of the viviparous forms are given by Theobald (1926).

Data associated with our viviparous specimens of this peculiar aphid are as follows: Garfield Park Conservatory, Chicago, June 14, 1928, on *Hedychium coronarium*.

GENUS PHORODON PASSERINI

PHORODON HUMULI (SCHRANK)

FIG. 85

Aphis humuli Schrank, Fauna Boica, Band 2, 1 Abt., 1801, p. 110.

The hop aphid was included by Thomas (1879) in his Third Annual Report, though without definite mention of his having collected it in Illinois. It is not included in the more recent list of Davis (1910). For a long time it has been known as a serious pest of hops both in Europe and America. It is easily recognized because of the peculiar shape of the antennal tubercles (Fig. 85).

The winter is passed in the egg stage on plum. After a few generations on this host the aphids then migrate to hop for numerous summer generations. The sexual forms are produced in fall, the oviparous females being produced exclusively on the over-wintering host. The bulletin by Parker (1913) gives a good general account of this aphid in the Pacific Coast Region of North America. Another good general account, together with technical descriptions of all forms, is presented by Theobald (1926).

Data associated with our viviparous specimens are as follows: Muncie (July 8), Urbana (July 10), 1928; Gays (Sept. 10), Kappa (Sept. 10, 22, Oct. 1), Rock Island (July 7), 1929; Aledo (June 4), 1930. All collected on hop, *Humulus Lupulus*.

SUBFAMILY ERIOSOMATINAE

SUPERTRIBE ERIOSOMEA

Key to Genera

- | | |
|-------------------------------------|---|
| 1. Antennae with five segments..... | 2 |
| — Antennae with six segments..... | 4 |

2. Antennae with conspicuous setae; secondary sensoria oval or transverse-oval; stigma of fore wing rounded at apex, posterior margin convex (Fig. 69); wholly subterranean forms, not living in galls.....3
- Antennae without conspicuous setae; secondary sensoria more narrow and annular; stigma of fore wings pointed at apex, posterior margin concave (Fig. 73); living in galls on leaves of sumac *Melaphis* p. 359
3. Third antennal segment with not more than ten secondary sensoria; apterous forms with conspicuous and peculiarly bent and enlarged setae (Fig. 318)..... *Geioica* p. 356
- Third antennal segment with twenty or more secondary sensoria; apterous forms without bent and enlarged setae..... *Forda* p. 354
4. Third antennal segment with narrow annular, transverse, or ring-like secondary sensoria, giving antennae a corrugated or notched appearance when viewed from the side (Fig. 223).....5
- Third antennal segment with oval or oval-transverse secondary sensoria, not annular, giving antennae a more even or cylindrical appearance when viewed from the side (Fig. 238).....16
5. Fore wings normally with medial vein branched (Fig. 69).....6
- Fore wings normally with medial vein not branched (Fig. 64).....9
6. Fourth antennal segment about twice as long as greatest width.....7
- Fourth antennal segment three or four times as long as greatest width8
7. Hind wings with only medius present (Fig. 88); annular sensoria numbering about ten on third segment, and usually not more than three each on fourth, fifth, or sixth segments; aerial forms producing cockscomb galls (Fig. 41) on elms...
..... *Colopha (Colopha)* p. 348
- Hind wings with both medius and cubitus present (Fig. 92); annular sensoria numbering about eighteen on third segment, and usually five or more on fourth, fifth or sixth segments; producing bag-like galls (Fig. 46) on elms..... *Gobaishia* p. 359
8. Annular secondary sensoria incomplete or rarely entirely encircling antennal segments, well separated from one another on third segment (Fig. 226); curling leaves of elm (Fig. 45)...
..... *Georgiaphis* p. 357
- Annular secondary sensoria of antennae complete, almost or entirely encircling antennal segments; closely paralleling one another on third segment (Fig. 225); stem, bark, root or leaf feeders *Eriosoma* p. 350
9. Terminal filament of sixth antennal segment much longer than basal portion (Fig. 239) [Fundatrigenia or spring migrants leaving galls]; producing irregular sponge-like gall (Fig. 47) on poplar *Mordwilkoja* p. 360
- Terminal filament of sixth antennal segment not longer than basal portion10
10. Hind wings with only medius present (Fig. 88).....11
- Hind wings with both medius and cubitus present (Fig. 87).....12
11. Fourth antennal segment not more than twice as long as greatest width; aerial forms producing cockscomb galls (Fig. 41) on elms *Colopha (Colophella)* p. 348
- Fourth antennal segment about four times as long as greatest width; curling leaves of elms (Fig. 45)..... *Georgiaphis* p. 357
12. Longitudinal vein of hind wing not straight, with radial sector, media, and cubitus arising in a more or less three-pronged fork (Fig. 94)13
- Longitudinal vein almost straight, media and cubitus originating far apart and running subparallel to one another (Fig. 87).....15

13. Dorsum of head between compound eyes with two conspicuous large wax-pore plates [Sexuparae or fall migrants returning to galls] *Mordwilkoja* p. 360
- Dorsum of head between compound eyes without conspicuous large wax-pore plates 14
14. Fourth antennal segment about twice as long as greatest width; antennae of stem mother four-segmented *Pemphigus* p. 363
- Fourth antennal segment about four times as long as greatest width; antennae of stem mother five-segmented *Thecabius* p. 374
15. Stigma of fore wings pointed at apex, its posterior margin concave (Fig. 73); living in pear-shaped or round galls on leaves of sumac *Melaphis* p. 359
- Stigma of fore wings more rounded at apex, its postero-apical margin convex (Fig. 69); living in bag-like galls (Fig. 46) on leaves of elm *Gobaishia* p. 359
16. Antennae with numerous conspicuous hairs; species strictly subterranean, living continuously as far as known on roots of plants 17
- Antennae without hairs or with only a few minute ones; species not subterranean or but partially so, living mostly in pseudo-galls or in dense colonies on branches and leaves 18
17. Sixth antennal segment much longer than fifth; apterous forms with simple setae *Trifidaphis* p. 374
- Sixth antennal segment approximately as long as fifth; apterous forms with peculiarly bent and enlarged setae (Fig. 318) *Geocica* p. 356
18. Fourth antennal segment comparatively short, about one-half (or less) as long as third, usually shorter than basal portion of sixth antennal segment, its length not exceeding five times its greatest width 19
- Fourth antennal segment comparatively long, two-thirds (or more) as long as third, sometimes about as long as basal portion of sixth antennal segment, its length at least eight times its greatest width *Neoprociphilus* p. 361
19. Sixth antennal segment (basal portion plus terminal filament) as long as, or longer than, the fifth; never on elms 20
- Sixth antennal segment (basal portion plus terminal filament) shorter than the fifth; living in curled leaves (Fig. 45) on elms *Georgiaphis* p. 357
20. Fore tibia but slightly longer than width of head through eyes; media of fore wings usually branched but occasionally simple *Asiphum* p. 348
- Fore tibia longer, usually much longer than width of head through eyes; media of fore wings simple 21
21. Distance between wax-pore plates (Fig. 329) of mesonotum subequal to half the greatest diameter of one of them, except *P. imbricator*, in which the stigma is narrow, long, and pointed at apex (Fig. 97); stem mother [fundatrix] with five-segmented antennae; species with aerial forms causing pseudo-galls (Fig. 50), curling leaves, or living in dense colonies and not frequenting poplars *Prociphilus* p. 370
- Wax-pore plates (Fig. 330) of mesonotum separated by more than half the greatest diameter of one of them; stigma short and broad and diagonally truncate at apex (Fig. 98); stem mother [fundatrix] with four segmented antennae; species with aerial forms forming true galls (Fig. 49) and restricted to poplars *Pemphigus* p. 363

GENUS ASIPHUM KOCH

ASIPHUM PSEUDOPYRSA (WALSH)

Byrsocrypta pseudopyrsa Walsh, Proceedings of the Entomological Society of Philadelphia, December, 1862, p. 306.

This species has not been reported from Illinois since it was first described by Walsh (1862) from material taken near Rock Island. It seems probable that this aphid has an alternate host, because the alate forms leave the poplars in spring or early summer. Figures showing structural details and general appearance of adults, as well as appearance of infested leaves, have been published by Gillette (1914), who has also given the best descriptions of the known forms and data concerning their biology. He states: "The young lice all leave the stem-mother gall, which is a small almond-shaped pocket about midway on the midrib of the leaf, very soon after being born, and locate on the under or ventral surface. The larvae locate along the main veins into which they insert their beaks and their bodies soon become snowy white with a dense covering of short wax threads.....All of the second generation lice become winged."

According to statements in literature the media of the fore wings is branched, but our Illinois material shows that the media may sometimes be simple, or not branched. The determination of our specimens has been checked by Mr. A. C. Maxson.

Data associated with our specimens, all collected on *Populus*, are as follows: Galena (June 26), Oakwood (July 18), 1928. There is an alate specimen in the J. J. Davis collection from Chicago, Illinois, August 13, 1908, which is evidently a migrant or drift collected on *Pinus*.

GENUS COLOPHA MONELL

(SUBGENERA COLOPHA MONELL AND COLOPHELLA BÖRNER)

Key to the Species of the Genus Colopha

1. Fore wings with medial vein branched (Fig. 69).....*ulmicola* (Fitch) p. 349
- Fore wings with medial vein not branched (Fig. 64).....*graminis* (Monell) p. 348

COLOPHA GRAMINIS (MONELL)

FIGS. 40, 64, 88

Tetraneura graminis Monell, Canadian Entomologist, Vol. XIV, No. 1, January, 1882, p. 16.

Rhizobius spicatus Hart, Eighteenth Report of the State Entomologist on the Noxious and Beneficial Insects of the State of Illinois. (Text by S. A. Forbes, descriptions by C. A. Hart). March, 1895, p. 104.

This species and the following one is responsible for the curious cockscomb-like galls so common in spring on the upper surface of leaves of elms (Fig. 40). They migrate between elms and the roots of

grasses, the latter being the summer host. *Rhizobius spicatus* Hart (1895) has been placed by Cutright (1925) as the root form of this species, or *Colopha ulmicola* (Fitch), and we have accepted this synonymy. Certainly, *R. spicatus* Hart is the root form of some aerial form common in Illinois, and the cotypes agree in general with the illustrations of the root forms of *graminis* and *ulmicola* given by Patch (1910a). The best summary of the characters and habits of this small aphid is given by Patch (1910a).

Börner (1926) placed this species in the genus *Colophella* and later (1930) reduced *Colophella* to subgeneric rank. We are considering *Colophella* as a subgeneric name, pending the solution of the exact relationship between the species under discussion here and *Colopha ulmicola* (Fitch). As mentioned under the discussion of the latter, we may be dealing with a dimorphic form and hence a single genus. Reducing *Colophella* to subgeneric status may be only a temporary shift, but it will not mislead others into thinking the problem has been solved as the complete abandonment of name *Colophella* (*Tetrancura* authors) might do.

Data associated with our specimens, all taken on elms (*Ulmus fulva* and *americana*), are as follows: Normal (June 30), 1884; Mt. Carroll (June 25), Oregon (June 28), 1928; Hardin (June 25), Homer (June 17), Jonesboro (June 23), Newton (June 17), 1929. The data associated with cotypic specimens of *R. spicatus*, all in poor condition, are as follows: Urbana (April 10 and July 20), 1886, on roots of corn, slides 7653 and 7654; and Tamaroa (Oct. 5), 1893, on roots of corn, slides 7655 and 7656.

COLOPHA ULMICOLA (FITCH)

FIGS. 40, 69

Byrsocrypta ulmicola Fitch, Transactions of the New York State Agricultural Society, Vol. XVIII, 1858 (printed 1859), p. 843.

Like *Colopha* (*Colophella*) *graminis* (Monell), this species produces cockscomb-like galls on the upper surfaces of elm leaves (Fig. 40). These two species can be separated only upon the basis of wing venation, and Patch (1910a) has found some evidence that one may be a dimorphic form of the other. Our present information, however, is too incomplete to permit considering them here as the same species. *C. ulmicola* (Fitch) has been previously recorded from Illinois by Walsh (1862), Middleton (1878), Thomas (1879), Patch (1910a), and Davis (1910d). *Colopha cragrostidis* Middleton (1878), evidently described from Illinois material, has been placed in the synonymy of *C. ulmicola* by several authors, and this is undoubtedly correct.

Data associated with our specimens, all from elms (*Ulmus fulva* and *U. americana*), are as follows: Anna (April 11), 1884; Antioch (June 15), Cave-in-Rock (May 30), Kankakee (June 29), Oakwood (July 8), Starved Rock State Park (June 13), Urbana (July 10), 1928; Oakwood (June 29), Rock Island (July 7), Starved Rock State Park (July 5), Waukegan (July 13), 1929.



Fig. 40. Cockscomb galls on upper surfaces of leaves of the white elm, *Ulmus americana*, caused by *Colopha ulmicola* (Fitch); Oakwood, June 29, 1929. A similar gall is caused by *Colopha graminis* (Monell).

GENUS ERIOSOMA LEACH

Key to the Species of the Genus *Eriosoma*

1. Fifth antennal segment (Fig. 223) usually without well-developed annular secondary sensoria; curling leaves of elm.....
..... *mimica* n. sp. p. 353
- Fifth antennal segment usually with well-developed annular secondary sensoria; curling leaves of elm or closely clustered on branches (Fig. 42), leaves, or bark (Fig. 43) of elm, apple, and hawthorn2
2. Sixth antennal segment usually without annular secondary sensoria; causing a leaf cluster or rosette on terminal twigs of elms [*fundatrigenia*].....*lanigera* (Hausmann) p. 351
- Sixth antennal segment usually with annular secondary sensoria; never causing a leaf cluster; on roots, twigs, or branches, rarely leaves.....3
3. Medial vein of fore wing with point of origin of fork much beyond, or distad of, point of origin of radial sector; forming flocculent colonies on trunk and branches of elms (Fig. 43).....
..... *rileyi* Thomas p. 354
- Medial vein of fore wing with point of origin little, if any, beyond point of origin of radial sector; forming flocculent colonies on trunks, branches, or roots of apple or hawthorn (Fig. 42)4

4. Lining lower sides of branches of hawthorn in dense flocculent colonies (Fig. 42); waxy secretion granular; fourth antennal segment with from six to nine annular secondary sensoria; fifth segment with from five to nine annular secondary sensoria *crataegi* (Oestlund) p. 351
- . On bark, roots, branches, and leaves of apple; waxy secretion consisting of long fine wavy whitish filaments; fourth antennal segment with from three to five annular secondary sensoria; fifth segment with from four to six annular secondary sensoria [sexuparae] *lanigera* (Hausmann) p. 351

ERIOSOMA CRATAEGI (OESTLUND)

FIGS. 41, 92

Schizoneura crataegi Oestlund, Geological and Natural History Survey of Minnesota, Bulletin No. 4, 1887, p. 27.

This species was first reported from Illinois by Davis (1910d), who considered it a "serious pest of hawthorns used in ornamental plantings in Chicago." It has been very abundant on certain *Crataegus* plantings on the University campus at Urbana for the last three years. The lower sides of most branches of these shrubs were lined with a solid mass of aphids, made particularly conspicuous by the large quantity of white flocculent secretion produced (Fig. 41). The life history is not well known, and the species has at times been thought to be the same as *E. lanigerum* (Hausmann)—a view which we think has not been substantiated. The flocculent secretion of *E. lanigerum* is in long, silken, fluffy threads and often a bluish white, whereas in this species the flocculent secretion is more granular, compact, and chalky white in color.

Records associated with specimens of this species, all taken on *Crataegus* sp., are as follows: Odin (Aug. 27), 1888; Catlin (Sept. 27), Urbana (Aug. 2, Sept. 26), 1928; Muncie (Sept. 22), Oakwood (July 22), Starved Rock State Park (July 6), 1929; Chicago (Sept. 20).

ERIOSOMA LANIGERA (HAUSMANN)

FIGS. 158, 221, 225

Aphis lanigera Hausmann, Illiger's "Magazin für Insektenkunde," Vol. I, Braunschweig, 1802, p. 440.

Thomas first reported the woolly apple aphid from Illinois in 1877 under the generic name of *Eriosoma* and later (1879) under *Schizoneura*. It is common in all parts of the state and often is responsible for severe injury to young apple trees. The important discovery that this species migrates to apple in spring and early summer from leaf clusters or leaf rosettes on elm was first brought to general attention by Patch (1912), whose observations have since been confirmed by numerous studies by others. The paper by Baker (1915) presents a very thorough biological and morphological study of this pest.

Data associated with our specimens, all collected from leaf rosettes on elm (*Ulmus*) or bark and twigs of apple (*Pyrus*), are as follows: Antioch (June 15), Cave-in-Rock (May 30), Danville (July 15), Golconda (May 31),



Fig. 41. Characteristic groupings of adults and nymphs of *Eriosoma crataegi* (Oestlund) on hawthorn, *Crataegus*; Urbana, October 2, 1929. Production of large quantities of a white wax secretion makes them very conspicuous

Metropolis (June 1), Oakwood (May 29), Quincy (June 6), Shawneetown (May 27), Starved Rock State Park (June 12), 1928; Decatur (June 12), Elizabethtown (June 20), Hardin (June 25), Newton (June 17), Starved Rock State Park (July 5), 1929; Metropolis (April 17), 1930.

ERIOSOMA MIMICA new species

FIG. 223

ALATE VIVIPAROUS FEMALE

Size and general color.—Average length from vertex to tip of cauda, 1.49. Head and thorax dark dusky brown, abdomen yellowish brown. Cornicles dark brown. Antennae, legs, and beak yellowish brown, considerably lighter in color than head. Stigma of fore wings light dusky, veins the same. Head, thorax, and abdomen lightly pulverulent.

Head and appendages.—Average width of head across eyes, .31. Antennal segments with comparative lengths as follows: III— .23 to .29, average .25; IV— .07 to .10, average .09; V— .07 to .09, average .09; VI— .07 to .09, average .08. Secondary sensoria (Fig. 223) annular and distributed as follows: III— 17 to 24, average 19; IV— 4 to 6, average 5; V— 0 to one; VI— 0 to 1. Fifth and sixth antennal segments without secondary sensoria except sometimes at extreme tips of segments. Primary sensorium on fifth antennal segment annular and sometimes cleft; sensorium on sixth segment ovoid, normal. Beak reaching to mesothoracic coxae.

Thorax and appendages.—Mesothorax with a pair of large, oval wax glands on ventral portion of pleurae. Fore wings with stigma comparatively short and blunt and with radial sector comparatively straight. Hind tibiae .63 in length.

Abdomen.—Cornicles very shallow, ring-like. Anal plate not much wider than the cauda, which extends barely beyond the tip of the abdomen. Wax-pore plates on the abdomen indistinguishable in our preparations.

APTEROUS VIVIPAROUS FEMALE

Size and general color.—Length from vertex to tip of cauda, 1.73. Head, thorax and abdomen uniformly yellowish brown. Antennae slightly lighter than body with fifth and sixth segment slightly darker. Legs slightly darker than body, with the coxae and femora slightly darker than the tibiae and tarsi. Beak yellowish brown with the extreme tip darkest.

Head and appendages.—Average width of head across eyes, .40. Antennal segments with the following comparative lengths: III— .24; IV— .10; V— .09; VI— .09. Apparently both primary and secondary sensoria are absent. Antennae almost smooth, only slightly wrinkled, with a few scattered, fine hairs.

Thorax and abdomen.—Pro-, meso-, and metathoracic segments with large ovate wax-pore plates on the lateral margins. Abdomen with five pairs of wax-pore plates on the lateral margins anterior to cornicles similar to those found on thorax; posterior to cornicles are two very large wax-pore plates which extend across the posterior portion of the abdomen as two transverse bands, one just anterior to base of cauda, the other extending along the extreme posterior portion of the abdomen. Cauda not extending beyond tip of abdomen. Anal plate a little broader than cauda.

Holotype.—Alate viviparous female; Mt. Carroll, Illinois, June 25, 1928, on *Ulmus fulva*, (Frison and Hottes). On slide with paratype apterous and alate viviparous females and pupa. Slide No. 5538. *Morphotype.*—Apterous viviparous female; same data as holotype. Slide No. 5539. *Paratypes.*—Five slides, containing alate and apterous viviparous females and pupae, collected in Illinois on *Ulmus fulva*, by T. H. Frison and F. C. Hottes, at Mt. Carroll, June 25, and Kankakee, June 29, 1928. Slides Nos. 5537, 5540-5542 and one other unnumbered.

This species resembles *E. ulmi* (Linnaeus) in the reduced number, or entire lack, of secondary sensoria on the fifth and sixth antennal segments. It differs from the spring migrants of that species, as figured by

Patch (1913b) and Theobald (1929), in having much shorter antennae, about one-half as many secondary sensoria on the third antennal segment, and the third antennal segment not conspicuously exceeding the combined length of the fourth, fifth, and sixth segments. This species was declared to be new by Mr. A. C. Maxson to whom it was sent questionably determined as *ulmi*. We have no exact information as to the gall from which this species came, but we believe it caused a curling of the leaf of its host, the red elm (*Ulmus fulva*).

ERIOSOMA RILEYI THOMAS

FIG. 42

Eriosoma ulmi Riley, First Annual Report on the Noxious, Beneficial and other Insects of the State of Missouri, 1869, p. 123. Name preoccupied.
Eriosoma rileyi Thomas, Transactions of the Illinois State Horticultural Society, Vol. X, new series, 1876 (1877), p. 191. New name. Spelling of *Rilepi* a lapsus calami.

This species was originally described by Riley (1869) under the name of *Eriosoma ulmi*. Thomas (1877), recognizing that the specific name for this distinct species was preoccupied by *ulmi* Linnaeus, gave it the new name of *rileyi*. Through a typographical error the name was first spelled as *Rilepi*, but this is an evident lapsus calami because Thomas stated that he "named it after the original describer" and subsequently (1879) spelled the name as *rileyi*. It is a bark-feeding species (Fig. 42) and at times has been considered as a form of *E. lanigera* (Hausmann). The studies of Patch (1913b) indicate it passes its entire life cycle on elm and is a distinct species. Mordvilko (1924) states, "All living *Eriosomae* are inevitably attached to *Ulmus*, which means that they made their appearance and performed their evolution together with *Ulmus*, having originally been monophagous, as for instance the living *Eriosoma rileyi* Thomas in North America or *E. patchiae* Börner in the Mediterranean region."

Data associated with our specimens, all collected on the red or slippery elm (*Ulmus fulva*), are as follows: Champaign (June 8), Urbana (Oct. 22), 1928; Urbana (July 2), 1929.

GENUS FORDA HEYDEN

The American forms of this genus are not known to form galls and apparently live a wholly subterranean existence. Mordvilko (1928a) has shown, however, that *Forda trivalis* in Eurasia may develop in galls on leaves of *Pistacia*.

Key to the Species of the Genus Forda

1. Antennae of alate female with third segment much longer than length of fourth and fifth segments together, with about thirty secondary sensoria; apterous forms with numerous setae about as long as width of third antennal segment. *occidentalis* Hart p. 356
- Antennae of alate female with third scarcely longer than length of fourth and fifth segments together, with about twenty-four or less secondary sensoria; apterous forms with a few setae much less in length than width of third antennal segment. *olivacea* Rohwer p. 356



Fig. 42. Adults and nymphs of *Eriosoma rileyi* Thomas on the slippery elm, *Ulmus fulva*; Urbana, July 2, 1929. Clusters of the aphids most abundant at scars where branches were pruned.

FORDA OCCIDENTALIS HART

Forda occidentalis Hart, Eighteenth Report of the State Entomologist on the Noxious and Beneficial Insects of the State of Illinois, Springfield, March 4, 1895, p. 85.

Hart described this species from specimens collected in Illinois on the roots of shepherd's-purse (*Capsella Bursa-pastoris*), blue-grass, and corn. Only a few specimens of the original typic material remain and these are in very poor condition but still indicate the generic affinities of the species and show that it has setiferous antennae in the apterous forms. Gillette (1918) has placed this species in the synonymy of *F. formicaria* Heyden, but Theobald (1929) says this is in error. Maxson states in a letter to us that this species is unknown to him and comes nearest to *formicaria* Heyden. According to the observations of Hart (1895) and Gillette (1918), this species apparently passes its entire life cycle on the roots of grasses and is usually attended by ants.

Data associated with specimens in the Survey collection are as follows: Champaign (April 28—*lectotypic* slide, No. 7650), Urbana (April 4—*paratypic* slide, No. 7652, and April 10—*paratypic* slides, Nos. 7651 and 3170), 1894.

FORDA OLIVACEA ROHWER

Forda olivacea Rohwer, Psyche, Vol. XV, August, 1908, p. 68.

This species is recorded from Illinois for the first time. Our specimens were determined by Mr. A. C. Maxson. Most of the information that is available concerning the biology of this root-feeding species is contained in the article by Gillette (1918).

Data associated with our specimens are as follows: Danville (Sept. 18), Logan County (May 16), Oakwood (May 16), Urbana (June 10), 1928; Urbana, Brownfield woods (March 25), 1929. Collected on roots of grass, oats, and wheat.

GENUS GEOICA HART

GEOICA SQUAMOSA HART

FIGS. 43, 317, 318

Geoica squamosa Hart, Eighteenth Report of the State Entomologist on the Noxious and Beneficial Insects of the State of Illinois, Springfield, March 4, 1895, p. 102.

This root-feeding species (Fig. 43), originally described from Illinois material, is readily determined by its peculiar setae, which are bent and enlarged (Figs. 317, 318). Hart (1895) gives the best account of its habits. He found it often attended by ants. He reported it as a minor pest of corn and also recorded it from the roots of grasses, weeds, and clover. Apparently its entire active life cycle is spent on the roots of its various hosts, the eggs being kept by ants during the winter.

Mordvilko (1928a) described the genus *Pemphigetum*, with *muticae* Mordvilko as type, from material collected in Turkestan on *Pistacia*.

Later in the same year Mordvilko sunk *Pemphigetum* as a synonym of *Geoica* Hart and stated that *squamosa* Hart is a synonym of *utricularia* (Pass.). In view of the number of species of *Geoica* recognized by Theobald (1929), and the possibility of *squamosa* not being synonymous with *utricularia*, we are retaining the name of the former. If *squamosa* and *utricularia* are synonymous, then the former is certainly anolocyclic in North America.

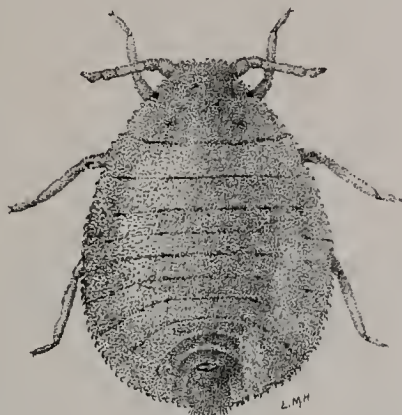


Fig. 43. Apterous viviparous female of a subterranean plant louse, *Geoica squamosa* Hart. (After Forbes and Hart: Ill. Ent. Rep. 18.)

Data associated with our specimens, mostly belonging to the typic series, are as follows: Normal (June 1, 6, Nov. 24), 1883; Normal (April 1, June 13, July 28, Nov. 19), 1884; Urbana (May 25, July 14, Aug. 11), 1885; Champaign (Feb. 26, Oct. 28), Normal (May 21), Urbana (May 21, 24, 29, Oct. 28), 1886; Champaign (April 19, Oct. 20), Urbana (May 7, 19, 31, June 1), 1887; Champaign (May 19), Urbana (May 9), 1888; Urbana (Nov. 24), 1890; Urbana (March 26), 1892; Champaign (April 26), Normal (April 1), Urbana (March 21, 23, April 4, 10, 12, May 12-14), 1894; Urbana (September 16), 1898; Buda (May 28), Oneida (May 27), 1901; Clayton (June 21), 1929; Humboldt (Nov. 12), 1930. The *lectotypic* slide is number 3164 (Frison, 1927). Paratype slide numbers are as follows: 3161-3169, 3172-3173, and 7661-7675.

GENUS GEORGIAPHIS MAXSON AND HOTTES

GEORGIAPHIS ULMI (WILSON)

FIGS. 44, 226

Georgia ulmi Wilson, Canadian Entomologist, Vol. XLIII, No. 2, February, 1911, p. 64.

Georgia gillettei Maxson and Hottes, Entomological News, Vol. XXXVII, No. 5, May, 1926, p. 130. *New synonymy*.

This species, not previously recorded from Illinois, has been taken from various localities over the entire state. It produces a leaf-curl (Fig. 44) on slippery elm (*Ulmus fulva*), which is similar to that of *Eriosoma americana* Riley. On certain trees in Urbana, *Georgiaphis*

ulmi produces a very heavy infestation every year, and has in the course of time markedly stunted their growth and sapped their vitality. At the time of the production of the sexual forms, some of these heavily infested trees produce so many winged lice that large piles of them accumulate under the trees. This species has been taken only on *Ulmus fulva* and *Ulmus alata*, and our records indicate that the entire life cycle is passed on the one host.

A large series of specimens shows that this species is very variable in regard to certain structural characters which have been used in the past to separate *G. ulmi* and *G. gillettei*. In fact, there is such great variation that we believe that in Illinois there is only one good



Fig. 44. An elm leaf curl caused by *Georgiaphis ulmi* (Wilson) on the slippery elm, *Ulmus fulva*; Urbana, June 10, 1929.

species in the genus, and that *gillettei* is only a variation of *ulmi*. Mr. A. C. Maxson has studied our material and says in correspondence on the matter: "I am beginning to fear that there is but one species of *Georgiaphis*, in which case *gillettei* would become of synonym of *ulmi*."

Records of this species in our collection are as follows: Urbana (June 14), 1885; Berwyn (June 15), Carbondale (June 4), East Dubuque (June 25), Herod (May 29), Mt. Carmel (May 26), Oakwood (June 17), Oregon (June 27), Pekin (June 20), Urbana (May 22, June 11 and 14), 1928; Urbana (June 4 and 11), 1929. Sexual forms have been taken at Urbana during the first two weeks of June.

GENUS GOBAISHIA MATSUMURA

GOBAISHIA ULMI-FUSUS (WALSH AND RILEY)

FIG. 45. 87

Pemphigus ulmi-fusus Walsh and Riley, American Entomologist, Vol. I, No. 6, February, 1869, p. 109.

This species was originally described from New York and "South Illinois" in a foot-note by Walsh and Riley (1869). Since then it has been recorded again from LeRoy and Urbana, Illinois, by Davis (1910d), and by Gronemann (1930) from the Chicago area (actual



Fig. 45. Pouch-like gall of *Gobaisha ulmi-fusus* (Walsh) on upper surfaces of leaves of the slippery elm, *Ulmus fulva*; Jonesboro, June 23, 1929.

specimens from Elgin). The large conspicuous bag-like gall (Fig. 45) is found on the upper side of the leaf of the slippery or red elm. The best account of this insect, together with descriptions and figures of structural details of adults, is that given by Patch (1910a).

The data associated with our Illinois specimens, all collected on *Ulmus fulva*, are as follows: Urbana (June 27), 1887; Tonti (June 12), 1888; Elgin (June 23), 1925; Jonesboro (June 23), 1929.

GENUS MELAPHIS WALSH

MELAPHIS RHOIS (FITCH)

FIG. 73

Byrsocrypta rhois Fitch, Journal New York Agricultural Society, Vol. XVI, August, 1866, p. 73.

This species, rare in Illinois, causes a small sac-like gall on the upper surface of the leaves of sumach (*Rhus* sp.). It was included among the species listed by Thomas (1879) but was not definitely recorded by him from Illinois. Walsh (1869) mentions this species

as occurring both in "Illinois and New York." Baker (1919a) has described a *Mcclaphis*, called *minutus*, collected on moss, May 5, 1916, at Springfield, West Virginia, and suggests that there is a remote possibility of his *minutus* being the spring forms of *rhois*.

This species was not taken by us during our work of the past three years, but there are specimens in the Survey collection which were found on sumach (*Rhus*) at Milan, Illinois, August 16, 1885.

GENUS MORDWILKOJA DEL GUERCIO

MORDWILKOJA VAGABUNDA (WALSH)

FIG. 46

Byrsocrypta vagabunda Walsh, Proceedings of the Entomological Society, of Philadelphia, Vol. I, December, 1862, p. 306.

This species was originally described by Walsh from fall migrants collected at Rock Island, Illinois. The galls caused by this plant louse are large, irregular, bladder-like growths (Fig. 46) on the terminal twigs of poplars. The life history of this migratory aphid is particularly interesting because the sexuparae, or fall migrants, have been

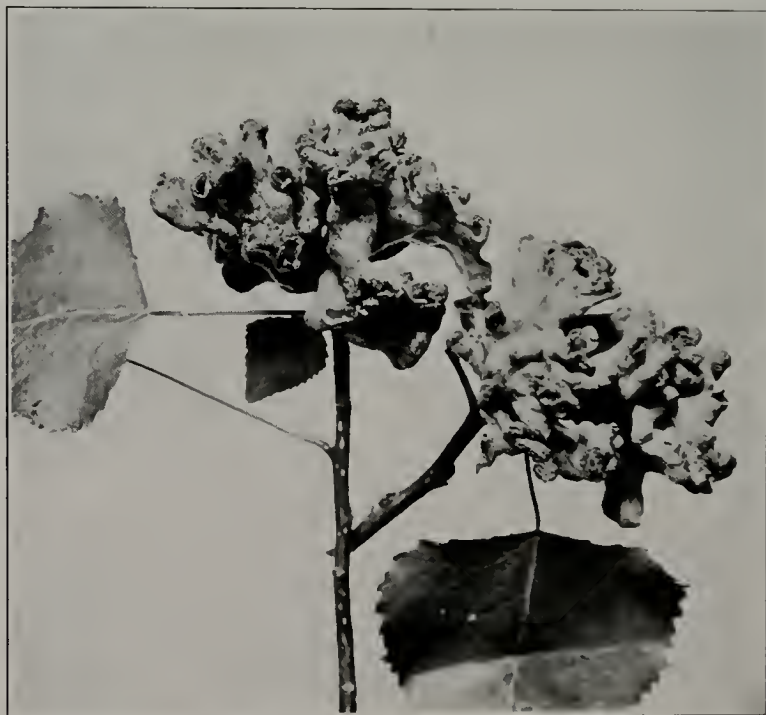


Fig. 46. A curious malformation of buds of the poplar, *Populus deltoides*, caused by a plant louse, *Mordwilkoja vagabunda* (Walsh); Savanna, July 9, 1929.

shown by Oestlund and Hottes (1926) to return from an unknown summer host to the galls formed on poplars by their ancestors in spring or early summer, i. e., by forms which preceded them by three to six generations. The finding of the return fall migrants, as well as sexual forms and eggs, in old galls on poplars at Willow Springs, Illinois, on November 5, 1930, shows that in Illinois the life history of this species is identical with that as described by Oestlund and Hottes (1926) for Minnesota. The summer host is still unknown.

In view of the fact that this species was originally described from fall migrants from Illinois by Walsh, and the types are lost, Slide No. 9744 of fall migrants in the collection of the Illinois State Natural History Survey has been selected as the *neotypic* slide.

Data associated with our Illinois specimens, all collected on *Populus deltoides*, are as follows: Urbana (July 14), 1885; Shawneetown (June 26), 1909; Beach (June 17-galls), 1928; Beach (July 13), Savanna (July 9), 1929; Charleston (December 14-galls), DesPlaines (July 10-galls), East Peoria (December 3-galls), Palos Park (Feb. 11-galls and eggs), Willow Springs (Nov. 5-galls, sexuparae, sexual forms, and eggs), 1930; Atlanta (Feb. 24), Bondville (Jan. 28-galls), Decatur (Jan. 28-galls), Funks Grove (Feb. 24), Harrisburg (April 4), McLean (Feb. 24), Marshall (March 8), Metropolis (April 4), Muncie (Jan. 25-galls), Odell (Feb. 24), Paris (March 8), Pontiac (Feb. 24), Silvis (April 11), West Union (March 8), Williamsville (Feb. 24), Wilmington (Feb. 24), 1931. Davis (1910) records this species from Chicago and Kankakee. A common species in certain parts of northern Illinois, but uncommon throughout most of central and southern Illinois.

GENUS NEOPROCIPHILUS PATCH

Key to the Species of the Genus Neoprociphilus

1. Secondary sensoria present on third, fourth, and fifth antennal segments..... **attenuatus** (Osborn & Serrine) p. 362
- Secondary sensoria restricted to third antennal segment.....
..... **aceris** (Monell) p. 361

NEOPROCIPHILUS ACERIS (MONELL)

Pemphigus aceris Monell, Canadian Entomologist, Vol. XIV, No. 1, January, 1882, p. 16.

Peoria, Illinois, is the locality from which came the cotypic specimens described by Monell (1882). The species has not again been recorded from the state until now. The information in literature concerning this aphid is meagre. On the basis of our observations concerning the biology of *N. attenuatus*, the distribution of *N. attenuatus* and *N. aceris* in Illinois, and their agreement in certain characters which are not found in other forms, we are inclined to believe that the two represent the same species—a case paralleling that of *Prociphilus tessellata* Fitch. (See following account of *N. attenuatus*.)

Mr. A. C. Maxson has checked the determination of some of our slides of this species.

Data associated with our viviparous specimens are as follows: Herod (May 29), Paris (Aug. 2), Starved Rock State Park (June 12), Urbana (Aug. 8), 1928; Homer (June 29), Rock Island (July 9), 1929. All specimens collected on plants taken on hard maple (*Acer saccharum*), except a single alate viviparous female on *Smilax rotundifolia* at Starved Rock State Park (June 12). Alates flying at Urbana (Aug. 8) and at Starved Rock State Park (June 12).



Fig. 47. Apterous viviparous females of *Neoprociphilus attenuatus* (Osborn and Serrine) clustered on lower side of stems of the smilax, *Smilax rotundifolia*; Urbana, November 4, 1929.

NEOPROCIPHILUS ATTENUATUS
(OSBORN & SERRINE)

FIG. 47

Pemphigus attenuatus Osborn and Serrine, Proceedings of the Iowa Academy of Sciences for 1892, Vol. I, part 3, (printed 1893), p. 100.

This species (Fig. 47) is here recorded for the first time from Illinois. We have discovered that at Urbana the nymphs can successfully pass the winter under leaves at the base of the *Smilax* vines on which they were produced. The life history of this species, as observed at Urbana (Frison and Ross), is as follows: continuation of species on infested *Smilax* for several successive years; development of apterous viviparous females in spring and early summer from hibernating nymphs; production of alate viviparous females in latter part of August, which migrate; production of nymphs which hibernate by the apterous females produced in late summer and fall. Just what becomes of the alate viviparous females which leave the *Smilax* in late summer has not been definitely ascertained, but they certainly either migrate to other *Smilax* vines, or an alternate host, to produce the sexual forms.

In some ways—the hibernating of the nymphs—the life history is suggestive of *Prociphilus tessellata* (Fitch). Patch (1912a) has figured the beakless oviparous female and best described the alate and apterous viviparous females. Miss Patch informs us, in answer to our query concerning this point, that these oviparous females may have been produced by the alate viviparous females after being caught and she has no definite evidence they were collected on *Smilax*. Since we have been unable to find the sexual forms on *Smilax*, we believe they are pro-

duced elsewhere and that *N. accris* (Monell) may be another form of this species and the maple the primary host (see account of *N. accris*).

The genus *Neoprociphilus* has been characterized as being without cornicles, but cornicles are very much in evidence in the over-wintering nymphs.

Data associated with our specimens, collected on *Smilax rotundifolia*, are as follows: Rock Island (June 24), 1928; Decatur (Oct. 5), Starved Rock State Park (Aug. 14), Urbana (Oct. 18, Nov. 7), 1929; Urbana (Feb. 15, Mar. 16, Apr. 4, May 3, 12, June 18, Aug. 25 and Sept. 18), 1930.

GENUS PEMPHIGUS HARTIG

Key to the Species of the Genus Pemphigus

1. Greatest diameter of fourth antennal segment not distinctly less than that of fifth antennal segment.....2
- Greatest diameter of fourth antennal segment distinctly less than that of fifth antennal segment; a large, membranous, irregularly shaped sensorium on distal half of both fifth and sixth antennal segments, these sensoria normally with small, more heavily chitinized, island-like areas bearing one or more setae (Fig. 240); from gall on petiole of poplar leaf, mature aphids escaping through a transverse slit (Fig. 49).....
.....[fundatrigeniae] *populi-transversus* Riley p. 367
2. Sixth antennal segment never with annular secondary sensoria.....3
- Sixth antennal segment always with annular secondary sensoria.....6
3. Sensorium on distal end of fifth antennal segment large and normally with a small, more heavily chitinized, island-like area in membranous area (Fig. 241); on roots of *Cruciferae*.....
.....[sexuparae] *populi-transversus* Riley p. 367
and
rubi Thomas p. 368
- Sensorium on distal end of fifth antennal segment small and without an island-like area in membranous area.....4
4. Fifth antennal segment without secondary sensoria.....5
- Fifth antennal segment with secondary sensoria (Fig. 229); on roots of birch.....[sexuparae] *ephemeratus* n. sp. p. 365
5. Fifth antennal segment about twice as long as greatest width and about as long as second antennal segment (Fig. 228); on roots of *Solidago*, *Erigeron*, etc...[sexuparae] *brevicornis* Hart p. 363
- Fifth antennal segment elongate, about three times as long as greatest width and conspicuously longer than second antennal segment (Fig. 227); on roots of *Bidens*.....
.....[sexuparae] *tartareus* n. sp. p. 369
6. Fourth antennal segment with from one to three, rarely four, secondary sensoria; from cockscomb-like gall on upper surface of poplar leaf.....[fundatrigeniae] *populi-venae* Fitch p. 368
- Fourth antennal segment usually with four or more secondary sensoria; from gall on petiole of poplar leaf, mature aphids escaping through a semi-circular curved slit.....
.....[fundatrigeniae] *populicaulis* Fitch p. 366

PEMPHIGUS BREVICORNIS (HART)

FIG. 228

Tychea brevicornis Hart, Eighteenth Report of the State Entomologist on the Noxious and Beneficial Insects of the State of Illinois, March 4, 1895, p. 97.

Ever since the original description in 1895 of *Tychea brevicornis* Hart, the relationships of this form have been in doubt. Collections

of root-frequenting aphids made during the fall of 1930 have proved, however, that this plant louse is a very common species on roots of *Erigeron*, *Solidago*, etc., in Illinois and that it belongs to the genus *Pemphigus* as Cutright (1925) has placed it. Our information to date indicates, too, that many or most of the sexuparae reach maturity before the ground is completely frozen and that they leave the soil for an alternate host. Those sexuparae that fail to leave the soil before it is frozen remain there during the winter and then in early spring probably fly to the alternate host.

Although predictions are hazardous, we believe that the forms now called *brevicornis* Hart will eventually be found to be the sexuparae of *populicaulis* Fitch, the latter name having priority. Only one other species of *Pemphigus* (*populi-transversus* Riley) approaches the abundance of *populicaulis* Fitch in Illinois, and the sexuparae of it have been made known by the excellent studies of Jones and Gillette (1918). The distribution and abundance of *brevicornis* Hart indicate that, if it has an alternate host, the gall which it forms on this host must be a common one; thus indicating by circumstantial evidence the gall of *populicaulis* Fitch. As already mentioned, the presence of numerous winged sexuparae in fall, the abdomens of which contain sexual forms, is indicative of an alternate host. Again, we have found in November in localities where *brevicornis* was abundant on roots, the sexuparae of a *Pemphigus*, inseparable from *brevicornis* Hart, in cracks in the bark and in scars on the trunk and branches of *Populus deltoides*. Associated with these sexuparae we have found the sexual forms and eggs, and later (June) the galls of *populicaulis*.

Little mention has been made in literature of *brevicornis* Hart since the original description. Its assignment to *Tycheoides cragrostidis* Pass. by Theobald (1929) is obviously incorrect because *brevicornis* is a true *Pemphigus*. Although Cutright (1925) has sunk *brevicornis* as a synonym of *lactucae* Fitch, for the present we have not accepted this synonymy because of the possibility of the latter being some other species. If Cutright's synonymy is correct, and if our supposition about *populicaulis* is correct, the name of *lactucae* Fitch (1859) will have priority over both other names. In any case, it seems that the name *brevicornis* is doomed to synonymy as are most names applied to sexuparae.

Since there is no detailed description of the alate sexupara in literature, the following is given:

ALATE SEXUPARAE

Size and general color.—Length from head to tip of anal plate, 1.70. Color of body, antennae, and legs dark brown, except abdomen, which is green. Wings almost hyaline, very slightly infuscate with gray; veins and stigma grayish brown.

Head and appendages.—Average width of head across eyes, .36. Comparative lengths as follows: III— .16 to .23, average .18; IV— .07 to .11, average .09; V— .06 to .11, average .08; VI— .11 to .14, average .12 plus .03. Sensoria (Fig. 228) present on third and fourth segments, numbering 5 to 6, average 7, on third, and 1 to 4, average 2, on fourth. Third segment with a spine-like process near base. Fourth and fifth segments imbricated, each with an oval primary sensorium without chitinous islands.

Thorax and abdomen.—The pair of wax-pore plates on mesonotum oblique and oval, separated by slightly more than their greatest diameter (length), sometimes more nearly round and farther apart. Wax-pore plates on abdomen similar to those described for *P. tartareus*.

Data associated with our recent collections on roots of *Erigeron* and *Solidago* are as follows. Normal (July 28), 1884; Champaign (October 25), 1886; Beardstown (November 7), Effingham (November 13), Flora (November 13), Golconda (November 27), Herod (November 27), Oakwood (October 22), Watson (November 13), Willow Springs (November 4), 1930. Forms inseparable from the true *breviceornis* Hart have been collected in Illinois from crevices on trunks and branches of *Populus deltoides* as follows: Golconda (November 27) and Watson (November 13), 1930. Males, oviparous females, and eggs were found associated with dead alate sexuparae from Watson on November 13.

The cotypic slides (3171, 7659, 7666) are from Normal, Illinois, July 28, 1884, on corn roots, and Champaign, Illinois, October 25, 1886, in ant nest.

PEMPHIGUS EPHEMERATUS new species

ALATE VIVIPAROUS FEMALE (SEXUPARA)

Size and general color.—Average length from vertex to tip of cauda, 2.25. In life entire body with a downy wax coating. Specimens preserved on slide with head and thorax dark brown, abdomen yellowish-brown with seven small brownish lateral patches serially arranged. Antennae and beak concolorous with head or slightly lighter. Legs concolorous with antennae, slightly lighter than thorax, almost uniformly brown, tibiae sometimes slightly darker than femora. Stigma with posterior portion darkest, posterior dark portion extending to base of wings; veins very light bordered with light fuscous bands; posterior margin of wing brownish near junction with anal vein.

Head and appendages.—Average width of head across eyes, .49. Antennal segments with the following comparative lengths: III— .17 to .21, average .19; IV— .11 to .13, average .12; V— .14 to .17, average .15; VI— .14 to .19, average .17 plus .03 to .06, average .05. Coefficient of antennal segment VI— $1.19 \pm$; antennal coefficient $0.72 \pm$ (Maxson's formulae). Secondary sensoria (Fig. 229) present on third, fourth, and fifth antennal segments, numbering as follows: III— 5 to 9, average 7; IV— 2 to 5, average 3; V— 2 to 5, average 3. Secondary sensoria of the transverse type varying greatly in length and width, but never longer than the diameter of the segment and always in a straight row. Primary sensorium on the sixth antennal segment without marginal sensoria. Third antennal segment with spine-like process on its inner side near base of segment (Fig. 229). The beak just fails to reach the mesothoracic coxae.

Thorax and appendages.—Prothorax with two transverse, narrow wax-pore plates on the dorsum, one on each side of the meson. Mesothorax with two oblique, elliptical wax-pore plates on dorsum, separated by a distance about equal to their length and with two large oval wax-pore plates on the venter, situated immediately cephalad of the mesocoxae on the anterior-mesal angle of the pleuron. Hind tarsi about twice as long as the fourth antennal segment. Veins of fore wing ending a considerable distance before margin of wing; some fore wings with a sub-costal border.

Abdomen.—Cornicles apparently absent. Dorsal wax-pore plates apparently lacking or, if present, very indistinct; six large wax-pore plates situated on lateral margins of abdomen; a larger median wax-pore plate present just anterior to the cauda. Cauda normal in shape.

APTEROUS VIVIPAROUS FEMALE (VIRGOGENIA)

Size and general color.—Average length from vertex to tip of anal plate, 2.4. General color of body light yellowish-brown, except as follows: antennae and anterior portion of head greyish-brown; mouthparts, legs, and pleural plates brown; tibiae slightly darker than the femora, as in the alate viviparous female.

Head and appendages.—Average length of head across eyes, .43. Antennal segments with comparative lengths as follows: III— .10 to .13, average .11; IV— .04 to .06, average .05; V— .09 to .10, VI— .13 to .17, average .15 plus .03 to .04, average .04. Third and fourth antennal segments cylindrical, of almost uniform width, faintly imbricated, and without sensoria; the division between them often indistinct, represented only by a narrow contraction of the integument. Fifth segment faintly imbricate, distinctly cuneate, its diameter near apex twice that at base; apex with a circular primary sensorium fringed with hairs, subequal to sensorium on sixth segment. Sixth segment slightly imbricate, including the terminal filament longer than segments three and four together; the terminal filament distinctly defined, bearing at its apex a group of four or five short, stout spines; the single primary sensorium small, circular and fringed with hairs, its diameter subequal to that of the terminal filament. Eye small, composed of three bulging facets. Beak reaching just beyond middle coxae.

Thorax and abdomen.—Lengths of front legs average as follows: femur .51, tibia .45, tarsus .18, claw .06; middle leg with femur .49, tibia .44, tarsus .18, and claw .06; hind leg with femur .68, tibia .70, tarsus .22, and claw .06. Femora smooth and bare, tibiae with scattered short spines. Cauda and anal plate broad and gently rounded.

Holotype.—Alate viviparous female (sexupara); Herod, Illinois, October 12, 1928, on roots, probably *Betula nigra*. (Frison and Hottes). On slide with a pupa. Slide No. 10773. *Morphotype.*—Apterous viviparous female; same data as holotype. On slide with alate viviparous females, pupae, and nymphs. Slide No. 10774. *Paratypes.*—Twelve slides of alate (sexuparae) and apterous viviparous females, pupae, and nymphs with the same data as holotype, two slides of apterous viviparous females with same data except date of November 27, 1930 (Frison and Ross). Slides Nos. 10775-10785 and others unnumbered.

This species was collected on fine moss-like rootlets of *Betula nigra* where these had been exposed by erosion along the bank of a small stream. The situation at the time was quite damp and dark, due to the previous high water and the slightly overhanging bank. It may be the fall migrant of an already described *Pemphigus*, but the situation and apparently unusual host add greatly to the possibility of its being entirely new. It is described with the hope that after its recognition others will interest themselves in investigating its life cycle. It differs from all other related species known to us by the combination of characters given in the key to the species of *Pemphigus*.

PEMPHIGUS POPULICAILIS Fitch

Pemphigus populicailis Fitch, Transactions of the New York State Agricultural Society, Vol. XVIII, 1858 (printed 1859), p. 845.

This plant louse has been previously recorded from Illinois by Walsh (1862), LeBaron (1873), Thomas (1879), and Davis (1910d). It causes a gall at the base of the leaves of poplar somewhat similar to *P. populi-transversus* except that opening is a semi-circular curved slit. Under a discussion of *P. brevicornis* Hart we have already advanced our supposition that *populicailis* is the aerial and gall-making form of the root-feeding plant louse described as *brevicornis* Hart, and the nomenclatorial changes that must result if this theory is substantiated.

Data associated with our specimens collected in galls on species of *Populus* are as follows: Champaign (July 16), 1885; Albion (May 26). Cave-in-Rock (May 30), Oakwood (July 18), Shawneetown (May 27). Ur-

bana (July 10), 1928; Eldorado (June 19), Elizabethtown (June 20), Kansas (June 17), Oakwood (June 1), Rock Island (July 7), Starved Rock State Park (July 5), 1929; Seymour (June 20), 1930.

PEMPHIGUS POPULI-TRANSVERSUS RILEY

FIGS. 48, 98, 240, 241, 330

Pemphigus populi-transversus Riley, Bulletin of the United States Geological and Geographical Survey of the Territories, Vol. V, No. 1, January 22, 1879, Article I, Part I, p. 15.

The details of the life history of this species are very well known because of the studies of Jones and Gillette (1918), who have shown that it alternates between poplars and the roots of various cruciferous plants. The winged migrants (fundatrigeniae) leave the galls (Fig.



Fig. 48. Leaf petiole gall on the poplar, *Populus deltoides*, caused by the migratory plant louse, *Pemphigus populi-transversus* Riley; Oakwood, July 22, 1929. The winged adults leave the gall through the transverse slit.

48) on poplars in spring or summer and fly to cruciferous plants, where the sexuparae are eventually produced. The latter return to the trunks and branches of poplars in spring and produce the sexual forms which produce eggs from which the stem mothers hatch. The stem mothers start the galls, each of which produces a large number of winged females or migrants.

We have been unable to separate the cotypic specimens of *P. rubi* Thomas (1879), which are sexuparae, from sexuparae of *P. populi-transversus* Riley. The similarity in their antennae, which are quite

different from the antennae of other sexuparae taken in Illinois, seems to us quite indicative that they are the same species.

Data associated with our Illinois material on *Populus* are as follows: Danville (Sept. 18), Elizabethtown (October 12), Golconda (October 13), Havana (June 21), Mahomet (October 2), Mt. Carmel (May 26), Pekin (July 22), 1928; Farmer City (September 22), Herod (Sept. 27), Oakwood (October 13), Starved Rock State Park (July 5), 1929; Fairmount (September 28), Watson (Nov. 13), 1930.

In addition, the sexuparae have been taken on roots of *Lepidium virginicum* at Mt. Carmel on May 26, 1928. Previously recorded from Illinois by Davis (1910) and Gronemann (1930).

PEMPHIGUS POPULI-VENAE FITCH

FIG. 94

Pemphigus populi-venae Fitch, Transactions of the New York State Agricultural Society, Vol. XVIII, 1858 (printed 1859), p. 851.

Thomas (1879), in the "Eighth Report of the State Entomologist of Illinois," lists a species of *Pemphigus* under this name but without definitely recording it from Illinois. This species has been rarely recorded in literature, and the only detailed description of its forms is that by Maxson and Knowlton (1929).

Our record establishing the occurrence of this species in Illinois is based upon the finding of the characteristic cockscomb-like galls upon the upper surfaces of leaves of *Populus deltoides* at Watson, Illinois, on November 13, 1930 (Frison and Ross).

PEMPHIGUS RUBI THOMAS

Pemphigus rubi Thomas, Eighth Report of the State Entomologist on the Noxious and Beneficial Insects of the State of Illinois, 1879, p. 147.

As mentioned in our remarks concerning *P. populi-transversus* Riley, we are unable to separate the cotypic specimens of *rubi* Thomas, which are sexuparae, from the sexuparae of the former and believe that they are the same. Only the slight possibility of their being two different species of *Pemphigus* with similar sexuparae has prevented us from sinking one of the names in synonymy at this time. If later investigations prove these to be the same, the name of *populi-transversus* Riley will have priority.

The statement of Jackson (1907), that this species "causes a curling and twisting of the leaves" of raspberry, is evidently without foundation. Jackson himself states he is not familiar with this species, and a check of all references known to us does not reveal such a statement by others. Even Thomas, when he described *rubi*, stated that "it is possible that these specimens were accidentally on the raspberry."

The cotypic slides, numbers 2767 and 2768, are alate viviparous females (sexuparae) collected at Carbondale, Illinois, April 12, 1878, on raspberry, by G. H. French.

PEMPHIGUS TARTAREUS new species

FIG. 227.

ALATE VIVIPAROUS FEMALE (FALL MIGRANT OR SEXUPARA)

Size and general color.—Average length from vertex to tip of cauda, 2.38. Head, antennae, beak, thorax, and legs, dark brown, with sutures paler. Abdomen pulverulent, pale whitish green, with spiracles, anal plate, and wax-pore plates greenish or brownish. Wings slightly infusate with brownish; front wings with costa, subcosta, stigma and posterior margin of wing in vicinity of anal vein deeply infusate with brownish, remaining veins paler; hind wings with veins still paler.

Head and appendages.—Average width of head across eyes, .41. Antennal segments with comparative lengths as follows: III— .21 to .24, average .22; IV— .11 to .13, average .13; V— .10 to .14, average .12; VI— .14 to .19, average .16 plus .04. Coefficients determined according to Maxson's formulae are as follows: antennal coefficient, 0.825; and coefficient of sixth antennal segment, 0.909. Secondary sensoria (Fig. 227) restricted to third and fourth antennal segments, linear-oval, with their margins wrinkled, arranged in a straight row on the dorsal side of the segment and numbering from 5 to 7, average 6, on the third segment, and 2 to 3, average 2.5, on the fourth. The third segment may have two or three small, round to oval, lateral sensoria. Primary sensorium on sixth antennal segment apparently without marginal sensoria. Third antennal segment with a very small, spine-like process on its inner side near base of segment. Flagellum of antenna imbricated. Beak reaching midway between pro- and mesothoracic coxae.

Thorax and appendages.—Prothorax with a lanceolate wax gland on each side of the dorso-meson. Mesothorax with an oval wax gland on each side of dorso-mesal line, separated by twice their greatest diameter, and in line with the base of the mesothoracic wings. Metathorax also with a pair of oval wax glands, in line with the other paired dorsal glands. Stigma of fore wings ending very abruptly, veins failing to reach margin of wing.

Abdomen.—Abdomen with seven pairs of lateral wax glands, those towards the posterior portion of abdomen very large. Dorsum typically with six pairs of wax glands, the basal ones largest, the posterior ones usually gradually decreasing in size, sometimes a pair coalescing, but varying greatly in shape and degree of coalescence. Seventh abdominal segment with an extremely large, oval, wax gland on the mid-dorsal region. The single condition is presumably due to the confluence of two paired wax glands. Cornicles apparently absent. Cauda normal and with but few hairs.

Holotype.—Alate viviparous female (sexupara); Decatur, Illinois, October 21, 1929, on roots of *Bidens* sp., (F. C. Hottes). Slide No. 10708.

Paratypes.—Fifteen slides in all, containing alate viviparous females and pupae; ten slides same data as holotype; one slide, Oak Park, Illinois, October 9, 1909, on roots of *Bidens*, (J. J. Davis); four slides, Lafayette, Indiana, October 3, 1913, on roots of *Bidens*, (J. J. Davis). Slides Nos. 10709-10717 and others unnumbered.

When the complete life cycles and seasonal forms of previously described species of *Pemphigus* become known, this species will likely be found to be the sexupara of one of them. At present, however, fall migrants of only two species of *Pemphigus* are authentically correlated with the spring, or gall making, forms. It is, therefore, impossible to place this form satisfactorily in our present system of classification, and it is best recorded as a new species. Mr. A. C. Maxson, to whom specimens were submitted for an opinion concerning their identity, concurs with this view. The specimens in the paratype series collected by Davis at Oak Park were recorded by him (1911b) as *P. betae* Doane.

The characters given in the key to the species of the genus *Pemphigus* are sufficient to differentiate this species from related and described forms.

GENUS PROCIPHILUS KOCH

Key to the Species of the Genus *Prociphilus*

1. Wax-pore plates on mesonotum separated by a distance equal to several times their greatest diameter (Fig. 330); fore tibiae and antennae about equal in length; large species, body about 4 mm. in length; in congested colonies on branches of beech... *imbricator* (Fitch) p. 372
- Wax-pore plates on mesonotum separated by a distance less, or but slightly more, than their greatest diameter (Fig. 329); fore tibiae much shorter than length of antennae; smaller species, body rarely exceeding 2 mm. in length; not found on beech 2
2. Sixth antennal segment with no secondary sensoria.....[fundatrigeniae] *corrugatans* (Sirriner) p. 370
- Sixth antennal segment with one or more secondary sensoria.....3
3. Third antennal segment usually with twelve or more secondary sensoria4
- Third antennal segment normally with less than twelve secondary sensoria6
4. Wax-pore plates on dorsum of mesothorax triangular in outline (Fig. 328)[fundatrigeniae and sexuparae] *venafuscus* (Patch) p. 373
- Wax-pore plates on dorsum of mesothorax oval in outline (Fig. 329)5
5. Veins of fore wing conspicuously margined with fuscous border; on roots of many plants...[sexuparae] *erigeronensis* (Thomas) p. 371
- Veins of fore wing not margined with fuscous border; on pomaceous trees.....[sexuparae] *corrugatans* (Sirriner) p. 370
6. Fourth and fifth antennal segments approximately the same length; fourth antennal segment about equal in length to front tarsi; wax-pore plates on mesonotum separated by a distance about equal to, or less than, their shortest diameter... ..*fraxinifolii* (Riley) p. 371
- Fourth antennal segment conspicuously shorter than the fifth; fourth antennal segment about equal in length to one-half length of front tarsi; wax-pore plates on mesonotum separated by a distance about equal to, or more than, their greatest diameter*tessellata* (Fitch) p. 373

PROCIPHILUS CORRUGATANS (SIRRINE)

FIG. 329

Pemphigus corrugatans Sirrine, Proceedings of the Iowa Academy of Sciences for 1893, Vol. I, Part 4, 1894, p. 130.

Davis (1910d) has recorded as questionably this species some specimens that he collected on *Crataegus*, July 7, 1907, at LeRoy, Illinois. At a later date of the same year he changed this determination to *Pemphigus*, saying it "may be Fitch's *P. pyri*." A slide of this LeRoy material was very kindly sent to us for study by Mr. Davis. We find, as Davis finally concluded, that the specimens undoubtedly belong to

the genus *Pemphigus* and, judging by Baker's (1916a) figures, are not *pyri* Fitch, which is a *Prociphilus*. The life history of the species is but poorly understood.

The data associated with our two Illinois collections of this species are as follows: Antioch (June 15), 1928; Starved Rock State Park (May 13), 1930; collected on *Crataegus* and *Amelanchier*, respectively. The material from Antioch apparently represents stem mothers and nymphs, and that from Starved Rock State Park the alate (fundatrigeniae) and apterous viviparous females.

PROCIPHILUS ERIGERONENSIS (THOMAS)

Tychea erigeronensis Thomas, Eighth Report of the State Entomologist on the Noxious and Beneficial Insects of the State of Illinois, 1879, p. 168.

A study of the original description and probable cotypic specimens of *Tychea erigeronensis* Thomas, the studies of Forbes and Hart (1895), and recent collections of our own, all clearly indicate that one of our common subterranean aphids in Illinois is the *Tychea erigeronensis* of Thomas. Furthermore, the studies of Patch (1918) and Cutright (1925), and their drawings of the rare alate form, indicate that this species is generically best placed as a *Prociphilus*; and this placement is supported also by an opinion expressed to us in a letter from Mr. A. C. Maxson. It seems to us that *Tychea radicola* Oestlund (1886) and *Tychea erigeronensis* Thomas (1879) are the same species, as Forbes and Hart (1895) have previously stated. Maxson in a letter to us writes that "*radicola* Oestlund may be identical with the *Tychea erigeronensis* Thomas." The best account of the life-history of this species is that given by Cutright (1925). Whether it migrates and produces aerial forms is still unknown.

Our Illinois host records for this root-feeding species are: *Taraxacum officinale*, *Erigeron philadelphicus*, and species of grass. Locality and seasonal records are as follows: Normal (April 24), 1884; Urbana (March 19, Nov 25), 1890; Urbana (April 23, 26), 1892; Urbana (April 9-19), 1894; Urbana (Sept. 22, Oct. 25), 1928; Champaign (April 27), Urbana (April 2, May 1, July 22), 1929; Oakwood (Oct. 22), and Urbana (Sept. 22, Nov. 18), 1930. The data associated with probable cotypes (Slide No. 2769) are "roots of endive and *Erigeron canadense*, collector T. J. Burrill."

PROCIPHILUS FRAXINIFOLII (RILEY)

FIG. 49

Pemphigus fraxinifolii Riley, Bulletin of the United States Geological and Geographical Survey of the Territories, Vol. V, No. 1, 1879, Art. 1, p. 17.

This greenish and pulverulent aphid was described by both Riley (1879) and Thomas (1879) under the same name. The description of Riley, however, has priority over that of Thomas. It is a very common species in all parts of Illinois on ash (*Fraxinus*) and has been previously recorded from our state by Davis (1910d). It may well be classed as an important pest of this tree because of the direct injury that it causes and the unsightly appearance of trees infested with the pseudo-leaf galls (Fig. 49). According to Davis (1910d), the sexual

forms are produced in fall and the eggs laid in crevices of the bark of ash trees. Definite information as to an alternate host of this plant louse is lacking, and it may be that the entire life cycle is spent upon the ash.

All the typic material of *Pemphigus fraxinifolii* Thomas, previously recorded by Davis (1913), is now mounted on two slides. Slide No. 2762 is designated as the *lectotypic* slide and Slide No. 7167 as a *paratypic* slide. Data associated with these slides are: Sauk City, Wisconsin, June, on *Fraxinus quadrangulata*, collected by Bundy.



Fig. 49. Pseudo-gall on leaves of the white ash, *Fraxinus americana*, caused by *Prociphilus fraxinifolii* (Riley); Urbana, June 16, 1929. Normal foliage on right and infested twig on left.

Data associated with our specimens, all collected on ash (*Fraxinus* sp.), are as follows: Freeport (June 20), 1920; Antioch (June 15), Bement (July 17), Champaign (July 8), Havana (June 22), Kankakee (June 29), Metropolis (June 1), Rock Island (June 23), St. Joseph (Aug. 5), Urbana (July 5), 1928; Anna (June 21), Cairo (June 22), Effingham (June 18), Elizabethtown (June 20), El Paso (July 5), Grayville (June 19), Harrisburg (May 28), Jerseyville (June 25), Lisle (July 14), Maryville (Sept. 11), Newton (June 17), Oregon (July 10, 11), Rock Island (July 7), 1929; Starved Rock State Park (May 13), 1930.

PROCIPHILUS IMBRICATOR (FITCH)

Fig. 97

Eriosoma imbricator Fitch, Fourth Annual Report of the Regents of the University, on the Condition of the State Cabinet of Natural History. State of New York, January 14, 1851, p. 68.

Apparently this species has not been recorded heretofore from Illinois. Like many other species, it is mentioned in the Eighth Re-

port of the State Entomologist of Illinois by Thomas (1879) but not recorded or stated to be found in the state. The species is a large and exceedingly flocculent one, feeding and living in congested colonies on the larger branches of its host, the beech. Often it produces so much honey-dew that the ground beneath the infestation becomes discolored. Almost nothing has been published concerning the life history of this plant louse, a species which is somewhat of a misfit in either the genus *Prociphilus* or *Pemphigus*.

Our specimens were taken on beech (*Fagus grandifolia*) at Jonesboro, Sept. 28, 1929.

PROCIPHILUS TESSELLATA (FITCH)

Eriosoma tessellata Fitch, Fourth Annual Report of the Regents of the University, on the Condition of the State Cabinet of Natural History, State of New York, January 14, 1851, p. 68.

This species was first recorded from Illinois by Davis (1910d), who collected specimens on alders growing in the Chicago parks. According to Davis and several other authors, this plant louse is capable of causing injury to alders used in ornamental plantings. Biologically this species is of special interest, in addition to its migratory habits, because it is one of the few aphids known to hibernate in numbers in the nymphal stage. The sexual forms are produced on maples by migrants leaving the alders in fall. The over-wintering eggs produce stem mothers in spring which produce generations (*accrifolii* Riley) destined to return in summer to alders. Although the life cycle is interrupted on its probable original host, the maple, the life cycle may continue without interruption on alders. The first person to work out the life history of this species was Patch (1908, 1911b), whose findings were confirmed by the extensive studies of Pergande (1912).

Data associated with our specimens, all collected on alder (*Alnus* sp.), are as follows: Herod (Nov. 29, 30), 1928; Herod (June 21), 1929.

PROCIPHILUS VENAFUSCUS (PATCH)

FIG. 328

Pemphigus venafuscus Patch, Entomological News, Vol. XX, No. 7, July, 1909, p. 319.

Only one specimen of this species, a fall migrant, has been taken in Illinois. Patch (1909b) has shown that in Maine the fall migrants may be taken on lilac, elm, and ash, on all of which the sexual forms were produced and winter eggs subsequently laid. The spring forms were found to develop "in the angles of the twigs or about the swelling buds" of lilacs and ash. Besides her first illustrations of this species, additional figures of the curious wax-pore plates (Fig. 328) of the thorax, and of the antennae, are given in a later publication (1918).

Our specimen, a sexupara, was collected at Watson, Illinois November 13, 1930, on the bark of *Populus deltoides*. It may have been a "stray" on *Populus*.

GENUS THECABIUS KOCH

THECABIUS SPECIES

Since we have been unable to secure alate specimens, the specific identification of our *Thecabius* material has been impossible. A British species of *Thecabius*, as well as *T. populi-conduplicifolius* (Cowen) in the United States, is known to migrate between *Populus* and *Ranunculus*, the former being the over-wintering host.

Our apterous material has been examined by Mr. A. C. Maxson, who reports that specimens taken on the stems and crowns of *Ranunculus* plants at Starved Rock State Park (August 14-September 10, 1929) are probably *T. gravicornis* Patch. What is apparently another species of this genus was collected in leaves of *Lysimachia* at the following places and dates: Kankakee (June 29, July 15), 1928; Beach (Aug. 28, 29), 1929. The apterous forms of all our material produced considerable flocculent secretions.

GENUS TRIFIDAPHIS DEL GUERCIO

TRIFIDAPHIS PHASEOLI (PASSERINI)

Tychea phascoli Passerini, Gli Afidi, 1860, p. 39.

This subterranean species has not been previously reported from Illinois. According to Garman (1895) and Theobald (1929), it is capable of causing severe injury to garden beans. The best account in English of *T. phascoli* is that given by Theobald (1929). Mordvilko (1928a) has indicated that *T. radicola* (Essig) is a synonym of *phascoli* and in certain parts of Europe other forms not thus far found in America produce galls on *Pistacia*. According to our present information, this species is anolocyclic in America.

Mr. A. C. Maxson has kindly determined our apterous specimens of this species. They were collected on the roots of sweet peas (*Lathyrus* sp.) in a greenhouse at Maywood, Illinois, on April 12, 1923, by Mr. C. C. Compton.

SUBFAMILY MINDARINAE

SUPERTRIBE MINDAREA

GENUS MINDARUS KOCH

MINDARUS ABIETINUS KOCH

Mindarus abietinus Koch, Die Pflanzenläuse Aphiden getreu nach dem Leben abgebildet und beschrieben, Nürnberg, 1857, p. 278.

This species was described by Thomas (1879) in the "Eighth Report of the State Entomologist of Illinois," as a new species under the name of *Schizoneura pinicola*. Patch (1910b) and Davis (1913) have shown that the species described by Thomas is synonymous with *M. abietinus* Koch. It is rather strange that the species has not been

recorded from Illinois since its collection by Thomas. According to Patch (1910b), who gives a good description of the alate and apterous viviparous females, it develops in "curly tips of *Abies balsamea* Mill. and *Picea canadensis* Mill."

Data associated with the typic slide of *S. pinicola* Thomas in the Survey collection (Slide No. 2774) are as follows: Carbondale, Illinois, April 20, 1879, on young white pine, by C. Thomas.

SUBFAMILY HORMAPHIDINAE

SUPERTRIBE HORMAPHEA

Key to Genera

1. Antennae of alate forms with five segments.....*Hamamelistes* p. 375
- Antennae of alate forms with three segments.....*Hormaphis* p. 376

GENUS HAMAMELISTES SHIMER

HAMAMELISTES SPINOSUS SHIMER

FIG. 50

Hamamelistes spinosus Shimer, Transactions of the American Entomological Society, Vol. I, 1867, p. 284.

Like *Hormaphis hamamelidis* (Fitch), this plant louse has a complicated and most interesting life history. It alternates, too, between the same two hosts—witch-hazel and birch. Its life history (Pergande, 1901) differs from that of *H. hamamelidis*, as outlined under that species, principally as follows: the over-wintering eggs are laid on witch-hazel in spring or early summer and do not hatch until the following spring; the galls on witch-hazel (Fig. 50) caused by the stem mothers are bud-galls of spiny appearance; in addition to the over-wintering eggs on witch-hazel there is a *coccidiform* (Fig. 332) generation which over-winters on the birch and their offspring produce the common corrugations, or pseudo-galls, on the leaves; and the winged migrants produced on the birch return to the witch-hazel in late spring and produce the sexual generation.

Neotypic slide.—Since this species was originally described by Shimer from specimens collected in Illinois (Mt. Carroll), and we have no knowledge that the types were ever preserved, a slide from the Survey collection is selected as the *neotype*. The data associated with the neotypic slide are as follows: Slide No. 8144, collected on witch-hazel, Starved Rock State Park, Illinois, August 14, 1929, by T. H. Frison and F. C. Hottes.

This species is very generally distributed over Illinois. We have taken the galls and second-generation material on witch-hazel (*Hamamelis virginiana*) at Urbana (July 26 and December 2, 1928, and July 23, 1929) and at Starved Rock State Park (August 14, 1929). The pseudo-galls on birch and associated generations have been collected as follows: Antioch (June 15), Carbondale (June 4), East Dubuque (June 25), Galena (June 25), Kankakee (June 29), Oregon (June 28), Quincy (June 6), Rock Island

(June 24), 1928; Macomb (May 4), Wankegan (July 13), 1929. Davis (1910) has recorded the species from Chicago and Kankakee on witch-hazel, and Gronemann has sent us material from Elgin (September, 1930) upon which his "near Chicago" record (1930) is based.



Fig. 50. Spiny bud gall on the witch-hazel, *Hamamelis virginiana*, caused by *Hamamelistes spinosus* Shimer; Urbana, July 24, 1929.

GENUS *HORMAPHIS* OSTEN SACKEN

HORMAPHIS *HAMAMELIDIS* (FITCH)

Bryocrypta hamamelidis Fitch, Fourth Annual Report of the Regents of the University on the Condition of the State Cabinet of Natural History, January 14, 1851, State of New York, p. 69.

Few plant lice present a more remarkable or more diversified life cycle than this and the preceding species. Like *Hamamelistes spinosus*

Shimer, it too, alternates between the witch-hazel and the birch. The complicated life history of this species was worked out by Pergande (1901) and published after "nearly twenty-two years of patient labor." The winter is passed in the egg stage on witch-hazel. The stem mothers hatching from these eggs in spring cause the formation of conical galls on the upper sides of the leaves, and in these galls they produce a second generation of aphids which are winged and migratory. These winged forms migrate to birches in late spring or early summer and produce generations which in their last stages are remarkably suggestive of the white-flies and are referred to in literature as *aleurodi-form* generations. In late summer or early fall these aleurodifform generations, in turn, produce a generation of winged forms, or migrants, which return to the witch-hazel and produce the sexual forms that lay the over-wintering eggs.

This species has not been previously recorded from Illinois, except for the record by Gronemann (1930) from the "Chicago area." Mr. Gronemann has kindly supplied us with actual specimens of his collecting from Elgin, Illinois, on witch-hazel. During the past three years of collecting we have taken the species but once, at Starved Rock State Park, June 12-13, 1928, on witch-hazel (*Hamamelis virginiana*).

PART III

KEYS TO SPECIES OF PLANT LICE GROUPED WITH
REFERENCE TO HOST PLANTS

For the convenience and use of workers in the field of economic entomology, and others interested only in naming a few of the commoner and more important plant lice, we have prepared ten special keys, based upon natural or well-known artificial groupings of plants serving as hosts for aphids. These keys have been made as simple as possible, and in most cases the characters used can be seen with the aid of a hand lens or a wide-field binocular microscope.

We have included in these keys only the species of plant lice most likely to be found in Illinois on certain natural or artificial groupings of plants, using the data assembled by our field collecting in all parts of the state as the basis for the selection of the included species. In other geographical or political areas these keys will require the incorporation of additional species. Even in Illinois they are not complete, because to make them so would entail the addition of numerous polyphagous species of very little economic importance and the expansion of the keys to a point where they would be necessarily comparable to the more technical keys in Part II.

KEY TO THE SPECIES OF PLANT LICE LIKELY TO OCCUR ON
APPLE IN ILLINOIS

1. Secondary sensoria of antennal segments in the form of narrow ring-like structures almost encircling antennae, antennae therefore with a corrugated or notched appearance when seen from the side (Fig. 225); terminal filament of sixth segment shorter than basal portion (Fig. 244); covered in life with long white woolly secretions (Fig. 42); on trunks and roots of host.....*Eriosoma lanigera* (Hausmann) p. 351
- Secondary sensoria of antennal segments circular or oval (Figs. 262, 266); terminal filament of sixth segment much longer than basal portion (Fig. 266); not covered in life with white woolly secretion although sometimes slightly pulverulent (Fig. 30); on leaves and twigs of host.....2
2. Cornicles short, but slightly if any longer than hind tarsi or basal portion of sixth antennal segment; dorsum of abdomen with a large dark-colored dorsal patch anterior to cornicles; migrating from apple to clovers and alfalfa.....*Aphis bakeri* Cowen p. 181
- Cornicles of medium length, about twice as long as hind tarsi or basal portion of sixth antennal segment; dorsum of abdomen with or without a large dark-colored dorsal patch anterior to cornicles3
3. Abdomen with a large dark-colored spot on dorsum anterior to cornicles; third antennal segment much longer than width of head through the eyes; apterous forms slightly pruinose...*Aphis rosea* Baker p. 214
- Abdomen with dorsum essentially greenish, without a dark-colored spot anterior to cornicles; third antennal segment no longer than width of head through the eyes.....4

4. Cornicle distinctly constricted before conspicuous flaring flange at apex (Fig. 134); secondary sensoria on fourth antennal segment numerous; cauda stout and not sharply constricted near middle (Fig. 196).....*Rhopalosiphum prunifoliae* (Fitch) p. 239
- Cornicle not constricted before apex and without conspicuous flaring flange (Figs. 130, 133, 139); secondary sensoria on fourth antennal segment lacking or few; cauda sharply constricted near middle (Fig. 203).....*Aphis pomi* DeGeer p. 210

KEY TO THE SPECIES OF PLANT LICE LIKELY TO OCCUR ON BERRIES IN ILLINOIS

1. On blackberry2
- On raspberry3
- On gooseberry4
- On strawberry6
- On currant; pale yellowish aphid feeding on lower surface of leaves and causing them to become distorted and reddish (Fig. 34).....*Capitophorus ribis* (Linnaeus) p. 290
- On grape; brownish aphid feeding on lower surface of leaves and on tendrils (Fig. 22).....*Aphis illinoisensis* Shimer p. 198
- 2 Antennae five-segmented; apterous forms yellowish white; causes curling of leaves particularly near tips of canes.....*Cerosipha rubifolii* (Thomas) p. 229
- Antennae six-segmented; apterous forms greenish; beneath leaves and on stems.....*Aphis rubicola* Oestlund p. 215
- 3 Cornicles long and distinctly swollen (Fig. 121); species of large size; on stems of new growth.....*Amphorophora sensoriata* Mason p. 279
- Cornicles cylindrical and not swollen (Fig. 130); species of minute size; beneath leaves and on stems.....*Aphis rubicola* Oestlund p. 215
4. Third antennal segment much shorter than width of head through eyes; terminal filament short, not over three times as long as basal portion.....*Aphis sanborni* Patch p. 218
- Third antennal segment longer than width of head through eyes; terminal filament long, at least six times as long as basal portion5
5. Fifth antennal segment with few secondary sensoria (0 to 5).....*Myzus houghtonensis* (Troop) p. 338
- Fifth antennal segment with secondary sensoria more numerous (7 to 20).....*Myzus thomasi* n. sp. p. 343
6. Black or bluish-black aphid; apterous forms without capitate setae (Fig. 324); on roots, crowns or stems.....*Aphis forbesi* Weed p. 194
- Pale yellowish white or greenish aphid; apterous forms with capitate setae (Fig. 320); on undersides of leaves and stems.....7
7. Apterous forms with conspicuous capitate setae scattered over entire body; third antennal segment with secondary sensoria widely scattered and numbering about thirty.....*Capitophorus fragaefolii* (Cockerell) p. 283
- Apterous forms with conspicuous capitate setae restricted almost entirely to head and anal regions of abdomen; third antennal segment with secondary sensoria less scattered and numbering about twenty.....*Capitophorus minor* (Forbes) p. 284

KEY TO THE SPECIES OF PLANT LICE LIKELY TO OCCUR ON COMMON GARDEN FLOWERS IN ILLINOIS

1. Partial to rose2
- Partial to aster9
- Partial to chrysanthemum11

- Partial to sunflower12
- Partial to sweet pea13
- Common to variety of flowers.....14
- Partial to columbine; medium-sized, yellowish green form with dark dorsal markings.....*Myzus essigi* Gillette and Palmer p. 337
- Partial to nastertium; medium-sized, bluish to blackish form, often with white spots on dorsum (Fig. 26).....*Aphis rumicis* Linnaeus p. 215
- Partial to delphinium; medium-sized, reddish-brown to blackish species.....*Aphis rociadae* Cockerell p. 214
- Partial to golden glow; large reddish species (Fig. 38).....*Macrosiphum rudbeckiae* (Fitch) p. 320
- 2. Apterous forms with numerous capitate or clubbed setae over surface of body (Fig. 82).....3
- Apterous forms with simple setae (Fig. 84).....5
- 3. Alate forms with secondary sensoria present at least on third and fourth antennal segments.....*Capitophorus fragaeifolii* (Cockerell) p. 283
- Alate forms with secondary sensoria restricted to third antennal segment4
- 4. Cornicles much longer than fourth antennal segment, basal portion light shading to dark at apices; hind tibiae uniformly dark.....*Capitophorus corambus* n. sp. p. 281
- Cornicles shorter or about same length as the fourth antennal segment, uniformly dark; hind tibiae mostly light-colored with apices dark and contrasting.....*Capitophorus tetraerhodus* (Walker) p. 291
- 5. Cornicles reticulated at apex (Fig. 108).....6
- Cornicles not reticulated at apex (Fig. 129).....8
- 6. Cornicles black, strongly contrasting with color of abdomen.....7
- Cornicles with at least basal portion concolorous with abdomen and not contrasting with it.....*Macrosiphum gei* (Koch) p. 306
- 7. Abdomen uniformly greenish or reddish; cornicles shorter than third antennal segment.....*Macrosiphum pseudoroseae* Patch p. 318
- Abdomen greenish with dark lateral patches; cornicles about as long as, or longer than, third antennal segment.....*Macrosiphum rosae* (Linnaeus) p. 320
- 8. Antennal tubercles well developed (Fig. 86); secondary sensoria on third antennal segment arranged approximately in a straight row.....*Myzus porosus* Sanderson p. 340
- Antennal tubercles poorly developed (Fig. 84); secondary sensoria on third antennal segment not arranged in a straight row.....*Macrosiphum dirhodum* (Walker) p. 304
- 9. On roots.....*Aphis maidi-radicis* Forbes p. 202
- On leaves or stems.....10
- 10. Cornicles much shorter than third antennal segment.....*Macrosiphum anomalae* n. sp. p. 298
- Cornicles approximately as long as third antennal segment.....*Macrosiphum erigeronensis* (Thomas) p. 304
- 11. Predominantly dark reddish brown or blackish.....*Macrosiphum sanborni* Gillette p. 323
- Predominantly greenish.*Rhopalosiphum rufomaculatum* (Wilson) p. 241
- 12. Cornicles very short, about as long as hind tarsi; a small bluish form tightly curling the leaves (Fig. 20).....*Aphis debilicornis* Gillette and Palmer p. 191
- Cornicles at least twice as long as hind tarsi; a small yellowish-green form on lower sides of leaves....*Aphis helianthi* Monell p. 196
- Cornicles elongate, four or five times as long as hind tarsi; a large yellowish form with dark markings on lower sides of leaves.....*Macrosiphum illini* n. sp. p. 309

13. On roots; winged form with media simple (Fig. 64); terminal filament of alate or apterous forms about as long as basal portion of sixth antennal segment.....*Trifidaphis phaseoli* (Passerini) p. 374
- On stems and leaves; winged form with media branched (Fig. 72); terminal filament of alate and apterous forms much longer than basal portion of sixth antennal segment.....*Macrosiphum pisi* (Kaltenbach) p. 317
14. Cornicles much shorter than width of head through eyes; medium sized bluish to blackish form, often with white dorsal spots (Fig. 26).....*Aphis rumicis* Linnaeus p. 215
- Cornicles about as long or longer than width of head through eyes; medium to large, sized yellowish or greenish forms, sometimes with dark dorsal markings.....15
15. Large greenish form, without dark markings on dorsum of abdomen; cornicles with closed reticulations at apices (Fig. 103); antennal tubercles poorly developed (Fig. 84).....*Macrosiphum gei* (Koch) p. 306
- Medium-sized greenish forms, usually with dark markings on dorsum of abdomen; cornicles without closed reticulations at apices (Fig. 124); antennal tubercles well developed (Fig. 86)16
16. Cornicles slightly swollen near apex and about as long as width of head through eyes; apterous forms with dorsum of abdomen uniformly yellowish green.....*Myzus persicae* (Sulzer) p. 339
- Cornicles cylindrical, much longer than width of head through eyes; apterous forms usually with a dark horseshoe-shaped patch on dorsum contrasting with ground color of yellowish green.....*Myzus circumflexus* (Buckton) p. 335

KEY TO THE SPECIES OF PLANT LICE LIKELY TO OCCUR ON GRAIN CROPS IN ILLINOIS

1. On roots2
- On leaves or stems.....3
2. Cornicles present, about as long as hind tarsi, and cylindrical (Fig. 23); terminal filament of sixth antennal segment much longer than base of segment (Fig. 266).....*Aphis maidi-radicis* Forbes p. 202
- Cornicles absent or ring-like and inconspicuous (Fig. 158); terminal filament of sixth antennal segment much shorter than base of segment (Fig. 241); several species of slight economic importance*Eriosomatinae* sp. p. 345
3. Body with numerous long, sharp, spine-like hairs; cornicles ring-like, inconspicuous*Sipha flava* (Forbes) p. 174
- Body without strong, spine-like hairs; cornicles cylindrical, conspicuous, at least as long as hind tarsi.....4
4. Medial vein of front wing only once branched (Fig. 70).....*Toxoptera graminum* (Rondani) p. 241
- Medial vein of front wings twice branched (Fig. 72).....5
5. Terminal filament of sixth antennal segment about twice length of basal portion; hind tibiae unicolorous, brown or black.....*Aphis maidis* Fitch p. 205
- Terminal filament of sixth antennal segment over three times length of basal portion; hind tibiae light yellowish with apices black6
6. Cornicles long and slender, about as long as width of head through eyes, slightly tapering to apex; apical third with closed reticulations (Fig. 114); cornicles and cauda greatly contrasting in color.....*Macrosiphum granarium* (Kirby) p. 308
- Cornicles shorter and stouter, much shorter than width of head through eyes, constricted before apical flange; imbricate but without closed reticulations (Fig. 134); cornicles and cauda more or less concolorous, not contrasting.....*Rhopalosiphum prunifoliae* (Fitch) p. 239

KEY TO THE SPECIES OF PLANT LICE LIKELY TO OCCUR ON
PLANTS IN GREENHOUSES IN ILLINOIS

1. Wings with conspicuous dusky brown shading outlining all veins (Figs. 66, 74).....2
- Wings without dark shading outlining veins (Fig. 70).....4
2. Cornicles slightly swollen.....3
- Cornicles cylindrical and tapering towards apex; on fern.....
.....*Idiopterus nephrolepidis* Davis p. 292
3. Hind wings normally with two oblique veins (Fig. 93); on violets
.....*Idiopterus violae* (Pergande) p. 292
- Hind wings normally with one oblique vein (Fig. 95); closed cell
always present in fore wings and at least four-sided (Fig. 74);
on bananas and other tropical plants.....
.....*Pentalonia nigronervosa* Coquerel p. 345
4. Predominant color some shade of brown or black.....5
- Predominant color yellowish, pink, or some shade of green.....8
5. Cornicles short, scarcely longer than hind tarsi.....
-*Aphis padi* Linnaeus p. 209
- Cornicles longer, at least twice as long as hind tarsi.....6
6. Cornicles with apical portion conspicuously swollen (Fig. 148);
restricted to aquatic or semi-aquatic plants.....
-*Rhopalosiphum nymphaeae* (Linnaeus) p. 238
- Cornicles cylindrical or gradually tapering to apex, not swollen,
or at most apex is but slightly enlarged (Fig. 106); not asso-
ciated with aquatic or semi-aquatic plants.....7
7. Dark reddish brown; cornicles much wider at base than at apex,
reticulate for much of their length; restricted to chrysanthem-
um.....*Macrosiphum sanborni* Gillette p. 323
- Black to bluish black, often with small white spots on dorsum;
cornicles but slightly wider at base than at apex, imbricated
but not reticulated at apex; infesting a great variety of plants
.....*Aphis rumicis* Linnaeus p. 215
8. On roots.....9
- Not on roots.....10
9. Medius of fore wing branched (Fig. 72); alate or apterous forms
with terminal filament much longer than basal portion of sixth
segment (Fig. 266); cornicles present in all forms; on roots
of Aster, Erigeron, and other Compositae.....
-*Aphis maidi-radicis* Forbes p. 202
- Medius of fore wing simple (Fig. 64); alate or apterous forms
with terminal filament shorter or at least not longer than basal
portion of sixth segment (Fig. 245); cornicles absent in all
forms; on roots of sweet pea, *Trifidaphis phaseoli* (Passerini) p. 374
10. Cornicles short, less than width of head through the eyes; spe-
cies of small size.....11
- Cornicles long, as long or much longer than width of head
through the eyes; species of medium to large size.....13
11. Fourth antennal segment without secondary sensoria; likely to
be found on a variety of plants.....*Aphis gossypii* Glover p. 195
- Fourth antennal segment with secondary sensoria.....12
12. Cornicles much longer than basal portion of sixth antennal seg-
ment; cauda elongate and rather pointed; dorsum of abdomen
greenish; restricted to chrysanthemums.....
-*Rhopalosiphum rufomaculatum* (Wilson) p. 241
- Cornicles about as long as basal portion of sixth antennal seg-
ment; cauda not elongate, rounded; dorsum of abdomen with
dark markings on a greenish background; on *Senecio cruentus*
.....*Aphis padi* Linnaeus p. 209

13. Cornicles exceedingly long, between one and one-half and two times as long as width of head through eyes; species of very large size 14
- Cornicles of moderate length, about as long as width of head through eyes; species of medium size 16
14. Apex of cornicles without closed reticulations (Figs. 118, 119); body, legs, and cornicles almost uniformly greenish; on sweet peas *Macrosiphum pisi* (Kaltenbach) p. 317
- Apex of cornicles with closed reticulations (Fig. 111); partial to roses 15
15. Secondary sensoria on third antennal segment approximately in a straight row (Fig. 293); cornicles uniformly tapering to apex (Fig. 111), with basal portion greenish and apices dusky; abdomen green or pink; on a variety of plants *Macrosiphum gei* (Koch) p. 306
- Secondary sensoria on third antennal segment not approximately in a straight row (Fig. 288); cornicles somewhat constricted at apex before flange (Fig. 108), uniformly black; abdomen green with black lateral spots; on rose *Macrosiphum rosae* (Linnaeus) p. 320
16. Antennal tubercles well developed (Fig. 86); cornicles cylindrical or but slightly swollen near apex; on a variety of plants 17
- Antennal tubercles poorly developed (Fig. 80); apical half of cornicles conspicuously swollen; on aquatic or semi-aquatic plants *Rhopalosiphum nymphaeae* (Linnaeus) p. 238
17. Cornicles slightly swollen near apex and about as long as width of head through eyes; apterous forms with dorsum of abdomen uniformly yellowish green *Myzus persicae* (Sulzer) p. 339
- Cornicles cylindrical, much longer than width of head through eyes; apterous forms usually with a dark horseshoe-shaped patch on dorsum contrasting with ground color of yellowish green *Myzus circumflexus* (Buckton) p. 335

KEY TO THE SPECIES OF PLANT LICE LIKELY TO OCCUR ON LEGUMES IN ILLINOIS

1. Cornicles inconspicuous, short or cone-shaped (Fig. 155), not much if any longer than width at base 2
- Cornicles conspicuous, cylindrical or elongate (Fig. 100), much longer than width at base 3
2. Terminal filament of sixth antennal segment much longer than basal portion; veins of wings not conspicuously margined with fuscous (Fig. 70); hind tibiae about four times as long as hind tarsi; apterous forms with ordinary setae (Fig. 324) *Sipha flava* (Forbes) p. 174
- Terminal filament of sixth antennal segment about as long as basal portion; veins of wings conspicuously margined with fuscous (Fig. 54); hind tibiae about six times as long as hind tarsi; apterous forms with setae on body enlarged at tips (Fig. 333) *Myzocallis ononidis* (Kaltenbach) p. 258
3. Large greenish species; cornicles long and slender (Fig. 129), longer than width of head through the eyes; cauda elongate (Fig. 181) *Macrosiphum pisi* (Kaltenbach) p. 317
- Small yellowish-green, brownish or reddish species; cornicles short and stout (Fig. 130), much shorter than width of head through eyes; cauda short (Fig. 202) 4
4. Beak long, reaching to or beyond base of middle legs; fifth antennal segment usually with secondary sensoria; stigma rather broad, apex not especially acute *Aphis crataegifoliae* Fitch p. 190
- Beak short, seldom reaching to base of middle legs; fifth antennal segment without secondary sensoria; stigma rather narrow, apex rather acute *Aphis bakeri* Cowen p. 181

KEY TO THE SPECIES OF PLANT LICE LIKELY TO OCCUR ON ORNAMENTAL SHRUBS IN ILLINOIS

1. On stems and leaves of elder berry (*Sambucus*); a medium-size blackish or bluish aphid with a greenish tinge; cornicles about as long as width of head through eyes.....*Aphis sambucifoliae* Fitch p. 218
- On stems near base of snowberry and coralberry (*Symphoricarpos*); a large aphid covered with conspicuous white woolly secretion; cornicles short, shorter than length of basal portion of sixth antennal segment.....*Amphiceridus pulverulens* (Gillette) p. 160
- On leaves of nine-bark (*Physocarpus*); a small dark brownish aphid; cornicles short, much shorter than width of head through eyes; third, fourth, and fifth antennal segments with numerous secondary sensoria.....*Aphis neilliae* Oestlund p. 205
- On twigs and leaves of buttonbush (*Cephalanthus*); a small greenish or reddish-brown aphid, somewhat pruinose; cornicles short, much shorter than width of head through eyes.....*Aphis cephalanthi* Thomas p. 185
- On stems and leaves of barberry (*Berberis*); a small yellowish aphid; cornicles about as long as width of head through eyes, apical portions distinctly swollen (Fig. 148).....*Rhopalosiphum berberidis* (Kaltenbach) p. 235
- On stems and leaves of *Evonymus*; a small blackish or bluish aphid, often with white dorsal spots; cornicles much shorter than width of head through eyes.....*Aphis rumicis* Linnaeus p. 215
- On twigs and leaves of buckthorn (*Rhamnus*), often causing them to curl; a very small greenish or blackish aphid; cornicles shorter than width of head through eyes.....*Aphis rhamni* Fonscolombe p. 214
- On leaves of bush honeysuckle (*Dicervilla*); a small yellowish or greenish aphid with dark cornicles; cornicles short, much shorter than width of head through eyes.....*Aphis gossypii* Glover p. 195
- On species and varieties of roses (*Rosa*); (see key of aphids likely to occur on garden flowers)..... p. 379
- On sumach (*Rhus*)2
- On hawthorn (*Crataegus*)3
- On snowball, highbush cranberry, and other shrubs belonging to the same genus (*Viburnum*).....8
- On privet (*Ligustrum*)11
- On honeysuckle (*Lonicera*)13
- On dogwood (*Cornus*)15
- On ornamental currant (*Ribes*).....18
- On witch-hazel (*Hamamelis*)19
- On hazelnut (*Corylus*)20
- On *Spiraea*21
- On *Elacagnus*23
- On *Prunus*24
2. Cornicles present, swollen at apices (Fig. 148), about as long as width of head through eyes; forming dense colonies on undersides of leaves and stems; a medium-size, reddish-brown species.....*Rhopalosiphum rhois* Monell p. 240
- Cornicles absent; forming bag-like galls on upper surfaces of leaves; a very small species.....*Melaphis rhois* (Fitch) p. 359
3. Cornicles absent or not protruding conspicuously from abdomen.....4
- Cornicles present and conspicuously protruding from abdomen.....5
4. Antennae with annular secondary sensoria, appearing notched or corrugated from a side view (Fig. 223); in flocculent colonies in curled leaves.....*Prociphilus corrugatus* (Sirrime) p. 370

- Antennae with oval or oval-transverse secondary sensoria, appearing more cylindrical from a side view (Fig. 226); in flocculent colonies on undersides of stems and branches (Fig. 42) *Eriosoma crataegi* (Oestlund) p. 351
- 5. Cornicles longer than width of head through eyes; a large yellowish aphid..... *Macrosiphum crataegi* (Monell) p. 304
- Cornicles shorter than width of head through eyes; medium-sized aphids 6
- 6. Cauda short and rounded; secondary sensoria numerous on fourth and fifth antennal segments; head and thorax in life with a pink or crimson tinge..... *Aphis crataegifoliae* Fitch p. 190
- Cauda elongate; secondary sensoria few or wanting on fourth and fifth antennal segments; head and thorax in life brown or greenish brown, never pink or crimson..... 7
- 7. Cornicles not swollen nor constricted before apices (Fig. 130)..... *Aphis pomi* DeGeer p. 210
- Cornicles slightly swollen and constricted before apices (Fig. 134)..... *Rhopalosiphum prunifoliae* (Fitch) p. 239
- 8. Apterous forms colored a pale bluish green, covered with a whitish powdery secretion; causing a severe curling of the leaves or pseudogall (Fig. 28)..... *Aphis viburnicola* Gillette p. 223
- Apterous forms yellowish green, brown, or black, never covered with whitish powdery secretion; on stems and leaves and not causing a pseudogall..... 9
- 9. Apterous forms yellowish-green, alates with dark spots along sides of abdomen; third antennal segment usually with less than ten secondary sensoria..... *Aphis pomi* DeGeer p. 210
- Apterous forms brownish or bluish black; third antennal segment usually with more than twelve secondary sensoria..... 10
- 10. A bluish black species, often with white spots on dorsum; apices of hind tibiae dark, sharply contrasting with lighter basal portion..... *Aphis rumicis* Linnaeus p. 215
- A uniformly brownish species; hind tibiae more uniformly brown..... *Aphis viburniphila* Patch p. 224
- 11. Abdomen colored shades of green or pink..... 12
- Abdomen bluish black, often with white dorsal spots..... *Aphis rumicis* Linnaeus p. 215
- 12. Cornicles cylindrical, much longer than width of head through eyes, reticulated at apex (Fig. 111); dorsum of abdomen uniformly some shade of green or pink; antennal tubercles poorly developed (Fig. 84)..... *Macrosiphum gei* (Koch) p. 306
- Cornicles with apical portion often slightly swollen, about as long as width of head through eyes, not reticulated at apex (Fig. 129); dorsum of abdomen often with a large dark dorsal patch on a yellowish green background; antennal tubercles well developed (Fig. 86)..... *Myzus persicae* (Sulzer) p. 339
- 13. Cornicles absent; causes leaves to curl..... *Gypsoaphis oestlundi* Hottes p. 167
- Cornicles present and conspicuous..... 14
- 14. Longitudinal vein of hind wing once-forked, the second branched but partially developed (Fig. 89); fifth antennal segment about twice as long as hind tarsi; causes leaves to curl..... *Alphitoaphis lonicericola* (Williams) p. 175
- Longitudinal vein of hind wing twice-forked (Fig. 93); fifth antennal segment and hind tarsi about equal in length; on leaves and flower bracts.. *Rhopalosiphum melliferum* (Hottes) p. 238
- 15. Terminal filament much shorter than basal portion of sixth segment; cornicles on cone-shaped areas (Fig. 155)..... *Anoecia querci* (Fitch) p. 152
- Terminal filament two or three times as long as basal portion of sixth segment; cornicles cylindrical (Fig. 133), prominently projecting from abdomen..... 16

16. Apterous forms and abdomen of alate forms greenish; cornicles but slightly shorter than terminal filaments, secondary sensoria on third antennal segment numbering over twenty; often causing leaves of terminal branches to curl (Fig. 21)..... *Aphis helianthi* Monell p. 196
- Apterous forms and abdomen of alate forms blackish or brownish; in cornicles about one-half or less as long as terminal filament; secondary sensoria on third antennal segment numbering under twenty; on stems and under sides of leaves, sometimes causing the latter to curl.....17
17. Cornicles much longer than basal portion of sixth antennal segment; a blackish form on the upper and lower sides of leaves..... *Aphis cornifoliae* Fitch p. 189
- Cornicles no longer than basal portion of sixth antennal segment; a reddish-brown form on stems near tips..... *Aphis caliginosa* n. sp. p. 182
18. Cauda elongate; secondary sensoria lacking or rare on fourth and fifth antennal segments; apterous forms without knobbed setae (Fig. 324); alates with dorsum of abdomen uniformly yellowish green..... *Macrosiphum ribiellum* Davis p. 319
- Cauda short and blunt; secondary sensoria numerous on fourth and fifth antennal segments; apterous forms with knobbed setae (Fig. 320); alates with a dark dorsal patch on abdomen..... *Capitophorus ribis* (Linnaeus) p. 290
19. Antennae with three segments; causing small conical galls on upper surfaces of leaves..... *Hormaphis hamamelidis* (Fitch) p. 376
- Antennae with five segments; causing a many-spined bud gall (Fig. 40)..... *Hamamelistes spinosus* Shimer p. 375
20. Cornicles very long and conspicuous, much longer than width of head between eyes; a large green and dark-colored species, black cornicles contrasting with abdomen..... *Macrosiphum coryli* Davis p. 303
- Cornicles very short, much shorter than width of head through eyes, about as long as hind tarsi; a medium-size yellowish species, cornicles concolorous with abdomen..... *Myzocallis coryli* (Goeze) p. 257
21. Abdomen essentially black or bluish-black and often with dorsal white spots; secondary sensoria on third antennal segment usually more than fourteen in number..... *Aphis rumicis* Linnaeus p. 215
- Abdomen some shade of green or pinkish-brown; secondary sensoria on third antennal segment rarely exceeding ten in number.....22
22. Abdomen of alates and apterous forms yellowish-green, not pruinose; cornicles much longer than hind tarsi; recorded from several species and varieties of *Spiraea* as well as numerous other hosts..... *Aphis pomi* DeGeer p. 210
- Abdomen of alates and apterous forms pinkish-green or reddish-brown, slightly pruinose; cornicles about as long as hind tarsi; recorded only from the meadowsweet (*Spiraea salicifolia*)... *Aphis spiraeophila* Patch p. 222
23. Cornicles with apical portion slightly swollen..... *Capitophorus gillettei* Theobald p. 284
- Cornicles cylindrical..... *Capitophorus flaveolus* (Walker) p. 282
24. Hind wings with longitudinal vein once-forked (Fig. 89); apterous forms and abdomen of alates a reddish brown..... *Hysteroneura setariae* (Thomas) p. 232
- Hind wings with longitudinal vein twice-forked (Fig. 91); apterous forms and abdomen of alates some shade of green..... *Aphis pomi* DeGeer p. 210

KEY TO THE SPECIES OF PLANT LICE LIKELY TO OCCUR ON
PEACH, PLUM, OR CULTIVATED CHERRY IN ILLINOIS

1. Cornicles very short, about as long as hind tarsi; secondary sensoria numerous on fourth antennal segment.....2
- Cornicles long, at least several times as long as hind tarsi; secondary sensoria lacking or rare on fourth antennal segment.....3
2. Cornicles with a distinct flange (Fig. 137); cauda short and rounded; dorsum of abdomen with dark markings on a yellowish or greenish background; apterous forms without a white woolly secretion; tightly curling leaves at ends of branches of peach and plum (Fig. 25).....*Aphis padi* Linnaeus p. 209
- Cornicles without a flange (Fig. 142); cauda elongate; dorsum of abdomen uniformly yellowish or greenish; apterous forms with a white woolly secretion; on lower sides of leaves and succulent stems of plum.....*Hyalopterus pruni* (Geoffroy) p. 232
3. Hind wings with longitudinal vein with one branch (Fig. 89); antennal tubercles not well developed (Fig. 79).....*Hysteroncra setariae* (Thomas) p. 232
- Hind wings with longitudinal vein with two branches (Fig. 91); antennal tubercles well developed (Fig. 86).....4
4. Almost uniformly reddish brown; cornicles distinctly imbricated throughout; partial to cherry (Fig. 39).....*Myzus cerasi* (Fabricius) p. 335
- Yellowish-green with dark markings; cornicles not distinctly imbricated throughout; partial to peach, causing leaves on shoots to curl.....*Myzus persicae* (Sulzer) p. 339

KEY TO THE SPECIES OF PLANT LICE LIKELY TO OCCUR ON
TRUCK CROPS IN ILLINOIS

1. Cornicles much longer than width of head through the eyes.....2
- Cornicles not longer than width of head through eyes.....3
2. Apical portion of cornicles reticulated (Fig. 111); species partial to potatoes and not likely to occur in numbers on other truck crops.....*Macrosiphum gei* (Koch) p. 306
- Apical portion of cornicles not reticulated (Fig. 129); species partial to peas and not likely to occur in numbers on other truck crops.....*Macrosiphum pisi* (Kaltenbach) p. 317
3. Abdomen entirely brown, bluish-black, or black, and dorsum often with small white spots; cauda and cornicles concolorous with abdomen; likely to be found on any truck crop.....*Aphis rumicis* Linnaeus p. 215
- Abdomen mostly shades of green or yellow; cauda and cornicles sometimes contrasting with abdomen.....4
4. Cornicles approximately as long as width of head through eyes; dorsum of abdomen with a large solid brownish patch anterior to cornicles; likely to occur on any truck crop.....*Myzus persicae* (Sulzer) p. 339
- Cornicles much shorter than width of head through eyes; dorsum of abdomen without a large solid brownish patch anterior to cornicles, although spots and transverse bars may be present.....5
5. Third antennal segment as long as, or longer than, combined length of fourth, fifth, and basal portion of sixth; apterous forms thickly covered with whitish powder; partial to cruciferous plants, often causing the leaves to blister or curl.....*Brevicoryne brassicae* (Linnaeus) p. 228
- Third antennal segment shorter than combined length of fourth, fifth, and basal portion of sixth; apterous forms not covered with whitish powder.....6

6. Veins of wings conspicuously outlined with fuscous; fourth antennal segment with four or more secondary sensoria; partial to cruciferous plants. *Rhopalosiphum pseudobrassicæ* (Davis) p. 240
- Veins of wings normal, not conspicuously outlined with fuscous; fourth antennal segment with secondary sensoria lacking, rarely one or two; partial to cucurbitaceous truck crops. *Aphis gossypii* Glover p. 195

KEY TO THE SPECIES OF PLANT LICE LIKELY TO OCCUR ON
PLANTS USED AS VINES IN ILLINOIS

1. Cornicles absent or inconspicuous. 2
- Cornicles present and conspicuous (Fig. 100). 3
2. Alate and apterous forms essentially brownish, usually covered with a white flocculent secretion; sixth antennal segment with terminal filament much shorter than basal portion (Fig. 244); on stems and leaves of smilax (Fig. 48). *Neoprociphilus attenuatus* (O. & S.) p. 362
- Alate and apterous forms essentially greenish white, usually covered with a white flocculent secretion; sixth antennal segment with terminal filament much longer than basal portion (Fig. 248); on leaves and terminal shoots of honeysuckle. *Gypsoaphis oestlundii* Hottes p. 167
3. Abdomen essentially yellow or yellowish-green with some dark markings. 4
- Abdomen dark-brown, reddish-brown, or black. 5
4. Antennal tubercles with a finger-like inward projecting protrusion (Fig. 85); cornicles slender and smooth; many irregularly distributed secondary sensoria on third antennal segment; on hop. *Phorodon humuli* (Schrank) p. 345
- Antennal tubercles without a projection (Fig. 80); cornicles stout and imbricated; secondary sensoria fewer and arranged more in a straight row; on angle-pod and morning glory. *Aphis nerii* Fonscolombe p. 206
5. Black or bluish-black, apterous forms with white spots on dorsum; on bittersweet. *Aphis rumicis* Linnaeus p. 215
- Alate and apterous forms essentially a uniform dark or reddish brown. 6
6. Third, fourth and fifth antennal segments of winged females of about the same length; on Boston ivy and Virginia creeper. *Aphis folsomii* Davis p. 193
- Third antennal segment of winged females much longer than fourth or fifth; on wild and cultivated grapes. *Aphis illinoisensis* Shimer p. 198

HOST INDEX

In this index are summarized all of our records of associations between plants and plant lice in Illinois. Under the scientific names of the plants are given lists of the species of plant lice found attacking them. The common names of many plants are inserted for convenience and references given to their scientific names.

The botanical and common names used in this paper are in accordance with the seventh edition of "*Gray's New Manual of Botany*," except for the cultivated plants and some not included in Gray's Manual because of their extralimital origins. For the cultivated plants we have followed the nomenclature of the "*Manual of Cultivated Plants*," by L. H. Bailey (1924). For other plants not covered by these references we have followed the "*Dictionary of Plant Names*," by H. L. Gerth van Wijk (1911).

- Acer Negundo
 Aphis rumicis L.
 Aphis spiraeicola Patch
 Periphyllus negundinis (Thomas)
 Acer saccharinum
 Clavigerus smithiae (Monell)
 Drepanaphis acerifoliae (Thomas)
 Drepanaphis monelli (Davis)
 Neoprociphilus aceris (Monell)
 Acer saccharum
 Aphis rumicis L.
 Clavigerus smithiae (Monell)
 Drepanaphis acerifoliae (Thomas)
 Drepanaphis keshenae Granovsky
 Drepanaphis monelli (Davis)
 Drepanaphis sp.
 Myzocallis ononidis (Kalt.)
 Myzocallis punctata (Monell)
 Neoprociphilus aceris (Monell)
 Periphyllus lyropictus (Kessler)
 Shenahweum minutum (Davis)
 Achillea Millefolium
 Capitophorus patonkus H. & F.
 Macrosiphum ambrosiae (Thomas)
 Macrosiphum frigidicola (G. & P.)
 Macrosiphum tapuskae H. & F.
 Actinomeris alternifolia
 Macrosiphum ambrosiae (Thomas)
 Macrosiphum ruralis H. & F.
 Aesculus glabra
 Drepanaphis monelli (Davis)
 Alder—see Alnus
 Alfalfa—see Medicago
 Alkanet—see Anchusa
 Alnus sp.
 Myzus alnifoliae (Fitch)
 Prociphilus tessellata (Fitch)
 Alum-root—see Heuchera
 Amaranth—see Amaranthus
 Amaranthus paniculatus
 Macrosiphum gei (Koch)
 Amaranthus retroflexus
 Macrosiphum gei (Koch)
 Amaranthus sp.
 Macrosiphum gei (Koch)
 Macrosiphum schranki Theobald
 Ambrosia trifida
 Macrosiphum ambrosiae (Thomas)
 Ambrosia sp.
 Macrosiphum ambrosiae (Thomas)
 Macrosiphum rudbeckiae (Fitch)
 Amelanchier sp.
 Prociphilus corrugatus (Sirrinc)
 American aspen—see Populus tremuloides
 American elm—see Ulmus americana
 Amphicarpa monoica
 Microparsus variabilis Patch
 Amsonia Tabernaemontana
 Aphis rhamni Fonsc.
 Anchusa myosotidiflora
 Aphis gossypii Glover
 Myzus circumflexus (Buckton)
 Angelica sp.
 Aphis signatis H. & F.
 Angle-pod—see Gonolobus
 Anthemis cotula
 Macrosiphum gei (Koch)
 Apium graveolens var. dulce
 Aphis gossypii Glover
 Macrosiphum gei (Koch)
 Myzus lactucae (Schrank)
 Myzus persicae (Sulz.)
 Apocynum sp.
 Aphis asclepiadis Fitch
 Aphis spiraeicola Patch
 Macrosiphum gei (Koch)

- Apple—see *Pyrus Malus*
Aquilegia canadensis
 Aphis spiraeicola Patch
 Myzus essigi G. & P.
 Myzus persicae (Sulz.)
Arabis Drummondii
 Aphis gossypii Glover
Arctium minus
 Aphis rumicis L.
Arctium sp.
 Myzus persicae (Sulz.)
Arctostaphylos Uva-ursi
 Amphorophora nervata (Gill.)
 Tamalia coweni (Kell.)
 Arrow-wood—see *Viburnum*
Artemisia abrotanum
 Macrosiphum frigidicola (G. & P.)
Artemisia pedemontana
 Macrosiphum frigidicola (G. & P.)
Artemisia sp.
 Macrosiphum gei (Koch)
 Macrosiphum ludoviciana (Oestl.)
Aruncus sylvestris
 Macrosiphum pseudorosae Patch
Asclepias curassavica
 Aphis nerii Fonsc.
Asclepias incarnata
 Aphis nerii Fonsc.
Asclepias sp.
 Aphis asclepiadis Fitch
 Aphis gossypii Glover
 Aphis rumicis L.
 Aphis spiraeicola Patch
 Macrosiphum gei (Koch)
 Myzocallis asclepiadis (Monell)
 Myzocallis punctata (Monell)
 Myzus persicae (Sulz.)
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 Aspen—see *Populus*
Aspidium sp.
 Macrosiphum adianti (Oestl.)
Asplenium Filix-femina
 Macrosiphum ptericolens Patch
Asplenium sp.
 Amphorophora laingi Mason
 Idiopterus nephrolepidis Davis
 Macrosiphum adianti (Oestl.)
 Macrosiphum ptericolens Patch
Aster novae-angliae
 Macrosiphum anomala H. & F.
Aster sp.
 Macrosiphum ambrosiae (Thomas)
 Macrosiphum anomala H. & F.
 Macrosiphum erigeronensis
 (Thomas)
 Macrosiphum gravicornis Patch
Avena sativa
 Aphis maidi-radici Forbes
 Forda olivacea Rohwer
 Geocia squamosa Hart
 Macrosiphum granarium (Kby.)
 Rhopalosiphum prunifoliae (Fitch)
 Toxoptera graminum (Rond.)
 Avena—see *Geum*
 Barberry—see *Berberis*
 Basswood—see *Tilia americana*
 Bearberry—see *Arctostaphylos*
 Bedstraw—see *Galium*
 Beech—see *Fagus grandifolia*
 Beet—see *Beta vulgaris*
 Beggar-ticks—see *Bidens vulgata*
Berberis Thunbergii minor
 Rhopalosiphum berberidis (Kalt.)
 Bergamot—see *Monarda fistulosa*
Beta vulgaris
 Myzus persicae (Sulz.)
Betula alba var. *papyrifera*
 Calaphis betulae (Fitch)
 Calaphis betulella Walsh
 Eucraphis betulae (Koch)
 Hamamelistes spinosus Shimer
 Neosymydobius americanus
 (Baker)
Betula nigra
 Calaphis betulella Walsh
 Hamamelistes spinosus Shimer
 Pemphigus ephemeratus H. & F.
Betula pendula
 Calaphis betulae (Fitch)
 Hamamelistes spinosus Shimer
 Neosymydobius annulatus (Koch)
Betula pumila
 Cepigillettea betulae foliae Gra-
 novsky
 Hamamelistes spinosus Shimer
Bidens vulgata
 Aphis coreopsidis (Thomas)
 Macrosiphum chrysanthemi
 (Oestl.)
Bidens sp.
 Aphis ageratoides Oestl.
 Aphis coreopsidis (Thomas)
 Macrosiphum chrysanthemi Oestl.
 Pemphigus tartareus H. & F.
 Bindweed—see *Convolvulus*
 Birch—see *Betula*
 Bittersweet—see *Celastrus* and *Solanum Dulcamara*
 Blackberry—see *Rubus*
 Black cherry—see *Prunus serotina*
 Black currant—see *Ribes nigrum*
 Black-eyed susan—see *Rudbeckia hirta*
 Black gum—see *Nyssa sylvatica*
 Black jack—see *Quercus marilandica*
 Black larch—see *Larix laricina*
 Black locust—see *Robinia Pseudo-Acacia*
 Black mustard—see *Brassica nigra*
 Black oak—see *Quercus velutina*
 Black snakeroot—see *Sanicula*
 Black walnut—see *Juglans nigra*
 Black willow—see *Salix nigra*
 Blazing star—see *Liatris squarrosa*
Blephilia hirsuta
 Aphis agertoides Oestl.

- Bloodflower—see *Asclepias curasavica*
 Bloodroot—see *Sanguinaria canadensis*
 Blue beech—see *Carpinus caroliniana*
 Blueberry—see *Vaccinium*
 Boston ivy—see *Parthenocissus tricuspidata*
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 Bramble—see *Rubus*
 Brasenja Schreberi
 Aphis maidis Fitch
 Brassica nigra
 Aphis maidi-radici Forbes
 Brassica oleracea
 Brevicoryne brassicae (L.)
 Myzus persicae (Sulz.)
 Rhopalosiphum pseudobrassicae (Davis)
 Brassica rapa
 Myzus persicae (Sulz.)
 Rhopalosiphum pseudobrassicae (Davis)
 Brassica sp.
 Myzocallis asclepiadis (Monell)
 Myzus persicae (Sulz.)
 Rhopalosiphum pseudobrassicae (Davis)
 Brickellia grandiflora
 Aphis ageratoidis Oestl.
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 Broom corn—see *Holcus Sorghum* var. *technicus*
 Buckeye—see *Aesculus*
 Buckthorn—see *Rhamnus*
 Buffalo currant—see *Ribes odoratum*
 Bull thistle—see *Cirsium lanceolatum*
 Burdock—see *Arctium*
 Bur marigold—see *Bidens*
 Bur oak—see *Quercus macrocarpa*
 Burning bush—see *Evonymus atropurpureus*
 Bush honeysuckle—see *Diervilla*
 Buttercup—see *Ranunculus*
 Butter-weed—see *Erigeron canadensis* and *Senecio glabellus*
 Buttonbush—see *Cephalanthus*
 Button snakeroot—see *Liatris*
 Buttonwood—see *Platanus occidentalis*
 Cabbage—see *Brassica oleracea*
 Calendula sp.
 Macrosiphum gei (Koch)
 Canada plum—see *Prunus nigra*
 Canada thistle—see *Cirsium arvense*
 Canoe birch—see *Betula pendula* and *Betula alba* var. *papyrifera*
 Cape primrose—see *Streptocarpus*
 Capsella Bursa-pastoris
 Forda occidentalis Hart
 Geonica squamosa Hart
 Capsicum dulce
 Aphis gossypii Glover
 Macrosiphum gei (Koch)
 Myzus persicae (Sulz.)
 Carex sp.
 Aphis maidis Fitch
 Aphis rumicis L.
 Iziphya flabella (Sanborn)
 Macrosiphum pisi (Kalt.)
 Rhopalosiphum enigmae var. *parvae* H. & F.
 Rhopalosiphum melliferum (Hottes)
 Rhopalosiphum prunifoliae (Fitch)
 Saltusaphis elongata Baker
 Saltusaphis wanica H. & F.
 Sipha flava (Forbes)
 Thripsaphis ballii (Gill.)
 Thripsaphis producta Gill.
 Thripsaphis verrucosa Gill.
 Toxoptera graminum (Rond.)
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 Carpinus caroliniana
 Macrosiphum carpinicolens Patch
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 Carya illinoensis
 Longistigma caryae (Harris)
 Monellia caryella (Fitch)
 Monellia nigropunctata Granovsky
 Carya ovata
 Monellia caryella (Fitch)
 Monellia costalis (Fitch)
 Monellia nigropunctata Granovsky
 Carya sp.
 Melanocallis fumipennella (Fitch)
 Monellia caryae (Monell)
 Monellia caryella (Fitch)
 Monellia costalis (Fitch)
 Monellia nigropunctata Granovsky
 Myzocallis discolor (Monell)
 Myzocallis punctata (Monell)
 Myzocallis walshii (Monell)
 Tuberculatus punctatellus (Fitch)
 Castalia sp.
 Rhopalosiphum nymphaeae (L.)
 Castanea dentata
 Anoea oenotherae Wilson
 Calaphis castaneae (Fitch)
 Longistigma caryae (Harris)
 Catalpa speciosa
 Aphis spiraeicola Patch
 Myzus persicae (Sulz.)
 Catawba tree—see *Catalpa*
 Cat brier—see *Smilax*
 Cat mint—see *Nepeta*
 Catnip—see *Nepeta*
 Cat spruce—see *Picea canadensis*
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 Cedar—see *Juniperus virginiana*

- Celastrus scandens*
 Aphis rumicis L.
 Aphis spiraeicola Patch
 Macrosiphum pisi (Kalt.)
Celery—see *Apium*
Cephalanthus occidentalis
 Aphis cephalanthi Thomas
Chamomile—see *Anthemis*
Chenopodium album
 Hyalopterus atriplicis (L.)
Chenopodium sp.
 Aphis gossypii Glover
 Macrosiphum gei (Koch)
 Myzus persicae (Sulz.)
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Chestnut—see *Castanea*
Chokeberry—see *Pyrus arbutifolia*
 var. *atropurpurea*
Choke cherry—see *Prunus virginiana*
Chrysanthemum sp.
 Macrosiphum sanborni Gill.
 Myzus circumflexus (Buckton)
 Rhopalosiphum rufomaculatum
 (Wilson)
Cineraria—see *Senecio cruentus*
Cinquefoil—see *Potentilla*
Cirsium arvense
 Aphis rumicis L.
Cirsium lanceolatum
 Aphis carduella Walsh
 Aphis cardui L.
 Aphis rumicis L.
 Capitophorus flaveolus (Walker)
Cirsium sp.
 Capitophorus flaveolus (Walker)
 Macrosiphum ambrosiae (Thomas)
Clearweed—see *Pilea*
Climbing bittersweet—see *Celastrus*
Climbing dogbane—see *Trachelospermum*
Clotbur—see *Xanthium*
Clover—see *Melilotus* and *Trifolium*
Coccoloba laurifolia
 Aphis gossypii Glover
Coccoloba flendana
 Aphis gossypii Glover
Cocklebur—see *Xanthium*
Columbine—see *Aquilegia*
Cone-flower—see *Rudbeckia*
Conioselinum chinense
 Rhopalosiphum melliferum
 (Hottes)
Convolvulus sepium
 Aphis nerii Fonsc.
Convolvulus sp.
 Aphis nerii Fonsc.
 Aphis spiraeicola Patch
 Macrosiphum gei (Koch)
 Myzus persicae (Sulz.)
Coral-berry—see *Symphoricarpos orbiculatus*
Corn—see *Zea Mays*
Cornel—see *Cornus*
Cornelian cherry—see *Cornus mas*
Cornus mas
 Aphis helianthi Monel.
Cornus stolonifera
 Aphis cornifoliae Fitch
 Aphis helianthi Monell.
Cornus stricta
 Aphis spiraeicola Patch
Cornus sp.
 Anoecia querci (Fitch)
 Aphis caliginosa H. & F.
 Aphis cornifoliae Fitch
 Aphis helianthi Monell
 Aphis spiraeicola Patch
Corylus americana
 Macrosiphum coryli Davis
 Myzocallis coryli (Goeze)
Cotton—see *Gossypium*
Cotton-wood—see *Populus deltoides*
Cowslip—see *Dodecatheon*
Cranberry—see *Vaccinium*
Cranberry-tree—see *Viburnum opulus* var. *americanum*
Cranesbill—see *Geranium*
Crataegus Crus-galli
 Prociphilus corrugatus (Sirrine)
 Rhopalosiphum prunifoliae (Fitch)
Crataegus tomentosa
 Macrosiphum crataegi (Monell)
Crataegus sp.
 Aphis crataegifoliae Fitch
 Aphis pomi DeGeer
 Eriosoma crataegi (Oestl.)
 Macrosiphum crataegi (Monell)
 Rhopalosiphum prunifoliae (Fitch)
 Tuberculatus ulmifolii (Monell)
Crocus sp.
 Aphis gossypii Glover
Crowfoot—see *Ranunculus*
Cryptotaenia canadensis
 Macrosiphum gei (Koch)
 Rhopalosiphum melliferum
 (Hottes)
Cucumber—see *Cucumis sativus*
Cucumis melo
 Aphis gossypii Glover
Cucumis sativus
 Aphis gossypii Glover
 Aphis spiraeicola Patch
Cup plant—see *Silphium perfoliatum*
Cucurbita maxima
 Aphis gossypii Glover
 Macrosiphum gei (Koch)
Cucurbita Pepo
 Aphis gossypii Glover
 Macrosiphum gei (Koch)
Currant—see *Ribes*
Cut-leaf birch—see *Betula pendula*
Cyclamen indicum
 Myzus persicae (Sulz.)
Cycloloma atriplicifolium
 Macrosiphum gei (Koch)

- Daisy—see *Chrysanthemum*
 Daisy fleabane—see *Erigeron annuus*
 Dandelion—see *Taraxacum*
 Daucus carota
 Aphis tulipae Fonsc.
 Rhopalosiphum melliferum
 (Hottes)
 Delphinium tricornae
 Aphis rociadae Ckll.
 Desmodium sp.
 Microparsus variabilis Patch
 Dianthus sp.
 Aphis rumicis L.
 Myzus persicae (Sulz.)
 Diervilla sp.
 Aphis gossypii Glover
 Dock—see *Rumex*
 Dodecatheon Meadia
 Aphis spiraeicola Patch
 Dogbane—see *Apocynum*
 Dog fennel—see *Anthemis cotula*
 Dogwood—see *Cornus*
 Downy poplar—see *Populus hetero-*
 phylla
 Duck's-meat—see *Lemna*
 Duckweed—see *Lemna*
- Easter lily—see *Lilium*
 Egg-plant—see *Solanum Melongena*
 Eichhornia sp.
 Rhopalosiphum nymphaeae (L.)
 Elaeagnus sp.
 Capitophorus flaveolus (Walker)
 Capitophorus gillettei Theobald
 Elder—see *Sambucus*
 Elecampane—see *Inula*
 Eleusine indica
 Anoecia querci (Fitch)
 Elm—see *Ulmus*
 Elymus sp.
 Periphyllus negundinis (Thomas)
 Erigeron annuus
 Macrosiphum erigeronensis
 (Thomas)
 Erigeron canadensis
 Macrosiphum erigeronensis
 (Thomas)
 Prociphilus erigeronensis
 (Thomas)
 Erigeron philadelphicus
 Anoecia querci (Fitch)
 Aphis maidi-radici Forbes
 Geocica squamosa Hart
 Macrosiphum erigeronensis
 (Thomas)
 Macrosiphum gravicornis Patch
 Pemphigus brevicornis (Hart)
 Erigeron sp.
 Anoecia querci (Fitch)
 Macrosiphum erigeronensis
 (Thomas)
 Macrosiphum gravicornis Patch
 Eupatorium purpureum var. macu-
 latum
 Aphis vernoniae Thomas
 Eupatorium urticaefolium
 Aphis ageratoidis Oestl.
 Aphis coreopsidis (Thomas)
 Macrosiphum ambrosiae (Thomas)
 Macrosiphum chrysanthemi
 (Oestl.)
 Macrosiphum gei (Koch)
 Macrosiphum rudbeckiae (Fitch)
 Euphorbia marginata
 Macrosiphum gei (Koch)
 Euphorbia sp.
 Aphis pulchella H. & F.
 Macrosiphum gei (Koch)
 Evening primrose—see *Oenothera*
 biennis
 Everlasting pea—see *Lathyrus*
 Evonymus alatus
 Aphis rumicis L.
 Evonymus atropurpureus
 Aphis rumicis L.
- Fagus grandifolia
 Prociphilus imbricator (Fitch)
 Phyllaphis fagi (L.)
 Fern—see *Aspidium*, *Asplenium*, and
 Nephrolepis
 Fetid Buckeye—see *Aesculus glabra*
 Figwort—see *Scrophularia*
 Filbert—see *Corylus*
 Fir—see *Pinus sylvestris*
 Fleabane—see *Erigeron*
 Fleur-de-lis—see *Iris*
 Flowering almond—see *Prunus ja-*
 ponica
 Flowering cherry—see *Prunus tri-*
 loba
 Forget-me-not—see *Myosotis*
 Foxtail—see *Setaria glauca*
 Fragaria sp.
 Aphis forbesi Weed
 Capitophorus fragaefolii (Ckll.)
 Capitophorus minor (Forbes)
 Fraxinus pennsylvanica var. lanceo-
 lata
 Prociphilus fraxinifolii (Riley)
 Fraxinus americana
 Prociphilus fraxinifolii (Riley)
 Fraxinus sp.
 Prociphilus fraxinifolii (Riley)
 Fuchsia sp.
 Myzus circumflexus (Buckton)
- Galium sp.
 Aphis rumicis L.
 Myzus cerasi (F.)
 Rhopalosiphum nymphaeae (L.)
 Garland flower—see *Hedychium cor-*
 onarium
 Gaura biennis
 Macrosiphum pseudorosae Patch
 Gaura sp.
 Macrosiphum pseudorosae Patch
 Geranium maculatum
 Macrosiphum geranii (Oestl.)

- Geranium sp., wild
 Macrosiphum geranli (Oestl.)
 Geranium sp., cultivated
 Myzus circumflexus (Buckton)
 Gerardia pedicularia
 Aphis rumicis var. *gerardiae*
 Geum canadense
 Amphorophora rossi H. & F.
 Macrosiphum pseudorosae Patch
 Ginger-lily—see *Hedychium*
 Goat's beard—see *Aruncus*
 Golden alexanders—see *Zizia aurea*
 Golden-glow—see *Rudbeckia laciniata* var. *hortensia*
 Golden-rod—see *Solidago*
 Gonolobus laevis
 Aphis nerii Fonse.
 Gooseberry—see *Ribes*
 Goosefoot—see *Chenopodium*
 Goose grass—see *Eleusine*
 Gossypium sp.
 Aphis gossypii Glover
 Gourd—see *Cucurbita* and *Lagenaria vulgaris*
 Grape—see *Vitis*
 Grass—see *Setaria*, *Eleusine*, *Elymus*, *Panicum*, and *Poa*.
 Grasses—(unidentified)
 Amphorophora singularis H. & F.
 Anoecia querci (Fitch)
 Brachycolus tritici Gill.
 Colopha graminis (Monell)
 Colopha ulmicola (Fitch)
 Forda occidentalis Hart
 Forda olivacea Rohwer
 Geioica squamosa Hart
 Prociphilus erigeronensis (Thomas)
 Rhopalosiphum prunifoliae (Fitch)
 Sipha flava (Forbes)
 Great ragweed—see *Ambrosia trifida*
 Green Amaranth—see *Amaranthus retroflexus*
 Green ash—see *Fraxinus pennsylvanica* var. *lanceolata*
 Green brier—see *Smilax*
 Green foxtail grass—see *Setaria viridis*
 Groundsel—see *Senecio*
 Hackmatack—see *Larix laricina*
 Hamamelis virginiana
 Hamamelistes spinosus Shimer
 Hamamelis sp.
 Hamamelistes spinosus Shimer
 Hormaphis hamamelidis (Fitch)
 Hard maple—see *Acer saccharum*
 Hawkweed—see *Hieracium*
 Hawthorn—see *Crataegus*
 Hazelnut—see *Corylus americana*
 Heart's ease—see *Viola tricolor* and *Viola*
 Hedge bindweed—see *Convolvulus sepium*
Hedychium coronarium
 Pentalonia nigronervosa Coquerel
Helenium autumnale
 Aphis gossypii Glover
 Aphis vernoniae Thomas
 Macrosiphum tardae H. & F.
Helianthus sp.
 Aphis debilicornis G. & P.
 Aphis helianthi Monell
 Aphis rumicis L.
 Macrosiphum ambrosiae (Thomas)
 Macrosiphum gei (Koch)
 Macrosiphum illini H. & F.
 Macrosiphum illini var. *crudae* H. & F.
 Macrosiphum illini var. *sangamonensis* H. & F.
 Macrosiphum rudbeckiae Fitch
 Macrosiphum ruralis H. & F.
 Myzus persicae (Sulz.)
Helichrysum bracteatum
 Aphis spiraeicola Patch
 Hemlock parsley—see *Conioselinum*
 Heuchera sp.
 Myzus heucherae (Thomas)
 Hibiscus sp.
 Aphis rhamni Fonse.
 Hickory—see *Carya*
 Hieracium venosum
 Macrosiphum rudbeckiae (Fitch)
 High-bush cranberry—see *Viburnum opulus* var. *americanum*
 Hog peanut—see *Amphicarpa*
 Holcus Sorghum var. *saccharatus*
 Sipha flava (Forbes)
 Holcus Sorghum var. *technicus*
 Sipha flava (Forbes)
 Honewort—see *Cryptotaenia*
 Honeysuckle—see *Diervilla* and *Lonicera*
 Hop—see *Humulus*
 Hop clover—see *Trifolium procumbens*
 Hornbeam—see *Carpinus*
 Horse chestnut—see *Aesculus*
 Horse mint—see *Monarda*
 Horse radish—see *Radicula Armoracia*
 Horsetweed—see *Erigeron canadensis* and *Lactuca canadensis*
 Humulus Lupulus
 Phorodon humuli (Schränk)
 Hydrangea sp.
 Aphis rumicis L.
 Aphis spiraeicola Patch
 Hypericum sp.
 Hyalopterus hyperici (Monell)
 Impatiens biflora
 Aphis cephalanthi Thomas

- Impatiens* sp.
 Aphis cephalanthi Thomas
 Macrosiphum impatiensicolens Patch
 Macrosiphum pseudorosae Patch
 Indian bean—see *Catalpa*
 Indian hemp—see *Apocynum*
Inula royaleana
 Capitophorus pakansus H. & F.
Ipomoea batatas
 Macrosiphum gei (Koch)
Ipomoea maxima
 Myzus circumflexus (Buckton)
 Myzus persicae (Sulz.)
Iris sp.
 Macrosiphum gei (Koch)
 Iron oak—see *Quercus stellata*
 Ironweed—see *Vernonia*
Ivy, boston—see *Parthenocissus tricuspidata*

 Japanese barberry—see *Berberis*
 Jewelweed—see *Impatiens*
 Joe Pye weed—see *Eupatorium purpureum* var. *maculatum*
Juglans nigra
 Monellia caryae (Monell)
 Monellia caryella (Fitch)
 Monellia costalis (Fitch)
 Monellia nigropunctata Granovsky
 Juneberry—see *Amelanchier*
 June grass—see *Poa pratensis*
 Juniper—see *Juniperus*
Juniperus virginiana
 Cinara difficilis H. & F.

 Kentucky blue grass—see *Poa pratensis*
 Knotweed—see *Polygonum*

Lactuca canadensis
 Macrosiphum sonchella (Monell)
Lactuca sp.
 Amphorophora cosmopolitana Mason
 Macrosiphum ambrosiae (Thomas)
 Macrosiphum gei (Koch)
 Macrosiphum graminis Patch
 Macrosiphum rudbeckiae (Fitch)
 Macrosiphum sonchellum (Monell)
 Myzus lactucae (Schränk)
 Prociphilus erigeronensis (Thomas)
 Lady fern—see *Asplenium Filix-femina*
Lagenaria vulgaris
 Aphis gossypii Glover
 Macrosiphum gei (Koch)
 Lamb's quarters—see *Chenopodium album*
 Larch—see *Larix*
 Large-toothed aspen—see *Populus grandidentata*

Larix laricina
 Cinara laricis (Hartig)
 Larkspur—see *Delphinium*
Lathyrus sp.
 Macrosiphum gei (Koch)
 Macrosiphum pisi (Kalt.)
 Trifidaphis phaseoli (Pass.)
 Laurel oak—see *Quercus imbricaria*
 Laurestinus—see *Viburnum*
 Leafcup—see *Polymnia*
Lemna trisulca
 Rhopalosiphum nymphaeae (L.)
Lepidium virginicum
 Pemphigus populi-transversus Riley
 Rhopalosiphum pseudobrassicae (Davis)
 Lettuce—see *Lactuca*
Liatris elegans
 Aphis zilora H. & F.
Liatris squarrosa
 Aphis funesta H. & F.
 Aphis spiraeicola Patch
Ligustrum vulgare
 Aphis rumicis L.
 Macrosiphum gei (Koch)
 Myzus persicae (Sulz.)
Ligustrum sp.
 Macrosiphum gei (Koch)
Lilium sp.
 Myzus circumflexus (Buckton)
 Lily—see *Lilium*
 Linden—see *Tilia*
Liriodendron Tulipifera
 Macrosiphum liriodendri (Monell)
 Locust—see *Robinia*
 Lombardy poplar—see *Populus nigra* var. *italica*
 Long-leaved pine—see *Pinus palustris*
Lonicera flava
 Rhopalosiphum melliferum (Hottes)
Lonicera sempervirens
 Rhopalosiphum melliferum (Hottes)
Lonicera sp.
 Alphitoaphis lonicericola (Williams)
 Gypsoaphis oestlundii Hottes
 Rhopalosiphum melliferum (Hottes)
 Loosestrife—see *Lysimachia*
 Lotus—see *Nymphaeae*
 Low birch—see *Betula pumila*
 Lucerne—see *Medicago*
Lycopersicon esculentum Mill.
 Amphorophora solani (Thomas)
 Macrosiphum gei (Koch)
 Myzus persicae (Sulz.)
Lysimachia producta
 Thecabius ? sp.

- Mallow—see *Hibiscus* and *Malva*
Malva sp.
 Aphis gossypii Glover
 Maple—see *Acer*
 Marigold—see *Calendula*
Marsilea quadrifolia
 Myzus persicae (Sulz.)
 May weed—see *Anthemis cotula*
 Mazzard—see *Prunus avium*
 Meadow grass—see *Poa*
 Meadow rue—see *Thalictrum*
 Meadow-sweet—see *Spiraea*
Medicago sativa
 Macrosiphum pisi (Kalt.)
 Medick—see *Medicago*
Melilotus alba
 Hysteroneura setariae (Thomas)
 Macrosiphum pisi (Kalt.)
Melilotus officinalis
 Macrosiphum pisi (Kalt.)
 Milfoil—see *Achillea Millefolium*
 Milkweed—see *Asclepias*
Mimulus sp.
 Myzus persicae
 Missouri currant—see *Ribes odoratum*
 Mock orange—see *Philadelphus coronarius*
Monarda fistulosa
 Aphis monardae Oestl.
 Myzus monardae (Williams)
Monarda sp.
 Myzus monardae (Williams)
 Monkey flower—see *Mimulus*
 Morning glory—see *Ipomoea*
 Mossy-cup oak—see *Quercus macrocarpa*
 Mountain ash—see *Pyrus americana*
 Muskmelon—see *Cucumis melo*
 Mustard—see *Brassica*
Myosotis sp.
 Aphis padi L.
 Myzus persicae (Sulz.)

Nasturtium—see *Tropaeolum majus*
 Necklace poplar—see *Populus deltoides*
Nepeta Cataria
 Aphis ageratoides Oestl.
 Aphis rhamni Fonsc.
 Aphis rumicis L.
Nephrolepis sp.
 Idiopterus nephrolepidis Davis
 Nettle—see *Urtica*
 Nightshade—see *Solanum*
 Nine-bark—see *Physocarpus*
 Norway spruce—see *Picea abies*
Nymphaea castaleiflora (?)
 Rhopalosiphum nymphaeae (L.)
Nymphaea sp.
 Aphis maidis Fitch
Nyssa sylvatica
 Aphis coreopsidis (Thomas)
- Oak—see *Quercus*
 Oats—see *Avena*
Oenothera biennis
 Anoecia oenotherae Wilson
 Anoecia setariae G. & P.
 Aphis oestlundii Gillette
 Macrosiphum ambrosiae (Thomas)
 Macrosiphum pseudorosae Patch
Oenothera sp.
 Anoecia oenotherae Wilson
 Anoecia setariae G. & P.
 Aphis oestlundii Gillette
 Ohio buckeye—see *Aesculus glabra*
 Orpine—see *Sedum*
 Osier—see *Salix*
 Over-cup oak—see *Quercus macrocarpa*
 Ox-eye daisy—see *Chrysanthemum*
Oxybaphus nyctagineus
 Aphis rumicis L.

 Panic grass—see *Panicum*
Panicum sp.
 Prociphilus erigeronensis (Thomas)
 Pansy—see *Viola tricolor*
 Paper birch—see *Betula alba* var. *papyrifera*
 Parsnip—see *Pastinaca*
Parthenocissus tricuspidata
 Aphis folsomii Davis
Partheuocissus sp.
 Aphis folsomii Davis
Pastinaca sativa
 Aphis decepta H. & F.
 Aphis rumicis L.
 Aphis spiraeicola Patch
 Macrosiphum gei (Koch)
 Rhopalosiphum melliferum (Hottes)
 Pea—see *Lathyrus* and *Pisum*
 Peach—see *Prunus persica*
 Peach-leaved willow—see *Salix amygdaloides*
 Pear—see *Pyrus communis*
 Pecan—see *Carya illinoensis*
Pentstemon sp.
 Macrosiphum gei (Koch)
 Pepper—see *Capsicum*
 Peppergrass—see *Lepidium*
 Pepperidge—see *Nyssa*
 Pepperwort—see *Lepidium*
Philadelphus coronarius
 Aphis rumicis L.
 Myzus persicae (Sulz.)
Phragmites sp.
 Hyalopterus pruni (Geoffroy)
Physocarpus opulifolius
 Aphis neilliae Oestl.
Picea Abies
 Cinara pinicola (Kalt.)
Picea canadensis
 Cinara pinicola (Kalt.)

- Picea* sp.
 Cinara palmerae (Gill.)
 Cinara pinicola (Kalt.)
 Pigeon grass—see *Setaria glauca*
 Pigeon plum—see *Coccoloba laurifolia*
 Pigweed—see *Amaranthus retroflexus* and *Chenopodium album*
Pilea pumila
 Asiphonaphis anogis H. & F.
 Pine—see *Pinus*
 Pink—see *Dianthus*
 Pin oak—see *Quercus palustris*
Pinus echinata
 Eulachnus rileyi (Williams)
Pinus palustris
 Eulachnus rileyi (Williams)
Pinus Strobus
 Cinara strobis (Fitch)
 Eulachnus rileyi (Williams)
 Mindarus abietinus Koch
Pinus sylvestris
 Cinara pini (L.)
 Eulachnus rileyi (Williams)
Piqueria trinervia
 Myzus persicae (Sulz.)
Pisum sativum
 Macrosiphum gei (Koch)
 Macrosiphum pisi (Kalt.)
Plantago sp.
 Aphis maidi-radidis Forbes
 Aphis roseus Baker
 Myzus persicae (Sulz.)
 Myzus plantagineus Pass.
 Plaintain—see *Plantago*
Platanus occidentalis
 Longistigma caryae (Harris)
 Plum—see *Prunus domestica*
 Plumed thistle—see *Cirsium*
Poa pratensis
 Capitophorus poae (Gill.)
Poa sp.
 Amphorophora nebulosa H. & F.
 Forda occidentalis Hart
 Geioica squamosa Hart
 Prociphilus erigeronensis (Thomas)
 Rhopalosiphum prunifoliae (Fitch)
Polygonatum sp.
 Macrosiphum gei (Koch)
 Macrosiphum kickapoo H. & F.
Polygonum hydropiper
 Aphis maidi-radidis Forbes
 Aphis spiraeicola Patch
 Capitophorus gillettei Theobald
Polygonum Muhlbergii
 Macrosiphum ambrosiae (Thomas)
 Macrosiphum gei (Koch)
 Macrosiphum pisi (Kalt.)
Polygonum sp.
 Macrosiphum gei (Koch)
Polymnia canadensis
 Macrosiphum zinzalae H. & F.
 Polymnia sp.
 Capitophorus gillettei Theobald
 Macrosiphum gei (Koch)
 Pondweed—see *Potamogeton*
 Poor robin's plantain—see *Hieracium venosum*
Poplar—see *Populus*
Populus deltoides
 Asiphum pseudobyrza Walsh
 Chaitophorus populifoliae Oestl.
 Chaitophorus neglectus H. & F.
 Clavigerus smithiae (Monell)
 Mordwilkoja vagabunda (Walsh)
 Pemphigus nortoni Maxson
 Pemphigus populicaulis Fitch
 Pemphigus populi-transversus Riley.
 Pemphigus populi-venae Fitch
 Periphyllus populicola (Thomas)
 Prociphilus venafuscus (Patch)
Populus grandidentata
 Chaitophorus neglectus H. & F.
 Chaitophorus populifoliae Oestl.
 Clavigerus smithiae (Monell)
Populus heterophylla
 Chaitophorus populifoliae Oestl.
Populus nigra var. *italica*
 Periphyllus populicola (Thomas)
Populus tremuloides
 Aphis maculatae Oestl.
 Chaitophorus populifoliae Oestl.
 Periphyllus populicola (Thomas)
Populus sp.
 Asiphum pseudobyrza Walsh
 Pemphigus populi-transversus Riley
 Periphyllus populicola (Thomas)
Portulaca oleracea
 Aphis gossypii Glover
 Myzus persicae (Sulz.)
Portulaca sp.
 Aphis maidi-radidis Forbes
 Post oak—see *Quercus stellata*
Potamogeton natans
 Rhopalosiphum nymphaeae (L.)
Potamogeton sp.
 Rhopalosiphum nymphaeae (L.)
 Potato—see *Solanum tuberosum*
Potentilla monspeliensis
 Capitophorus fragaefolii (Ckll.)
Potentilla sp.
 Capitophorus fragaefolii (Ckll.)
 Macrosiphum pseudorosae Patch
Prenanthes alba
 Amphorophora nabali (Oestl.)
 Macrosiphum ambrosiae (Thomas)
 Macrosiphum chrysanthemi (Oestl.)
Prenanthes sp.
 Macrosiphum ambrosiae (Thomas)
 Prim—see *Ligustrum*
 Primrose—see *Oenothera* and *Streptocarpus*

- Privet—see *Ligustrum*
 Prune—see *Prunus domestica*
Prunus americana
 Myzus persicae (Sulz.)
Prunus avium
 Hysteroneura setariae (Thomas)
 Myzus cerasi (Fabr.)
 Myzus persicae (Sulz.)
Prunus domestica
 Aphis pomi DeGeer
 Hyalopterus pruni (Geoffroy)
 Hysteroneura setariae (Thomas)
 Myzus persicae (Sulz.)
Prunus japonica
 Aphis pomi DeGeer
 Rhopalosiphum prunifoliae (Fitch)
Prunus nigra
 Aphis cerasifoliae Fitch
 Hysteroneura setariae (Thomas)
Prunus Persica
 Aphis padi L.
 Aphis persicae-niger Smith
 Hysteroneura setariae (Thomas)
 Myzus cerasi (F.)
 Myzus persicae (Sulz.)
Prunus serotina
 Aphis feminea Hottes
 Myzus persicae (Sulz.)
Prunus triloba
 Hysteroneura setariae (Thomas)
Prunus virginiana
 Aphis cerasifoliae Fitch
 Aphis pomi DeGeer
 Asiphonaphis pruni Wilson & Davis
 Hysteroneura setariae (Thomas)
Prunus sp.
 Aphis cerasifoliae Fitch
 Aphis chetansapa H. & F.
 Asiphonaphis pruni Wilson & Davis
 Hysteroneura setariae (Thomas)
 Pumpkin—see *Cucurbita Pepo*
 Purple amaranth—see *Amaranthus paniculatus*
 Purslane—see *Portulaca*
Pyrus americana
 Aphis pomi DeGeer
Pyrus arbutifolia var. *atropurpurea*
 Aphis cerasifoliae Fitch
Pyrus communis
 Aphis pomi DeGeer
Pyrus Malus
 Aphis maidis Fitch
 Aphis pomi DeGeer
 Aphis roseus Baker
 Eriosoma lanigera (Hausmann)
 Rhopalosiphum prunifoliae (Fitch)
Pyrus sp.
 Aphis chetansapa H. & F.
 Aphis pomi DeGeer
 Quaking asp—see *Populus tremuloides*
 Quercitron oak—see *Quercus velutina*
Quercus alba
 Drepanaphis acerifoliae (Thomas)
 Myzocallis alhambra Davidson
 Myzocallis discolor (Monell)
 Myzocallis walshii (Monell)
 Stegophylla quercicola (Baker)
 Tuberculatus punctatellus (Fitch)
Quercus bicolor
 Myzocallis alhambra Davidson
 Myzocallis walshii (Monell)
Quercus imbricaria
 Myzocallis walshii (Monell)
Quercus macrocarpa
 Chaitophorus quercicola (Monell)
 Myzocallis alhambra Davidson
 Myzocallis discolor (Monell)
 Neosymydobius albasiphus (Davis)
 Stegophylla quercicola (Baker)
 Tuberculatus punctatellus (Fitch)
Quercus marilandica
 Myzocallis punctata (Monell)
Quercus palustris
 Myzocallis discolor (Monell)
 Myzocallis punctata (Monell)
 Myzocallis walshii (Monell)
Quercus stellata
 Neosymydobius albasiphus (Davis)
 Neosymydobius memorialis H. & F.
 Stegophylla quercicola (Baker)
Quercus velutina
 Myzocallis bella (Walsh)
 Myzocallis walshii (Monell)
 Tuberculatus punctatellus (Fitch)
Quercus sp.
 Anoecia querci (Fitch)
 Monellia caryella (Fitch)
 Myzocallis alhambra Davidson
 Myzocallis bella (Walsh)
 Myzocallis discolor (Monell)
 Myzocallis punctata (Monell)
 Myzocallis walshii (Monell)
 Neosymydobius albasiphus (Davis)
 Tuberculatus punctatellus (Fitch)
 Quince—see *Prunus japonica*
 Radicula *Armoracia*
 Myzus persicae (Sulz.)
 Radish—see *Raphanus sativus*
 Ragweed—see *Ambrosia*
 Ragwort—see *Senecio*
Ranunculus sp.
 Thecabius gravicornus Patch
Raphanus sativus
 Myzocallis asclepiadis (Monell)
 Myzus persicae (Sulz.)
 Rhopalosiphum pseudobrassicae (Davis)
 Raspberry—see *Rubus occidentalis*

- Rattlesnake-root—see *Prenanthes*
 Rattlesnake-weed—see *Hieracium venosum*
 Red birch—see *Betula nigra*
 Red cedar—see *Juniperus virginiana*
 Red clover—see *Trifolium pratense*
 Red elm—see *Ulmus fulva*
 Red-osier dogwood—see *Cornus stolonifera*
 Reed—see *Phragmites*
 Rhamnus lanceolata
 Aphis rhamni Fonsc.
Rhus canadensis
 Rhopalosiphum rhois (Monell)
Rhus glabra
 Rhopalosiphum rhois (Monell)
Rhus sp.
 Liosomaphis rhois (Monell)
 Melaphis rhois (Fitch)
Ribes Grossularia
 Aphis sanborni Patch
 Capitophorus ribis (L.)
 Myzus houghtonensis (Troop)
Ribes nigrum
 Amphorophora cosmopolitana Mason
 Aphis sanborni Patch
 Capitophorus ribis (L.)
Ribes odoratum
 Amphorophora cosmopolitana Mason
 Capitophorus ribis (L.)
 Macrosiphum ribiellum Davis
 Myzus persicae (Sulz.)
Ribes sp.
 Aphis sanborni Patch
 Capitophorus ribis (L.)
 Macrosiphum ribiellum Davis
 Myzus houghtonensis (Troop)
 Myzus thomasi H. & F.
Ribwort—see *Plantago*
Richweed—see *Pilea*
River birch—see *Betula nigra*
Robinia Pseudo-Acacia
 Aphis laburni Kalt.
 Aphis rumicis L.
Rock cress—see *Arabis*
Rock moss—see *Sedum*
Rosa rugosa
 Capitophorus fragaefolii (Ckll.)
 Myzus porosus (Sanderson)
Rosa sp.
 Capitophorus corambus H. & F.
 Capitophorus fragaefolii (Ckll.)
 Capitophorus tetrarhodus (Walker)
 Macrosiphum dirhodum (Walker)
 Macrosiphum gei (Koch)
 Macrosiphum pseudorosae Patch
 Macrosiphum rosae (L.)
 Myzus circumflexus (Buckton)
 Myzus porosus Sanderson
Rose—see *Rosa*
Rose mallow—see *Hibiscus*
Rosin-weed—see *Silphium*
Rubus sp.
 Amphorophora sensoria Mason
 Aphis rubicola Oestl.
 Cerosipha rubifolii (Thomas)
Rudbeckia hirta
 Macrosiphum ambrosiae (Thomas)
Rudbeckia laciniata var. *hortensia*
 Macrosiphum rudbeckiae (Fitch)
Rudbeckia sp.
 Macrosiphum rudbeckiae (Fitch)
Rum cherry—see *Prunus serotina*
Rumex crispus
 Aphis rumicis L.
 Aphis spiraeicola Patch
 Macrosiphum venaefuscae Davis
Rumex sp.
 Aphis rumicis L.
 Macrosiphum gei (Koch)
Russian olive—see *Elaeagnus*
Saccharum officinarum
 Sipha flava (Forbes)
St. John's wort—see *Hypericum*
Salix amygdaloides
 Chaitophorus pusillus H. & F.
Salix longifolia
 Cavariella aegopodii (Scopoli)
 Chaitophorus viminalis Monell
Salix nigra
 Aphis saliceti Kaltenbach
 Chaitophorus viminalis Monell
 Clavigerus smithiae (Monell)
Salix sp.
 Aphis saliceti Kaltenbach
 Cavariella aegopodii (Scopoli)
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 Clavigerus populifoliae (Fitch)
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 Plocamaphis flocculosa (Weed)
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 Aphis sambucifoliae Fitch
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Sambucus sp.
 Aphis pomi DeGeer
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Sand bar willow—see *Salix longifolia*
Sanguinaria canadensis
 Macrosiphum sanguinarium H. & F.
Sanicle—see *Sanicula*
Sanicula sp.
 Aphis signatis H. & F.
Saxifraga splendens
 Aphis gossypii Glover
 Macrosiphum gei (Koch)
 Myzus persicae (Sulz.)
Saxifrage—see *Saxifraga*

- Scrophularia leporella*
Macrosiphum gei (Koch)
Scrophularia nodosa
Myzus scrophulariae (Thomas)
 Scorpion-grass—see *Myosotis*
 Scotch fir—see *Pinus sylvestris*
 Scotch pine—see *Pinus sylvestris*
 Scrub oak—see *Quercus marilandica*
 Seaside grape—see *Coccoloba*
 Sedge—see *Carex*
Sedum artissimum
Myzus persicae (Sulz.)
Sedum reflexum
Aphis gossypii Glover
Senecio cruentus
Aphis padi L.
Senecio glabellus
Aphis nyctalis H. & F.
Senecio vulgaris
Macrosiphum gei (Koch)
Setaria glauca
Geocia squamosa Hart
Hysteroneura setariae (Thomas)
Setaria viridis
Hysteroneura setariae (Thomas)
Myzus persicae (Sulz.)
Setaria sp.
Anoecia querci (Fitch)
Pemphigus populi-transversus Riley
 Shag-bark hickory—see *Carya ovata*
 Sheepberry—see *Viburnum lentago*
 Shell-bark hickory—see *Carya ovata*
 Shepherd's purse—see *Capsella Bursa-pastoris*
 Shield fern—see *Aspidium*
 Shingle oak—see *Quercus imbricaria*
 Shooting star—see *Dodecatheon*
Meadia
 Shrubby bitter-sweet—see *Celastrus*
Silphium integrifolium
Macrosiphum pallens H. & F.
Silphium perfoliatum
Macrosiphum rudbeckiae (Fitch)
 Silver maple—see *Acer saccharinum*
 Sky-flower—see *Senecio*
 Slippery elm—see *Ulmus fulva*
 Smartweed—see *Polygonum*
Smilax rotundifolia
Neoprociphilus aceris (Monell)
Neoprociphilus attenuatus (O. & S.)
 Smooth sumach—see *Rhus glabra*
 Snakeroot—see *Eupatorium urticaefolium*, *Liatris*, and *Sanicula*
 Sneezeweed—see *Helenium*
 Snowberry—see *Symphoricarpos*
 Snow-on-the-mountain—see *Euphorbia marginata*
 Soft maple—see *Acer saccharinum*
Solanum dulcamara L.
Macrosiphum pisi (Kalt.)
Solanum melongena
Macrosiphum gei (Koch)
Myzus persicae (Sulz.)
Solanum tuberosum
Macrosiphum gei (Koch)
Myzus persicae (Sulz.)
Solanum sp.
Aphis rumicis L.
Solidago canadensis
Aphis solidaginifoliae Williams
Macrosiphum erigeronensis (Thomas)
Macrosiphum gravicornis Patch
Macrosiphum rudbeckiae (Fitch)
Solidago nemoralis
Macrosiphum rudbeckiae (Fitch)
Solidago sp.
Aphis solidaginifoliae Williams
Macrosiphum ambrosiae (Thomas)
Macrosiphum chrysanthemi (Oestl.)
Macrosiphum erigeronensis (Thomas)
Macrosiphum gravicornis Patch
Macrosiphum rudbeckiae (Fitch)
Pemphigus brevicornis (Hart)
 Solomon's seal—see *Polygonum*
Sonchus arvensis
Amphorophora cosmopolitana Mason
Sonchus oleraceus
Amphorophora cosmopolitana Mason
Sonchus sp.
Aphis rumicis L.
Amphorophora cosmopolitana Mason
Capitophorus flaveolus (Walker)
Macrosiphum ambrosiae (Thomas)
 Sorghum—see *Holcus Sorghum* var. *saccharatus*
 Sorrel—see *Rumex*
 Sour gum—see *Nyssa*
 Southernwood—see *Artemisia abrotanum*
 Sow thistle—see *Sonchus arvensis*
 Spanish bayonet—see *Yucca*
 Spatter-dock—see *Nymphaea*
 Spear grass—see *Poa*
 Spinach—see *Spinacia oleracea*
Spinacia oleracea
Aphis gossypii Glover
Macrosiphum gei (Koch)
Myzus persicae (Sulz.)
 Spindle tree—see *Evonymus*
Spiraea latifolia
Aphis spiraeicola Patch
Aphis spiraeophila Patch
Spiraea salicifolia
Aphis spiraeophila Patch
Spiraea Vanhouttei
Aphis spiraeicola Patch
Spiraea sp.
Aphis spiraeicola Patch

- Spleenwort—see *Asplenium*
 Spotted touch-me-not—see *Impatiens biflora*
 Spruce—see *Picea*
 Spurge—see *Euphorbia*
 Spurgewort—see *Salvia*
 Squash—see *Cucurbita maxima*
 Squaw-weed—see *Senecio*
 Staff tree—see *Celastrus*
 Stick-tight—see *Bidens vulgata*
 Stiff cornel—see *Cornus stricta*
 Stonecrop—see *Sedum*
 Strawberry—see *Fragaria*
 Strawflower—*Helichrysum*
 Streptocarpus sp.
 Myzus circumflexus (Buckton)
 Sugar cane—see *Saccharum officinarum*
 Sugar maple—see *Acer saccharum*
 Sumach—see *Rhus*
 Sunflower—see *Helianthus*
 Swamp birch—see *Betula pumila*
 Swamp milkweed—see *Asclepias incarnata*
 Swamp spanish oak—see *Quercus palustris*
 Swamp white oak—see *Quercus bicolor*
 Sweet cherry—see *Prunus avium*
 Sweet clover—see *Melilotus*
 Sweet pea—see *Lathyrus*
 Sweet pepper—see *Capsicum dulce*
 Sweet potato—see *Ipomoea batatas*
 Sweet viburnum—see *Viburnum Lentago*
 Sword fern—see *Nephrolepis*
 Sycamore—see *Platanus occidentalis*
 Symphoricarpos orbiculatus
 Amphiceridus pulverulens (Gill.)
 Syringa—see *Philadelphus coronarius*

 Tamarack—see *Larix laricina*
 Taraxacum officinale
 Aphis knowltoni H. & F.
 Macrosiphum ambrosiae (Thomas)
 Macrosiphum taraxaci (Kalt.)
 Prociphilus erigeronensis (Thomas)
 Tare—see *Vicia*
 Thalictrum sp.
 Macrosiphum purpurascens (Oestl.)
 Thistle—see *Cirsium*, *Piqueria*, and *Sonchus*
 Thoroughwort—see *Eupatorium*
 Tick trefoil—see *Desmodium*
 Tilia americana
 Hysteroneura setariae (Thomas)
 Longistigma caryae (Harris)
 Macrosiphum tiliae (Monell)
 Myzocallis tiliae (L.)
 Tomato—see *Lycopersicon esculentum*

 Touch-me-not—see *Impatiens*
 Trachelospermum difforme
 Macrosiphum gei (Koch)
 Trefoil—see *Trifolium*
 Trifolium pratense
 Aphis bakeri Cowen
 Aphis cerasifoliae Fitch
 Aphis crataegifoliae Fitch
 Macrosiphum granarium (Kby.)
 Macrosiphum pisi (Kalt.)
 Myzocallis ononidis (Kalt.)
 Sipha flava (Forbes)
 Trifolium procumbens
 Macrosiphum pisi (Kalt.)
 Myzocallis ononidis (Kalt.)
 Trifolium repens
 Macrosiphum gei (Koch)
 Macrosiphum pisi (Kalt.)
 Trifolium sp.
 Geioica squamosa Hart
 Macrosiphum pisi (Kalt.)
 Myzocallis ononidis (Kalt.)
 Triticum aestivum
 Macrosiphum granarium (Kby.)
 Triticum sp.
 Macrosiphum granarium (Kby.)
 Myzocallis discolor (Monell)
 Rhopalosiphum prunifoliae (Fitch)
 Sipha flava (Forbes)
 Toxoptera graminum (Rond.)
 Tropaeolum majus
 Aphis rumicis L.
 Trumpet weed—see *Eupatorium purpureum*
 Trumpet honeysuckle—see *Lonicera sempervirens*
 Tulip—see *Tulipa*
 Tulip tree—see *Liriodendron*
 Tulipa sp.
 Aphis rumicis L.
 Tupelo—see *Nyssa*
 Turnip—see *Brassica rapa*
 Typha latifolia
 Rhopalosiphum enigmae H. & F.

 Ulmus alata
 Georgiaphis ulmi (Wilson)
 Tuberculatus ulmifolii (Monell)
 Ulmus americana
 Colopha ulmicola (Fitch)
 Eriosoma lanigera (Hausmann)
 Tuberculatus ulmifolii (Monell)
 Ulmus fulva
 Colopha graminis (Monell)
 Colopha ulmicola (Fitch)
 Eriosoma crataegi (Oestl.)
 Eriosoma mimica H. & F.
 Eriosoma rileyi (Thomas)
 Georgiaphis ulmi (Wilson)
 Gobaishia ulmi-fusus (Walsh)
 Macrosiphum gei (Koch)
 Tuberculatus ulmifolii (Monell)

- Ulmus* sp.
Colopha graminis Monell
Colopha ulmicola (Fitch)
Eriosoma lanigera (Hausmann)
Gobaishia ulmi-fusus (Walsh)
Tuberculatus ulmifolii (Monell)
Urtica sp.
Aphis rumicis L.
Vaccinium vacillans
Amphorophora vaccinii Mason
Verbena sp.
Myzus persicae (Sulz.)
Vernonia fasciculata
Aphis vernoniae Thomas
Vernonia sp.
Aphis spiraeicola Patch
Vervain—see *Verbena*
Vetch—see *Vicia*
Vetchling—see *Lathyrus*
Viburnum Lentago
Aphis viburnicola Gill.
Viburnum Opulus var. *americanum*
Aphis rumicis L.
Aphis viburnicola Gill.
Aphis viburniphila Patch
Viburnum sp.
Aphis bakeri Cowen
Aphis crataegifoliae Fitch
Aphis rumicis L.
Aphis spiraeicola Patch
Aphis viburnicola Gill.
Aphis viburniphila Patch
Vicia sp.
Macrosiphum pisi (Kalt.)
Viola tricolor
Myzus persicae (Sulz.)
Viola sp.
Idiopterus violae (Pergande)
Violet—see *Viola*
Virginia creeper—see *Parthenocissus*
Vitis labrusca
Aphis illinoisensis Shimer
Vitis sp.
Aphis illinoisensis Shimer
Aphis spiraeicola Patch
Waahoo—see *Evonymus atropurpureus*
Wahoo—see *Ulmus alata*
Walnut—see *Juglans nigra*
Water beech—see *Carpinus caroliniana*
Water cress—see *Radicula*
Water hyacinth—see *Eichhornia*
Water lily—see *Castalia* and *Nymphaea*
Water pepper—see *Polygonum hydropiper*
Water shield—see *Brasenia*
Waxwork—see *Celastrus scandens*
Weeping birch—see *Betula pendula*
Wheat—see *Triticum*
White Birch—see *Betula pendula* and *Betula alba* var. *papyrifera*
White clover—see *Trifolium repens*
White elm—see *Ulmus americana*
White lettuce—see *Prenanthes alba*
White melilot—see *Melilotus alba*
White oak—see *Quercus alba*
White Pine—see *Pinus Strobus*
White snake-root—see *Eupatorium urticaefolium*
White spruce—see *Picea canadensis*
White thorn—see *Crataegus*
White water lily—see *Castalia*
Whitewood tree—see *Liriodendron tulipifera*
Wild bergamot—see *Monarda fistulosa*
Wild black cherry—see *Prunus serotina*
Wild cranesbill—see *Geranium maculatum*
Wild lettuce—see *Lactuca canadensis*
Wild plum—see *Prunus nigra* and *Prunus americana*
Wild rye—see *Elymus*
Willow—see *Salix*
Winged elm—see *Ulmus alata*
Winged pigweed—see *Cycloloma*
Witch hazel—see *Hamamelis*
Woodbine—see *Parthenocissus*
Wood fern—see *Aspidium*
Wood mint—see *Blephilia hirsuta*
Wormwood—see *Artemisia*
Xanthium canadense
Macrosiphum ambrosiae (Thomas)
Yard grass—see *Eleusine*
Yarrow—see *Achillea*
Yellow barked oak—see *Quercus velutina*
Yellow daisy—see *Rudbeckia hirta*
Yellow dock—see *Rumex crispus*
Yellow honeysuckle—see *Lonicera flava*
Yellow melilot—see *Melilotus officinalis*
Yellow pine—see *Pinus echinata* and *Pinus palustris*
Yellow pond lily—see *Nymphaea*
Yellow poplar—see *Liriodendron tulipifera*
Yucca sp.
Aphis rumicis L.
Zea Mays
Anoecia querci (Fitch)
Aphis maidi-radici Forbes
Aphis maidis Fitch
Colopha graminis (Monell)
Geocia squamosa Hart
Macrosiphum granarium (Kby.)
Pemphigus brevicornis (Hart)
Sipha flava (Forbes)

Zizia aurea

Aphis luridis H. & F.

Aphis signatis H. & F.

Zizia sp.

Aphis luridis H. & F.

Aphis signatis H. & F.

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EXPLANATION OF PLATE I

WINGS

- Fig. 51 *Mindarus abietinus* Koch.
Fig. 52 *Tuberolachnus saligna* (Gmelin).
Fig. 53 *Hormaphis hamamelidis* (Fitch).
Fig. 54 *Periphyllus populicola* (Thomas).
Fig. 55 *Paducia antennatum* (Patch).
Fig. 56 *Tuberculatus punctatellus* (Fitch).
Fig. 57 *Calaphis castaneae* (Fitch).
Fig. 58 *Idiopterus nephrolepidis* Davis.
Fig. 59 *Longistigma caryae* (Harris).
Fig. 60 *Eulachnus rileyi* (Williams).
Fig. 61 *Myzocallis discolor* (Monell).
Fig. 62 *Chaitophorus quercicola* (Monell).
Fig. 63 *Myzocallis bella* (Walsh).
Fig. 64 *Colopha graminis* (Monell).
Fig. 65 *Calaphis betulella* Walsh.
Fig. 66 *Idiopterus nephrolepidis* Davis.
Fig. 67 *Cinara strobil* (Fitch).
Fig. 68 *Anoecia querci* (Fitch).
Fig. 69 *Colopha ulmicola* (Fitch).
Fig. 70 *Chaitophorus pusillus* Hottes and Frison.
Fig. 71 *Myzocallis punctata* (Monell).
Fig. 72 *Euceraaphis betulae* (Koch).
Fig. 73 *Melaphis rhois* (Fitch).
Fig. 74 *Pentalonia nigronervosa* Coquerel.

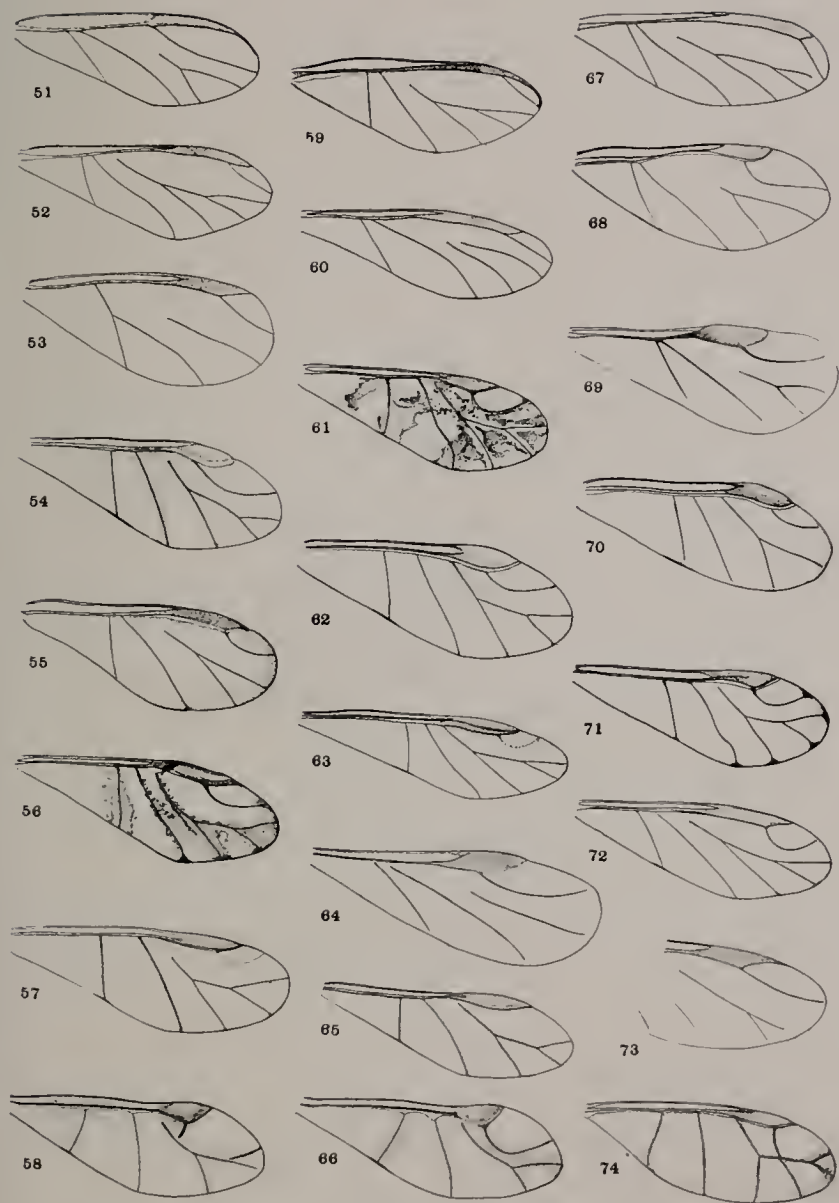


PLATE I

EXPLANATION OF PLATE II

HEADS AND WINGS

- Fig. 75 *Paducia antennatum* (Patch), head, alate, viviparous female.
 Fig. 76 *Paducia antennatum* (Patch), head, alate viviparous female.
 Fig. 77 *Clavigerus populifoliae* (Fitch), head, alate viviparous female.
 Fig. 78 *Calaphis betulella* Walsh, head, alate viviparous female.
 Fig. 79 *Alphitoaphis lonicericola* (Williams), head, alate viviparous female.
 Fig. 80 *Aphis rumicis* Linnaeus, head, alate viviparous female.
 Fig. 81 *Neosymydobius memorialis* Hottes and Frison, head, alate viviparous female.
 Fig. 82 *Capitophorus patonkus* Hottes and Frison, head, alate viviparous female.
 Fig. 83 *Tamalia coweni* (Cockerell), head, alate viviparous female.
 Fig. 84 *Macrosiphum rosae* (Linnaeus), head, alate viviparous female.
 Fig. 85 *Phorodon humuli* (Schrank), head, alate viviparous female.
 Fig. 86 *Myzus monardae* (Davis), head, alate viviparous female.
 Fig. 87 *Gobaishia ulmi-fusus* (Walsh), hind wing.
 Fig. 88 *Colopha graminis* (Monell), hind wing.
 Fig. 89 *Hysteroneura setariae* (Thomas), hind wing.
 Fig. 90 *Aphis crataegifoliae* Fitch, fore wing.
 Fig. 91 *Myzus persicae* (Sulzer), hind wing.
 Fig. 92 *Eriosoma crataegi* (Oestlund), hind wing.
 Fig. 93 *Alphitoaphis lonicericola* (Williams), hind wing.
 Fig. 94 *Pemphigus populi-venae* Fitch, hind wing.
 Fig. 95 *Pentalonia nigronervosa* Coquerel, hind wing.
 Fig. 96 *Microparsus variabilis* Patch, hind wing.
 Fig. 97 *Prociphilus imbricator* (Fitch), portion of fore wing.
 Fig. 98 *Pemphigus populi-transversus* Riley, portion of fore wing.
 Fig. 99 *Aphis bakeri* Cowen, portion of fore wing.

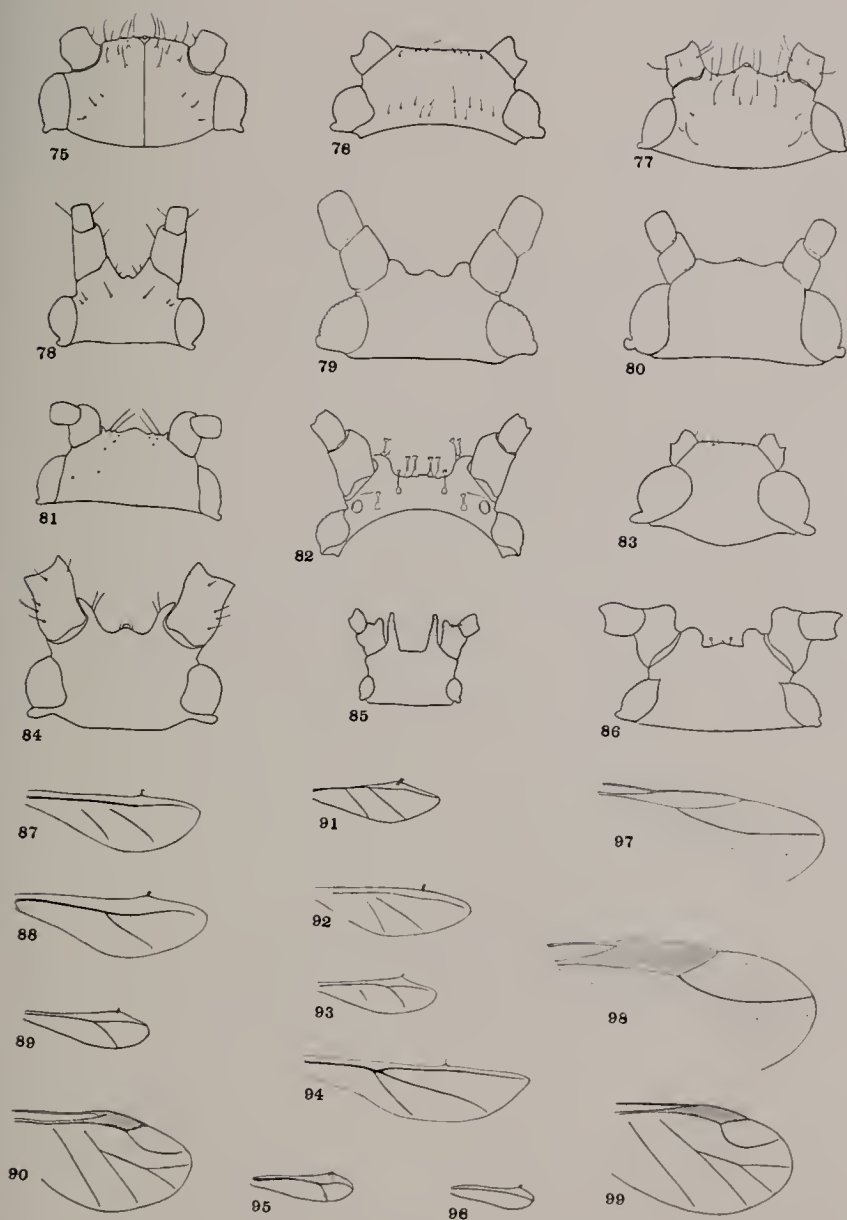


PLATE II

EXPLANATION OF PLATE III

CORNICLES

ALATE VIVIPAROUS FEMALES

EXCEPT FIG. 104, WHICH IS APTEROUS

- Fig. 100 *Macrosiphum frigidicola* (Gillette and Palmer).
Fig. 101 *Macrosiphum adianti* (Oestlund).
Fig. 102 *Macrosiphum carpiuicolen*s Patch.
Fig. 103 *Macrosiphum illini* Hottes and Frison.
Fig. 104 *Macrosiphum sonchella* (Monell).
Fig. 105 *Macrosiphum sanguinarium* Hottes and Frison.
Fig. 106 *Macrosiphum sanborni* Gillette.
Fig. 107 *Macrosiphum tardae* Hottes and Frison.
Fig. 108 *Macrosiphum rosae* (Linnaeus).
Fig. 109 *Macrosiphum kickapoo* Hottes and Frison.
Fig. 110 *Macrosiphum liriiodendri* (Monell).
Fig. 111 *Macrosiphum gei* (Koch).
Fig. 112 *Macrosiphum pallens* Hottes and Frison.
Fig. 113 *Macrosiphum sonchella* (Monell).
Fig. 114 *Macrosiphum ambrosiae* (Thomas).
Fig. 115 *Macrosiphum ruralis* Hottes and Frison.
Fig. 116 *Macrosiphum anomala*e Hottes and Frison.
Fig. 117 *Macrosiphum tapuskae* Hottes and Frison.
Fig. 118 *Macrosiphum schranki* Theobald.
Fig. 119 *Capitophorus pakansus* Hottes and Frison.
Fig. 120 *Macrosiphum zinzalae* Hottes and Frison.
Fig. 121 *Amphorophora rossi* Hottes and Frison.
Fig. 122 *Amphorophora singularis* Hottes and Frison.
Fig. 123 *Amphorophora nervata* (Gillette).
Fig. 124 *Myzus houghtonensis* (Troop), lectotype.
Fig. 125 *Capitophorus corambus* Hottes and Frison.
Fig. 126 *Amphorophora vaccinii* Mason.
Fig. 127 *Amphorophora nebulosa* Hottes and Frison.
Fig. 128 *Capitophorus patonkus* Hottes and Frison.
Fig. 129 *Myzus porosus* Sanderson.

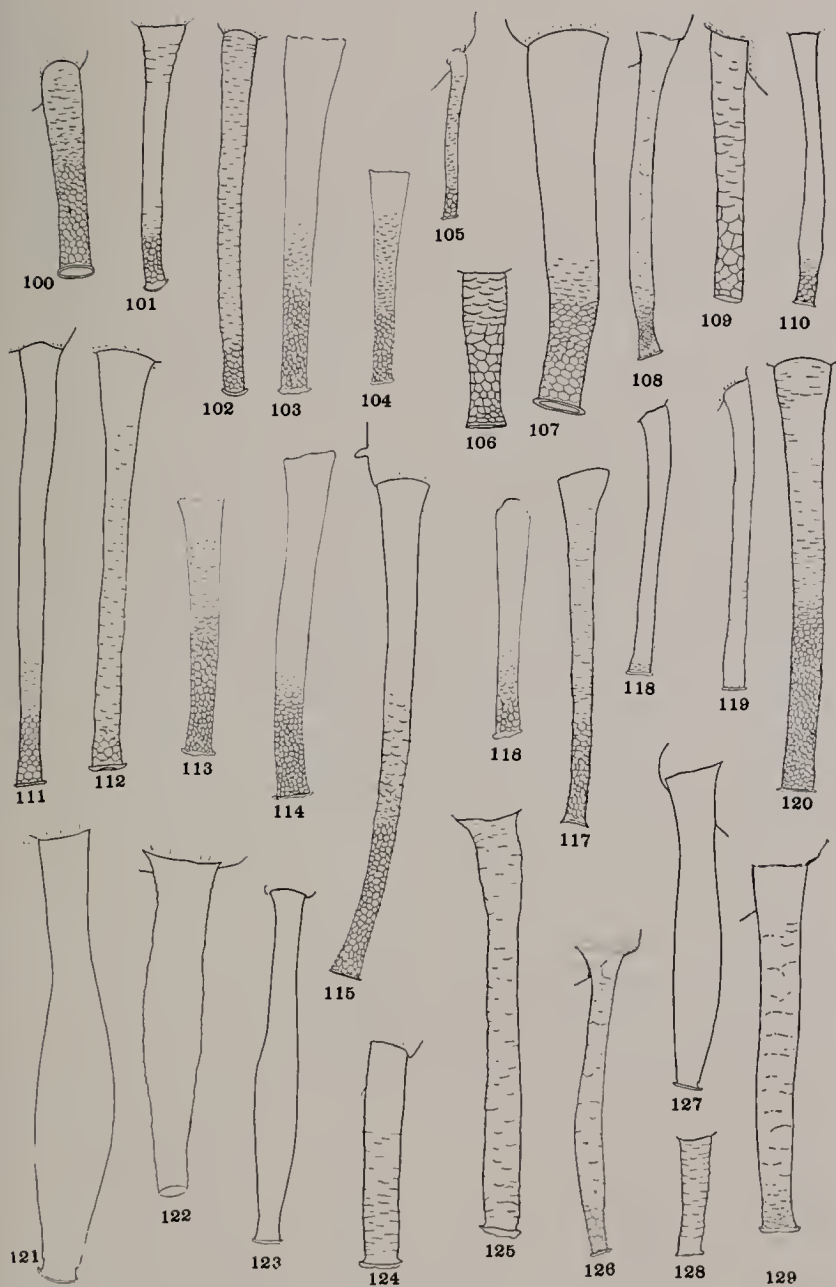


PLATE III

EXPLANATION OF PLATE IV

CORNICLES

ALATE VIVIPAROUS FEMALES

- Fig. 130 *Aphis decepta* Hottes and Frison.
Fig. 131 *Aphis funesta* Hottes and Frison.
Fig. 132 *Aphis carduella* Walsh.
Fig. 133 *Aphis cornifoliae* Fitch.
Fig. 134 *Rhopalosiphum enigmae* Hottes and Frison.
Fig. 135 *Hysteroneura setariae* (Thomas).
Fig. 136 *Alphitoaphis lonicericola* (Williams).
Fig. 137 *Aphis nyctalis* Hottes and Frison.
Fig. 138 *Cerosipha rubifolii* (Thomas).
Fig. 139 *Aphis roseus* Baker.
Fig. 140 *Aphis caliginosa* Hottes and Frison.
Fig. 141 *Aphis pulchella* Hottes and Frison.
Fig. 142 *Aphis chetansapa* Hottes and Frison.
Fig. 143 *Aphis zilora* Hottes and Frison.
Fig. 144 *Amphicercidus pulverulens* (Gillette).
Fig. 145 *Clavigerus smithiae* (Monell).
Fig. 146 *Clavigerus populifoliae* (Fitch).
Fig. 147 *Clavigerus populifoliae* (Fitch).
Fig. 148 *Rhopalosiphum herberidis* (Kaltenbach).
Fig. 149 *Paducia antennatum* (Patch).
Fig. 150 *Neosymydobius memorialis* Hottes and Frison.
Fig. 151 *Chaitophorus pusillus* Hottes and Frison.
Fig. 152 *Periphyllus negundinis* (Thomas).
Fig. 153 *Cinara laticis* (Hartig).
Fig. 154 *Drepanaphis acerifoliae* (Thomas).
Fig. 155 *Monellia costalis* (Fitch).
Fig. 156 *Melanocallis fumipennella* (Fitch).
Fig. 157 *Monellia caryella* (Fitch).
Fig. 158 *Eriosoma lanigera* (Hausmann).
Fig. 159 *Phyllaphis fagi* (Linnaeus).
Fig. 160 *Brevicoryne brassicae* Linnaeus.
Fig. 161 *Plocamaphis terricola* Hottes and Frison.
Fig. 162 *Plocamaphis flocculosum* (Weed).

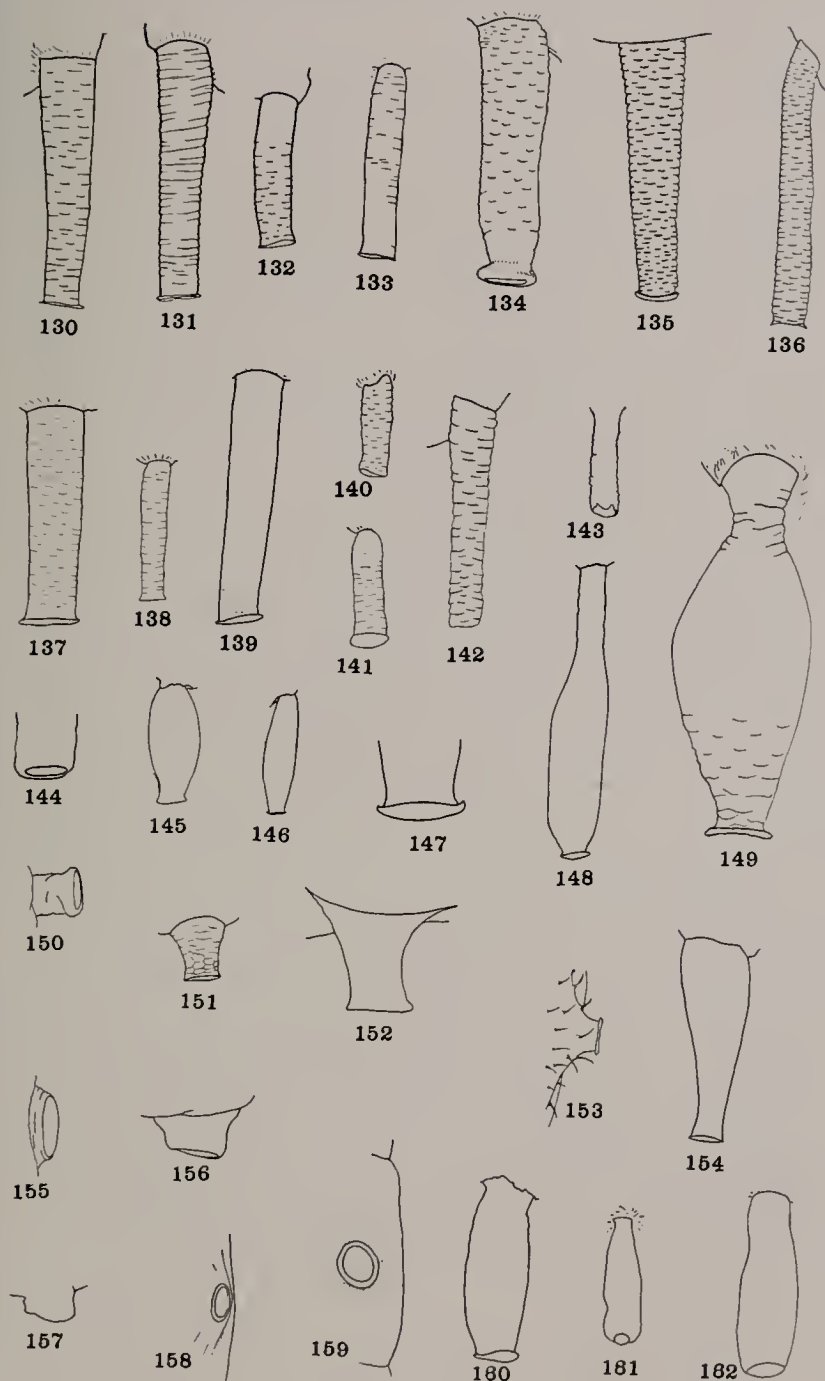


PLATE IV

EXPLANATION OF PLATE V

CAUDAE AND ANAL PLATES

- Fig. 163 *Capitophorus pakansus* Hottes and Frison, cauda, alate viviparous female.
- Fig. 164 *Amphorophora nebulosa* Hottes and Frison, cauda, alate viviparous female.
- Fig. 165 *Macrosiphum adianti* (Oestlund), cauda, alate viviparous female.
- Fig. 166 *Macrosiphum carpinicolens* Patch, apterous viviparous female, fundatrix.
- Fig. 167 *Capitophorus ribis* (Linnaeus), cauda, alate viviparous female.
- Fig. 168 *Myzocallis discolor* (Monell), anal plate, alate viviparous female.
- Fig. 169 *Capitophorus patonkus* Hottes and Frison, cauda, alate viviparous female.
- Fig. 170 *Macrosiphum carpinicolens* Patch, cauda, alate viviparous female.
- Fig. 171 *Macrosiphum illini* Hottes and Frison, cauda, alate viviparous female.
- Fig. 172 *Macrosiphum kickapoo* Hottes and Frison, cauda, alate viviparous female.
- Fig. 173 *Euceraphis betulae* (Koch), anal plate, alate viviparous female.
- Fig. 174 *Capitophorus corambus* Hottes and Frison, cauda, alate viviparous female.
- Fig. 175 *Macrosiphum pallens* Hottes and Frison, cauda, alate viviparous female.
- Fig. 176 *Macrosiphum tapuskae* Hottes and Frison, cauda, apterous viviparous female.
- Fig. 177 *Amphorophora rossi* Hottes and Frison, cauda, alate viviparous female.
- Fig. 178 *Myzocallis discolor* (Monell), cauda, alate viviparous female.
- Fig. 179 *Macrosiphum frigidicola* (Gillette and Palmer), cauda, alate viviparous female.
- Fig. 180 *Macrosiphum anomalae* Hottes and Frison, cauda, alate viviparous female.
- Fig. 181 *Macrosiphum pisi* (Kaltenbach), cauda, alate viviparous female.
- Fig. 182 *Macrosiphum tardae* Hottes and Frison, cauda, alate viviparous female.
- Fig. 183 *Cepegillettea betulaefoliae* Granovsky, cauda, alate viviparous female.
- Fig. 184 *Macrosiphum ambrosiae* (Thomas), cauda, alate viviparous female, lectotype.
- Fig. 185 *Macrosiphum ruralis* Hottes and Frison, cauda, alate viviparous female.
- Fig. 186 *Macrosiphum zinzalae* Hottes and Frison, cauda, alate viviparous female.
- Fig. 187 *Byzus houghtonensis* (Troop), cauda, alate viviparous female, lectotype.
- Fig. 188 *Chaitophorus viminalis* Monell, cauda, alate viviparous female.

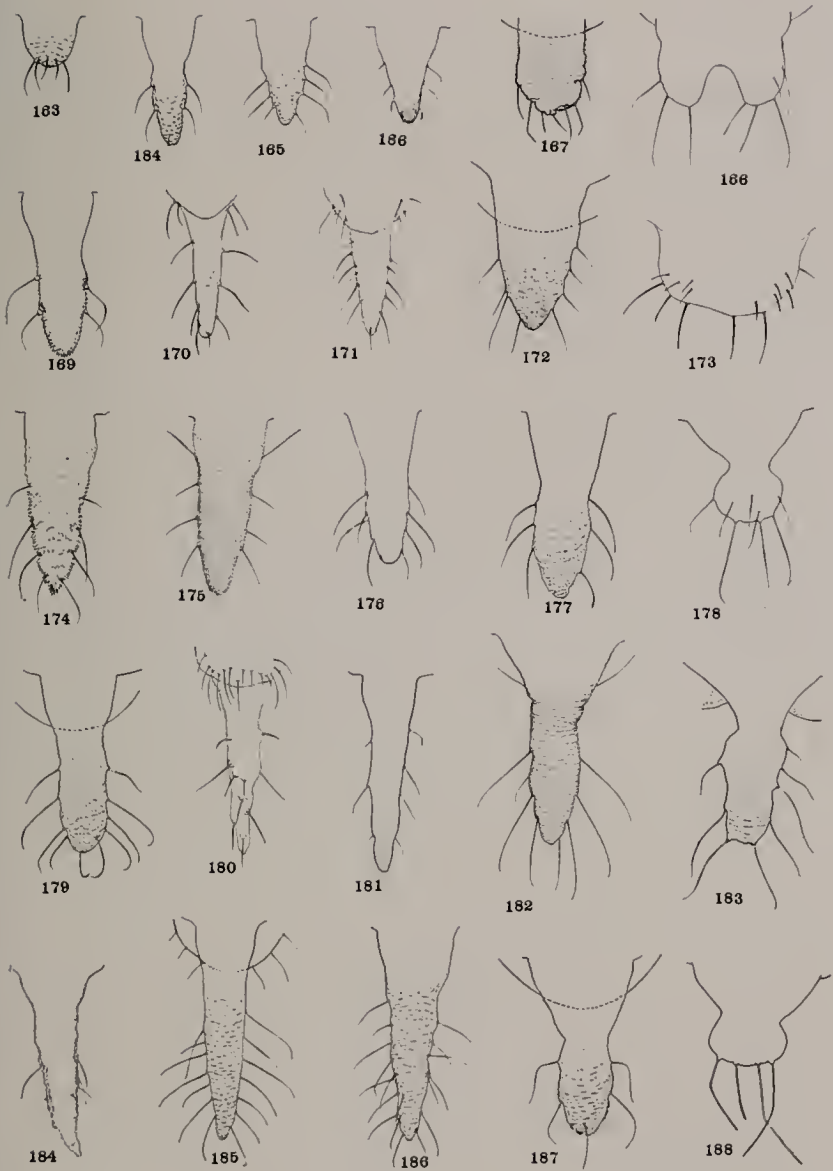


PLATE V

EXPLANATION OF PLATE VI

CAUDAE AND ANAL PLATES

- Fig. 190 *Paducia antennatum* (Patch), cauda, alate viviparous female.
 Fig. 191 *Aphis rociadae* Cockerell, cauda, alate viviparous female.
 Fig. 192 *Cerosipha rubifolii* (Thomas), cauda, alate viviparous female.
 Fig. 193 *Aphis chetansapa* Hottes and Frison, cauda, alate viviparous female.
 Fig. 194 *Aphis zilora* Hottes and Frison, cauda, alate viviparous female.
 Fig. 195 *Aphis carduella* Walsh, cauda, alate viviparous female.
 Fig. 196 *Rhopalosiphum prunifoliae* (Fitch), cauda, alate viviparous female.
 Fig. 197 *Aphis nyctalis* Hottes and Frison, cauda, alate viviparous female.
 Fig. 198 *Aphis illinoisensis* Shimer, cauda, alate viviparous female.
 Fig. 199 *Hyalopterus pruni* (Geoffroy), cauda, alate viviparous female.
 Fig. 200 *Rhopalosiphum enigmae* Hottes and Frison, cauda, alate viviparous female.
 Fig. 201 *Aphis folsomii* Davis, cauda, alate viviparous female.
 Fig. 202 *Aphis caliginosa* Hottes and Frison, cauda and anal plate, alate viviparous female.
 Fig. 203 *Aphis funesta* Hottes and Frison, cauda, alate viviparous female.
 Fig. 204 *Brevicoryne brassicae* Linnaeus, cauda, alate viviparous female.
 Fig. 205 *Asiphonaphis anogis* Hottes and Frison, cauda, alate viviparous female.
 Fig. 206 *Cavariella aegopodii* (Scopoli), cauda and supra-anal process, alate viviparous female.
 Fig. 207 *Rhopalosiphum enigmae* Hottes and Frison, cauda, oviparous female.
 Fig. 208 *Aphis spiraeophila* Patch, cauda, alate viviparous female.
 Fig. 209 *Gypsoaphis oestlundii* Hottes, anal plate, alate viviparous female.
 Fig. 210 *Aphis padi* Linnaeus, anal plate, alate viviparous female.
 Fig. 211 *Neosymydobius memorialis* Hottes and Frison, cauda, alate viviparous female.
 Fig. 212 *Thripsaphis ballii* (Gillette), apical dorsal abdominal segment, cauda, and anal plate, alate viviparous female.
 Fig. 213 *Cinara laricis* (Hartig), anal plate, alate viviparous female.
 Fig. 214 *Plocamaphis terricola* Hottes and Frison, cauda and anal plate, alate viviparous female.
 Fig. 215 *Saltusaphis elongatus* Baker, apical dorsal abdominal segment, cauda, and anal plate, apterous viviparous female.
 Fig. 216 *Cinara laricis* (Hartig), cauda, alate viviparous female.
 Fig. 217 *Drepanaphis acerifoliae* (Thomas), anal plate, alate viviparous female.
 Fig. 218 *Thripsaphis producta* Gillette, apical dorsal abdominal segment, cauda, and anal plate, alate viviparous female.
 Fig. 219 *Saltusaphis wanicus* Hottes and Frison, apical dorsal abdominal segment, cauda, and anal plate, apterous viviparous female.
 Fig. 220 *Calaphis betulella* Walsh, anal plate, alate viviparous female.
 Fig. 221 *Eriosoma lanigera* (Hausmann), cauda and anal plate, alate viviparous female.
 Fig. 222 *Hormaphis hamamelidis* (Fitch), cauda and anal plate, alate viviparous female.

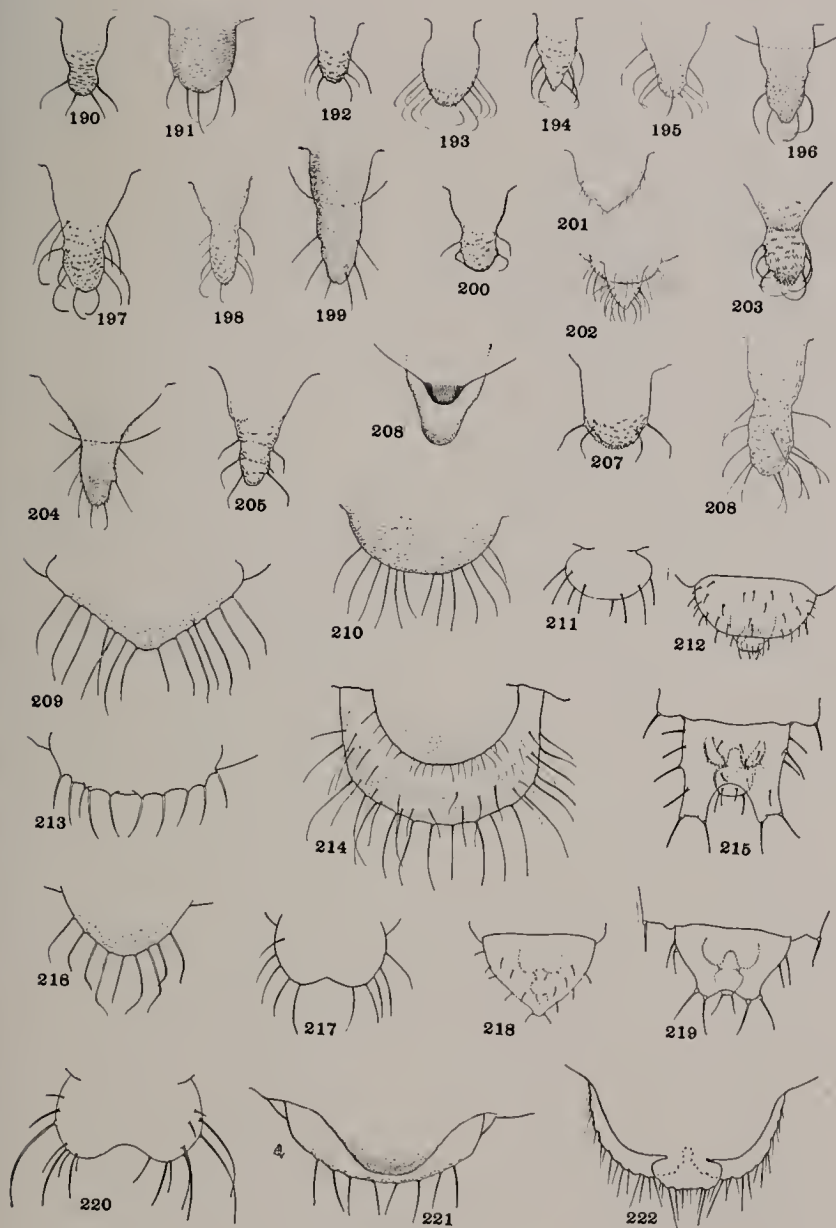


PLATE VI

EXPLANATION OF PLATE VII

ANTENNAE

ALATE VIVIPAROUS FEMALES EXCEPT FIGS. 233 AND 234

- Fig. 223 *Eriosoma mimica* Hottes and Frison, flagellum.
 Fig. 224 *Hormaphis hamamelidis* (Fitch), three-segmented antenna.
 Fig. 225 *Eriosoma lanigera* (Hausmann), third segment.
 Fig. 226 *Georgiaphis ulmi* (Wilson), third segment.
 Fig. 227 *Pemphigus tartareus* Hottes and Frison, sexupara, flagellum.
 Fig. 228 *Pemphigus brevicornis* (Hart), sexupara, flagellum.
 Fig. 229 *Pemphigus ephemeratus* Hottes and Frison, sexupara, flagellum.
 Fig. 230 *Paducia antennatum* (Patch), third and fourth antennal segments.
 Fig. 231 *Cinara difficilis* Hottes and Frison, flagellum.
 Fig. 232 *Sipha flava* (Forbes) five-segmented antenna.
 Fig. 233 *Saltusaphis elongatus* Baker, apterous male, third, fourth, and fifth antennal segments.
 Fig. 234 *Melanocallis fumipennella* (Fitch), alate male, flagellum.
 Fig. 235 *Calaphis castaneae* (Fitch), third segment.
 Fig. 236 *Calaphis betulaecolens* (Fitch), third segment.
 Fig. 237 *Saltusaphis wanicus* Hottes and Frison, third segment.
 Fig. 238 *Neoprociphilus aceris* (Monell), third segment.
 Fig. 239 *Mordwilkoja vagabunda* (Walsh), fundatrigenia, sixth segment.
 Fig. 240 *Pemphigus populi-transversus* Riley, fundatrigenia, sixth segment.
 Fig. 241 *Pemphigus populi-transversus* Riley, sexupara, fifth and sixth segments.
 Fig. 242 *Saltusaphis wanicus* Hottes and Frison, sixth segment.
 Fig. 243 *Drepanaphis acerifoliae* (Thomas), sixth segment.
 Fig. 244 *Tamalia coweni* (Cockerell), sixth segment.
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 Fig. 249 *Myzocallis alnifoliae* (Fitch), third segment.
 Fig. 250 *Chaitophorus populifoliae* Oestlund, third segment.
 Fig. 251 *Monellia costalis* (Fitch), third segment.
 Fig. 252 *Chaitophorus pusillus* Hottes and Frison, third segment.
 Fig. 253 *Chaitophorus neglectus* Hottes and Frison, third segment.
 Fig. 254 *Neosymydobius annulatus* (Koch), third segment.
 Fig. 255 *Neosymydobius memorialis* Hottes and Frison, flagellum.
 Fig. 256 *Plocamaphis terricola* Hottes and Frison, third segment.

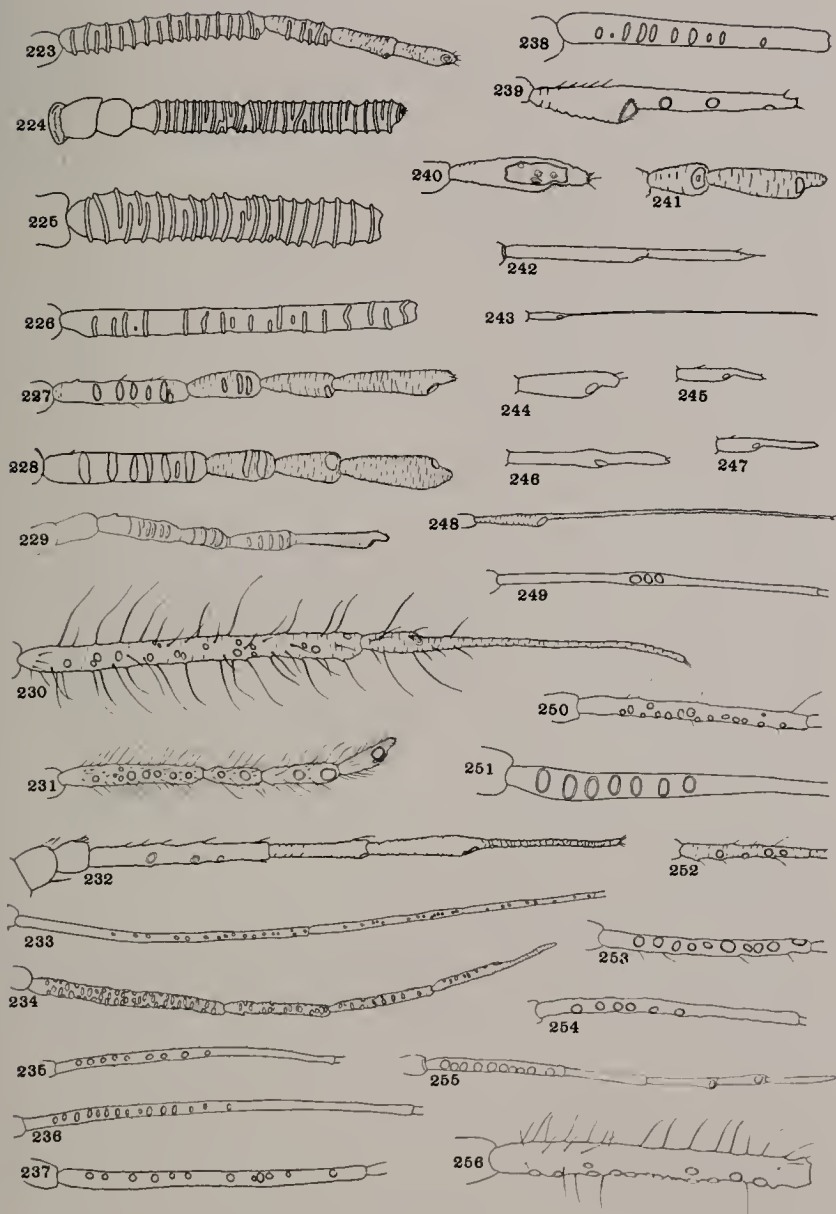


PLATE VII

EXPLANATION OF PLATE VIII

ANTENNAE

Fig. 257 *Capitophorus pakansus* Hottes and Frison, alate viviparous female, third and fourth antennal segments.

Fig. 258 *Capitophorus pakansus* Hottes and Frison, male, third, fourth, and fifth antennal segments.

Fig. 259 *Capitophorus corambus* Hottes and Frison, apterous viviparous female, third antennal segment.

Fig. 260 *Capitophorus corambus* Hottes and Frison, alate viviparous female, third antennal segment.

Fig. 261 *Myzus thomasi* Hottes and Frison, alate viviparous female, third, fourth, and fifth antennal segments.

Fig. 262 *Rhopalosiphum enigmae* Hottes and Frison, alate viviparous female, third and fourth antennal segments.

Fig. 263 *Rhopalosiphum enigmae* Hottes and Frison, male, third, fourth, and fifth antennal segments.

Fig. 264 *Myzus thomasi* Hottes and Frison, apterous viviparous female, third, fourth and fifth antennal segments.

Fig. 265 *Aphis signatis* Hottes and Frison, alate viviparous female, third and fourth antennal segments.

Fig. 266 *Aphis nyctalis* Hottes and Frison, alate viviparous female, third, fourth, fifth, and sixth antennal segments.

Fig. 267 *Aphis nyctalis* Hottes and Frison, apterous viviparous female, third and fourth antennal segments.

Fig. 268 *Aphis luridis* Hottes and Frison, alate viviparous female, third, fourth, and fifth antennal segments.

Fig. 269 *Aphis coreopsidis* (Thomas), alate viviparous female, third, fourth, and fifth antennal segments.

Fig. 270 *Asiphonaphis anogis* Hottes and Frison, alate viviparous female, third and fourth antennal segments.

Fig. 271 *Aphis cornifoliae* Fitch, alate viviparous female, third antennal segment.

Fig. 272 *Capitophorus patonkus* Hottes and Frison, apterous viviparous female, third antennal segment.

Fig. 273 *Myzus houghtonensis* (Troop), alate viviparous female, lectotype, third antennal segment.

Fig. 274 *Capitophorus patonkus* Hottes and Frison, alate viviparous female, third antennal segment.

Fig. 275 *Cerosipha rubifolii* (Thomas), alate viviparous female, third antennal segment.

Fig. 276 *Aphis pulchella* Hottes and Frison, alate viviparous female, third antennal segment.

Fig. 277 *Macrosiphum illini* Hottes and Frison, apterous viviparous female, third and fourth antennal segments.

Fig. 278 *Aphis zilora* Hottes and Frison, alate viviparous female, third antennal segment.

Fig. 279 *Aphis carduella* Walsh, alate viviparous female, third antennal segment.

Fig. 280 *Aphis chetansapa* Hottes and Frison, alate viviparous female, third antennal segment.

Fig. 281 *Aphis decepta* Hottes and Frison, alate viviparous female, third antennal segment.

Fig. 282 *Aphis funesta* Hottes and Frison, alate viviparous female, third antennal segment.

Fig. 283 *Hysteroneura setariae* (Thomas), alate viviparous female, third antennal segment.

Fig. 284 *Aphis caliginosa* Hottes and Frison, alate viviparous female, third antennal segment.

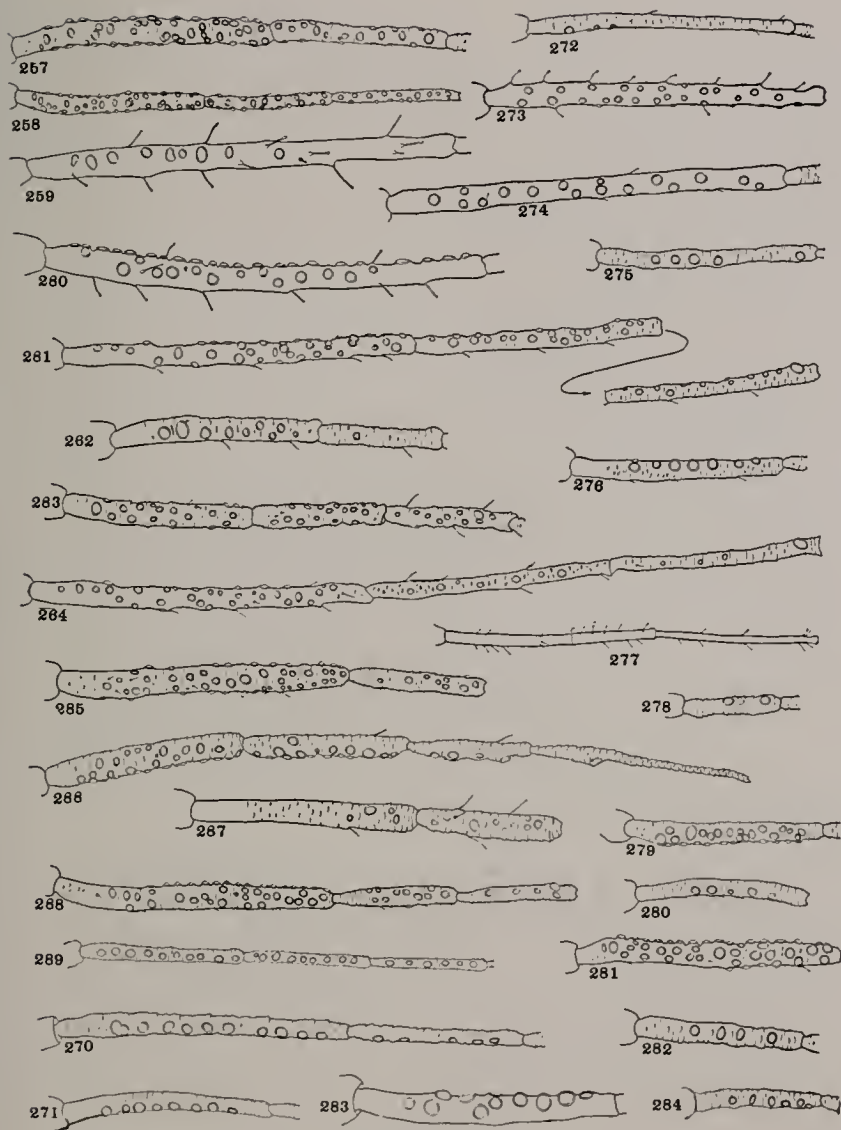


PLATE VIII

EXPLANATION OF PLATE IX

ANTENNAE

Fig. 285 *Macrosiphum illini* Hottes and Frison, male, third, fourth, and fifth antennal segments.

Fig. 286 *Macrosiphum ruralis* Hottes and Frison, alate viviparous female, third antennal segment.

Fig. 287 *Macrosiphum sanguinarium* Hottes and Frison, alate viviparous female, third antennal segment.

Fig. 288 *Macrosiphum tardae* Hottes and Frison, alate viviparous female, third antennal segment.

Fig. 289 *Macrosiphum pallens* Hottes and Frison, alate viviparous female, third antennal segment.

Fig. 290 *Macrosiphum zinzalae* Hottes and Frison, apterous viviparous female, third antennal segment.

Fig. 291 *Macrosiphum zinzalae* Hottes and Frison, alate viviparous female, third antennal segment.

Fig. 292 *Macrosiphum carpinicolens* Patch, alate viviparous female, third antennal segment.

Fig. 293 *Macrosiphum adianti* (Oestlund), alate viviparous female, third antennal segment.

Fig. 294 *Macrosiphum kickapoo* Hottes and Frison, alate viviparous female, third and fourth antennal segments.

Fig. 295 *Macrosiphum gravicornis* Patch, oviparous female, third antennal segment.

Fig. 296 *Macrosiphum erigeronensis* (Thomas), oviparous female, third antennal segment.

Fig. 297 *Macrosiphum frigidicola* (Gillette and Palmer), alate viviparous female, third antennal segment.

Fig. 298 *Macrosiphum sonchella* (Monell), apterous viviparous female, third and fourth antennal segments.

Fig. 299 *Macrosiphum tapuskae* Hottes and Frison, apterous viviparous female, third antennal segment.

Fig. 300 *Macrosiphum illini* Hottes and Frison, alate viviparous female, third antennal segment.

Fig. 301 *Macrosiphum ambrosiae* (Thomas), apterous viviparous female, lectotype, third antennal segment.

Fig. 302 *Macrosiphum ambrosiae* (Thomas), alate viviparous female, lectotype, third antennal segment.

Fig. 303 *Macrosiphum illini* Hottes and Frison, oviparous female, hind tibia.

Fig. 304 *Macrosiphum tapuskae* Hottes and Frison, alate viviparous female, third antennal segment.

Fig. 305 *Amphorophora nebulosa* Hottes and Frison, alate viviparous female, third antennal segment.

Fig. 306 *Amphorophora singularis* Hottes and Frison, alate viviparous female, third antennal segment.

Fig. 307 *Amphorophora rossi* Hottes and Frison, alate viviparous female, third antennal segment.

Fig. 308 *Macrosiphum anomala* Hottes and Frison, alate viviparous female, third antennal segment.

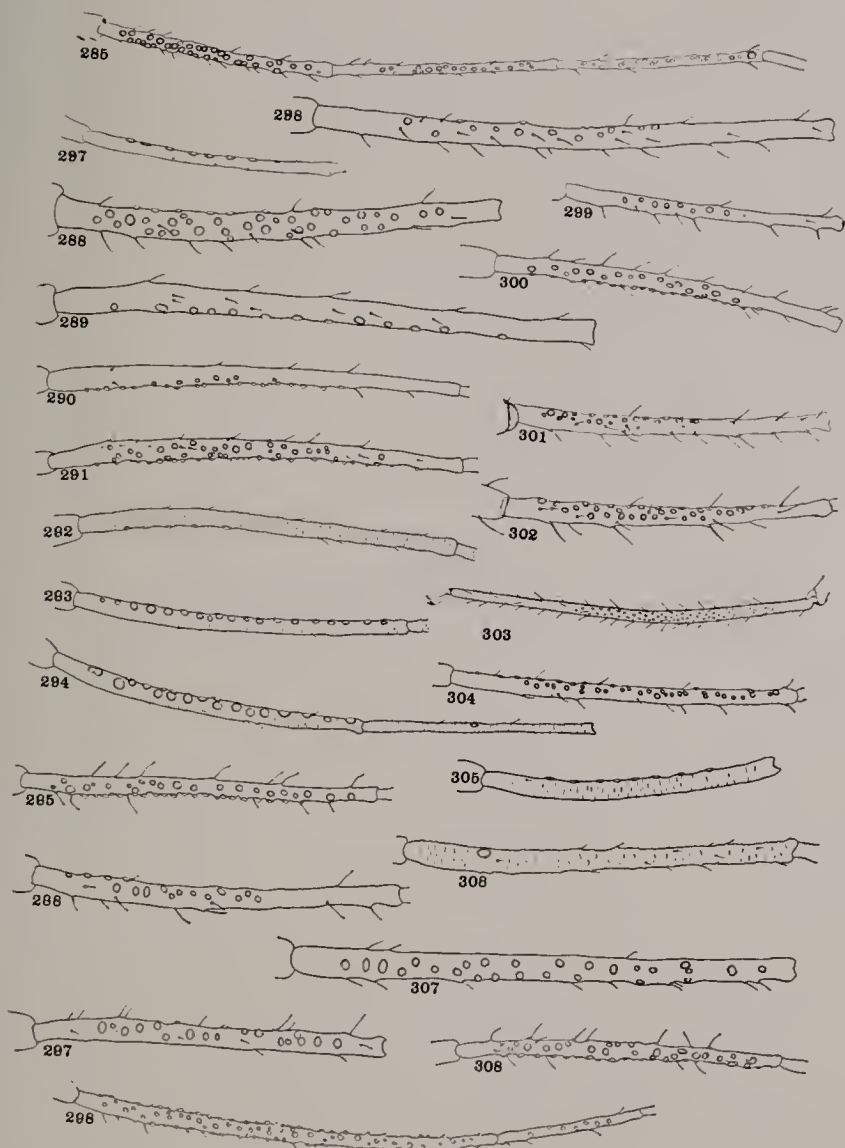


PLATE IX

EXPLANATION OF PLATE X

TUBERCLES, SETAE, ETC.

Fig. 309 *Aphis caliginosa* Hottes and Frison, alate viviparous female, lateral tubercles.

Fig. 310 *Melanocallis fumipennella* (Fitch), alate viviparous female, lateral tubercles.

Fig. 311 *Myzocallis asclepiadis* (Mouell), alate viviparous female, lateral tubercles.

Fig. 312 *Asiphonaphis pruni* Wilson and Davis, alate viviparous female, lateral tubercles.

Fig. 313 *Paducia antennatum* (Patch), alate viviparous female, lateral tubercles.

Fig. 314 *Gypsoaphis oestlundii* Hottes, lateral tubercles.

Fig. 315 *Asiphonaphis anogis* Hottes and Frison, apterous viviparous female, lateral tubercles.

Fig. 316 *Iziphyia flabellus* (Sanborn), alate viviparous female, modified setae.

Fig. 317 *Geoica squamosa* Hart, apterous viviparous female, top view of modified setae.

Fig. 318 *Geoica squamosa* Hart, apterous viviparous female, lateral view of modified setae.

Fig. 319 *Tuberculatus punctatellus* (Fitch), alate viviparous female, dorsal abdominal tubercles.

Fig. 320 *Capitophorus fragaefolii* (Cockerell), apterous viviparous female, globose setae.

Fig. 321 *Salтусaphis elongatus* Baker, apterous viviparous female, compound eyes without ocular tubercles.

Fig. 322 *Thripsaphis verrucosa* Gillette, apterous viviparous female, cauda, anal plate and terminal abdominal segment.

Fig. 323 *Drepanaphis monelli* (Davis), alate viviparous female, dorsal abdominal tubercles.

Fig. 324 *Thripsaphis ballii* (Gillette), alate viviparous female, unmodified setae.

Fig. 325 *Shenahweum minutus* (Davis), alate viviparous female, fore femora.

Fig. 326 *Cepigillettea betulaefoliae* Granovsky, alate viviparous female, fore femora.

Fig. 327 *Drepanaphis acerifoliae* (Thomas), alate viviparous female, dorsal abdominal tubercles.

Fig. 328 *Prociphilus venafuscus* (Patch), (sexupara), dorsal wax-pore plates of mesothorax.

Fig. 329 *Prociphilus corrugatus* (Sirriner), (fundatrigenia), dorsal wax-pore plates of mesothorax.

Fig. 330 *Pemphigus populi-transversus* Riley (fundatrigenia), dorsal wax-pore plates of mesothorax.

Fig. 331 *Periphyllus negundinis* (Thomas), dimorphic form.

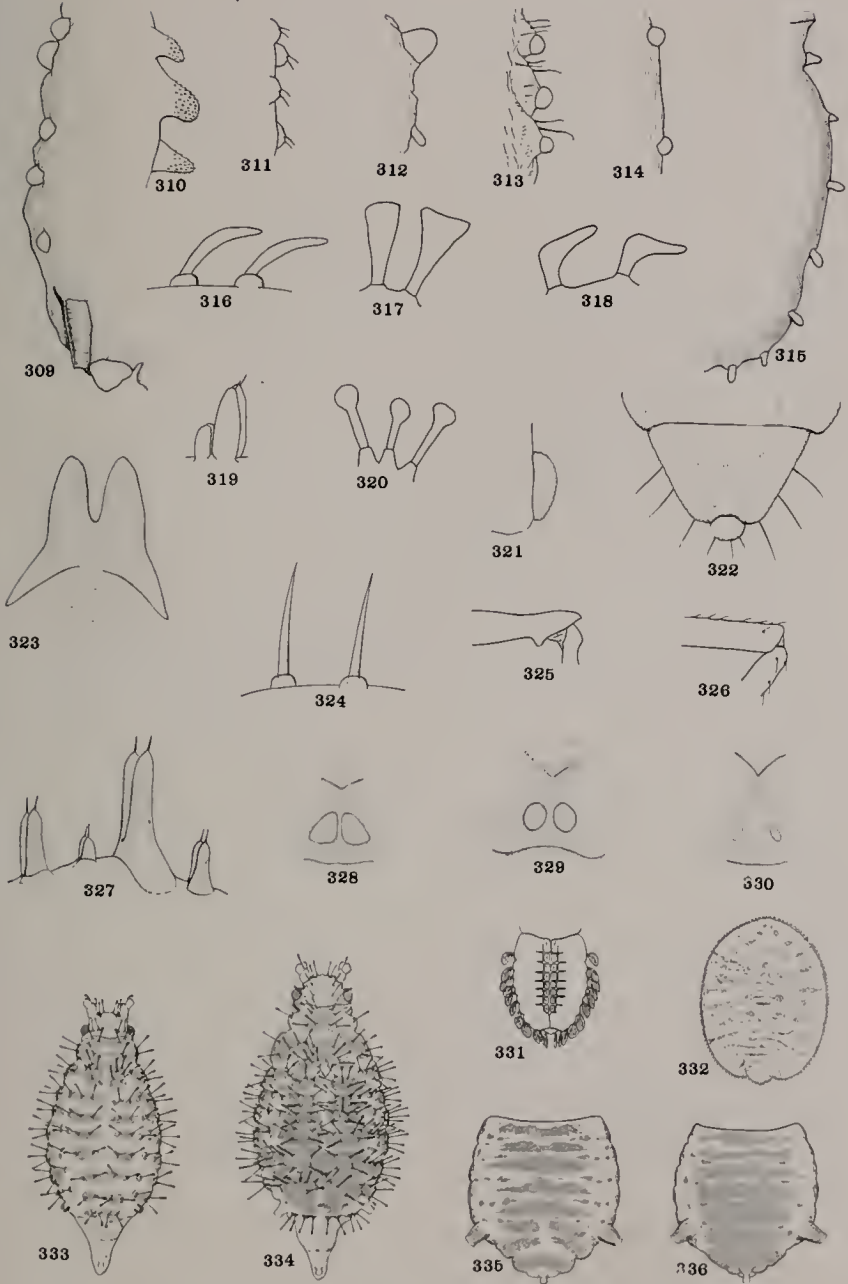
Fig. 332 *Hamamelistes spinosus* Shimer, coccidiform generation.

Fig. 333 *Myzocallis walshii* (Monell), oviparous female, showing color pattern and setal arrangement.

Fig. 334 *Myzocallis alhambra* Davidson, oviparous female, showing color pattern and setal arrangement.

Fig. 335 *Chaitophorus neglectus* Hottes and Frison, alate viviparous female, showing color pattern.

Fig. 336 *Chaitophorus populifoliae* Oestlund, alate viviparous female, showing color pattern.



ADDENDA

SPECIES NOT RECOGNIZED

There exist a few original descriptions of species of aphids, based upon specimens collected in Illinois, which are not recognized in the body of this paper. This situation is due to the fact that to date no one has been able to definitely associate particular species of aphids with these descriptions, probably because of their limitations or vagueness. These descriptions are as follows:

Aphis quercifoliae Walsh, Proc. Ent. Soc. Phil., Vol. 1, No. 9, 1862, p. 298.
Eriosoma? fungicola Walsh, Proc. Ent. Soc. Phil., Vol. 1, No. 9, 1862, p. 304.
Pemphigus formicarius Walsh, Proc. Ent. Soc. Phil., Vol. 1, No. 9, 1862, p. 308.
Pemphigus formicetorum Walsh, Proc. Ent. Soc. Phil., Vol. 1, No. 9, 1862, p. 308.

Siphonophora verbenae Thomas, Bulletin Illinois State Laboratory of Natural History, Vol. 1, No. 2, June, 1878, p. 8.

APHIS SYMPHORICARPI THOMAS

Among the recently recovered types of aphids originally described by Thomas, and not discussed in the body of this article because of their collection in Iowa, are specimens of *Aphis symphoricarpi* Thomas. These cotypic specimens, in poor condition, are mounted on Slides Nos. 2792 and 8776, and the following data are associated with them: Fort Dodge, Iowa, September 1, 1877, on *Symphoricarpus vulgaris*. Both slides contain apterous viviparous females, which may unquestionably be recognized as parasitized specimens of the species now known as *albipes* (Oestlund). The parasitized condition of the specimens accounts for the statements: "Bodies rather broadly ovoid, and very convex. Abdomen distinctly acuminate at the apex, but no tail apparent," which were used in the original description, and for the misleading color notes.

CEDOAPHIS INCOGNITA new name

We find that *Aphis albipes* Oestlund is a synonym of *Aphis symphoricarpi* Thomas. As a result of this synonymy, the species referred to by Oestlund (1922) as *Cedoaphis symphoricarpi* is without a name, and we therefore have proposed *incognita* as a new name for this species.

INDEX

The names of all species and varieties are here listed under the generic names to which the various species have been assigned in this paper, and also in alphabetical order. Those reduced to synonymy, preoccupied, of changed generic assignment, or representing previous Illinois records based upon misidentifications are indicated by *italic* type, and new names by **bold-faced** type.

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