

STATE OF ILLINOIS  
DEPARTMENT OF REGISTRATION AND EDUCATION  
DIVISION OF THE  
NATURAL HISTORY SURVEY  
STEPHEN A. FORBES, Chief

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Vol. XIII.

BULLETIN

Article VII.

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THE PENTATOMOIDEA OF ILLINOIS  
WITH KEYS TO THE NEARCTIC  
GENERA

BY

CHARLES ARTHUR HART



PRINTED BY AUTHORITY OF THE STATE OF ILLINOIS

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URBANA, ILLINOIS

June, 1919

## ERRATA

Page 97, line 17, for first *larval* read *pupal*.

Page 112, in legend, for *jonessi* read *jonesii*.

Page 114, in legend, for *or* read *of*.

Page 125, line 4, for *Bonosa* read *Bonaso*.

Page 131, in legend, for *hirundinaceus* read *hirudinaceus*.

Page 138, last line, for *cocoon* read *cocoon*.

Plate XII, explanation page, next to last line, for *acrivora* read *aerivora*.

Plate XIII, explanation page, next to last line, for *White-grubs* read *White-grub*.

Page 293, Figure 5*a* was reversed in printing, and the two items of the legend should change places.

Page 515, second table, for *Pelocoris femorata* read *Pelocoris femoratus*.

ARTICLE VII.—*The Pentatomoidea of Illinois, with Keys to the Nearctic Genera.*\* BY CHARLES ARTHUR HART.

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INTRODUCTORY

In 1898 Prof. H. E. Summers prepared the first key in English to the American pentatomid genera \*\*, using the collection of the Illinois State Laboratory of Natural History (now Division of Natural History Survey). The key was based on Stål's keys, but, as Van Duzee says, "contains much original work." It seems appropriate that this collection, greatly increased since 1898, and that of the University of Illinois should now serve for a revision of the subject. In identifying species and constructing keys to them, Van Duzee's "Annotated List" † has been of the greatest value. In the general grouping I have agreed closely with Kirkaldy's views.‡

The commoner species form homogeneous groups and are easily disposed of in keys, but there are a number of rare and little-known species, scattered representatives of important exotic groups, to which I wish to direct especial attention—although their inclusion complicates the classification—in order that further knowledge of them and their distribution, either in Illinois or elsewhere in the United States, may be particularly searched for.

In the arrangement of my keys I have tried to show the natural grouping and succession, because I believe that an artificial grouping, although apparently simpler, often obscures or suppresses the more difficult yet essential points of difference, and is of little value in the extension of knowledge. In characterizing groups, I have not necessarily taken into account extralimital forms. The term "segment" is often to be understood after such combinations as second antennal, rostral, tarsal, etc.; and the words dorsal and ventral, similarly used, refer to the abdominal segments. The term "elytra" is used as a convenient term for thickened opaque fore wings generally.

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\* The manuscript of this paper was only partially complete at the time of Mr. Hart's death. Its final preparation was undertaken by J. R. Malloch, and where additions to the original are made, whether in the form of records of species, or notes, or amplifications, these are indicated by brackets, either in the regular text or in footnotes.

\*\* Proc. Iowa Acad. Sci., Vol. 6, p. 40.

† Trans. Am. Ent. Soc., Vol. 30, No. 1. [Van Duzee's Catalogue of Hemiptera (Univ. Cal. Pub., Tech. Bul. Coll. Agr., Agr. Exper. Sta., Vol. 2, 1917) appeared but a short time before Mr. Hart's death, and synonyms therefrom have in some cases been added to the paper by the editor. The citations to original descriptions are also additions by the editor, nearly all of them being made direct from the publications in which the descriptions occur, the above-named catalogue serving admirably, however, as an aid in locating them.]

‡ Cat. Hemip. (Heter.), with Biol. and Anatom. References, p. 363.

The subfamily Tessaratominae, although usually placed last, seems to me to be a quite generalized group, with the first visible ventral (really the second) widely exposed, so that its spiracle is not beneath the metasternum nor just at its edge, but is an appreciable distance away from it. The elytral venation, which in most Pentatomidae is very obscure, is here easily traceable. Some of its genera are extremely close to our Pentatominae; others, in rostral structure, approach the Asopinae; others, in the venation of the hind wings, suggest the Cyrtocorinae. This subfamily forms an important group in the Old World, and is also represented by a few species in Mexico and Central America, some of which may at any time be found within the southwestern boundary of the United States; for this reason, and since this interesting group is often represented in general collections, I have included it in the key.

My thanks are especially due to Dr. S. A. Forbes, and to my colleague, Mr. J. R. Malloch, for their friendly encouragement and cooperation.

#### MISCELLANEOUS NOTES

The Pentatomoidea with slender beaks are normally plant feeders, although some of these, such as *Euschistus*, are sometimes seen sucking the juices of small insects. Some species, as *Murgantia*, are well-known pests; but the majority do little damage to plants. The strong-beaked forms are predaceous, and some are appreciably helpful in reducing the numbers of injurious insects, feeding upon larvae of the tussock-moth and similar species.

The species are probably mostly single-brooded, the nymphs occurring in spring and early summer and becoming adult as the season advances, very much as in the Acrididae. Many species hibernate as adults, and may be found among fallen leaves in winter or on vegetation in early spring. Horse-chestnut underbrush is a favorite shelter for *Euschistus* at this time. Some species are limited to particular food-plants, but many of them, especially the predaceous kinds, are widely scattered.

When heteropterous nymphs are pinned directly from the killing-bottle, the soft integument generally shrivels and curls in drying, and becomes more or less blackened because of interior decomposition, in which condition they are truly unsatisfactory objects for study. This trouble is avoided in most cases by leaving them in strong alcohol for a few weeks before pinning. This sterilizes and coagulates the tissues, specimens drying with all the fine color-patterns clear and distinct, and seldom showing any noticeable change of form, making attractive and interesting additions for a collection.

Adults may be pinned from the cyanide bottle, or they may be killed in alcohol without injury, perhaps with benefit, if not left in it more than a day or so. Specimens should be pinned through the scutellum near its anterior margin, preferably a little to the right of the median line. The waxy or greasy material that sometimes appears on them is easily removed by means of benzine or alcohol.

The sexes are usually recognized, as in all other Hemiptera, by the structure of the venter beyond the sixth segment. In the male there is only a single plate or capsule, open posteriorly, rarely transversely divided; in the female, the basal part is divided medially into two plates, while the apical part shows several small plates. The median division in the female is the most conspicuous difference. Secondary sexual characters are rarely seen. In *Amnestus* the distinction is very difficult, but in this genus there are interesting secondary sexual characters consisting of peculiar spines on the fore and hind femora, and differences in thoracic sculpture, which are indicative of the sexes.

[The general appearance of some of the commoner species is well represented in Plate XXI, Figures 78 to 83 inclusive.]

#### CLASSIFICATION

Kirkaldy believed that the pentatomids were the most primitive Heteroptera, and I am inclined to agree with him. Probably the Ochteridae represent a generalized stem, as Reuter suggests, but I believe that the five-segmented antennae of the pentatomids is older than the four-segmented of other families, and is not a case of specialization, even though the antennae of pentatomid nymphs is uniformly four-segmented.

The venation of the Coptosomidae is by far the most generalized in the Pentatomoidea studied by me; yet, singularly enough, the scutellum would seem a climax of specialization. The Scutellerinae come next in wing venation, leading to the Pentatominae, along with a reduction in the size of the scutellum. In the Pentatomidae, the development of ventral spine and sternal ridge would seem to begin in the subfamily Pentatominae in such forms as *Banasa*, *Nezara*, and *Arvelius*, with the *Acanthosominae* and *Asopinae* as offshoots, and lead up naturally through the *Edessinae* to the *Tessaratominae*. Yet the venational evidence shows that this order must be reversed.

The most primitive type of heteropterous caecal structure I should consider to be the one with the largest number of rows and pockets, specialization proceeding by numerical reduction and differentiation, frequently reaching complete elimination, as in *Asopinae*. The data are as yet very incomplete, but it is evident that the four-rowed type, found in the scutellerids and pentatomids, should precede the two-rowed type, represented by the *Cydnidae*, *sens. lat.*, and succeeding families. In the four-rowed series *Brochymena*, with its large number of caecal pockets and its well-developed wing hamus, is clearly primitive.

#### THE IMAGINES

##### *The Caecal Appendages*

Much light has been thrown on pentatomid relationships by the interesting studies of Dr. H. Glasgow\* on the caecal pockets of the Heteroptera. His paper appeared in a general biological publication. It was primarily a study of the symbiotic bacteria always inhabiting these

\* Biol. Bul., Vol. 36, p. 101, pl. I-VII.

caecal pockets, and the caecal structures themselves were but briefly treated. Dr. Glasgow hopes to continue these studies, and will be very glad to examine fresh specimens, living, if possible, of any additional species; in the meantime he has very kindly placed at my disposal the unpublished details thus far obtained by him on this subject.

In the Halydinae, genus *Brochymena*, he found between the third stomach and the rectum an elongate intestinal tract bearing four equal and equidistant rows (two opposite pairs) of numerous close-set finger-like caecal pockets, about 400 in each row. In all the Pentatominae, Scutellerinae, and Graphosomatinae examined, he found the same structure uniformly present, except that the number of pockets in a row was less, varying from 70 to 220. The largest numbers in the Pentatominae were in *Nezara* (220), *Euschistus* (190), and *Murgantia* (160); the smallest, in *Solubea* (70), *Hymenarcys* (75), *Cosmopepla* (75), and *Peribalus* (90). *Thyanta*, *Mormidea*, *Coenus*, and *Proxys* were intermediate (110-125). The Graphosomatinae were represented by *Podops cinctipes* (75-80), and the Scutellerinae only by *Homaemus proteus* (105-110).

A second type of this structure was found in the Cydnidae, Coreidae, Pyrrhocoridae, and certain Lygaeidae. Here there is only one pair of opposite rows, without the slightest trace of the other two of the first type. The number in each row varied greatly in different genera. In the Cydnidae the number was not large—65 in *Sehirus* (Cydninae) and 75-90 in Thyreocorinae; in the Coreidae there is a quite regular descending series, from 775 in *Archimerus* and 650 in *Metapodius* to 155 in *Catorhintha*, 125 in *Alydus*, and none at all in *Stachyocnemis* and the Rhopalinae; and in the Pyrrhocoridae, *Largus* had 135, while *Dysdercus* had very few—only six in the female and none at all in the male. The Lygaeidae show a decided tendency to reduction and specialization. In the Pachygronthinae there are again two rows; in *Oedancala dorsalis*, 31 in each row, rather loosely spaced and oval; in *Phlegyas abbreviatus*, about 29, long and narrow and closely placed in two short rows, but the last pair in the female is greatly enlarged. In most other Lygaeidae and in Berytidae [= Neididae] a third type of this structure appears, evidently a modification of the previous type. In this type there are very few pockets, more on one side than on the other, and the pockets of each side are bunched together in one or two groups on a common basal connection. In Myodochinae and Blissinae there are on one side two groups, each of 3-12 pockets; and on the other side, only 2-7 pockets in all, usually in a single group, rarely in two. In the Berytidae [= Neididae] there is only a single group on each side, the number of pockets on each side in *Jalysus spinosus* being 6 and 9 respectively in the example studied.

In making these studies, often many individuals of a species were examined, and the variation within a species was found to range from 4 to 18 per cent. of the total number, being usually about 10 per cent.

In the remaining groups examined, related to those mentioned, as well as in all the other Heteroptera, the structure was found to be entirely

wanting, the third stomach being sessile on the rectum without any intervening tract. This was the case in the Asopinae, represented by *Apateticus* and *Perillus*; in the rhopaline coreids (*Serinettha*, *Corizus*, and *Harmostes*), also in *Stachyocnemis* of the Alydinae; in the male of *Dysdercus*; in the Lygaeinae (*Nysius*, *Lygaeus*, and *Oncopeltus*), *Cyminae* (*Ischnorrhynchus*), and *Geocorinae* (*Geocoris*); in all *Tingitidae* and *Aradidae* (*Corythucha*, *Piesma*, and *Aradus*); and in representatives of many other heteropterous families examined.

### *The Wing Venation*

The chitinized corium and differentiated membrane of the fore wing, as well as the wing folds in both wings, have greatly obscured the venation in the Heteroptera, and retarded its use in systematic work. Comstock and Needham, in the "Wings of Insects," Chapter III,\* have figured the tracheation of the fore and hind wings of a pentatomid nymph, and the venation of a coreid fore wing. The pentatomid was not reared to the adult stage; but this is hardly essential, as the venation is very similar throughout the family.

In the fore wing of *Meneclis insertus* (Pl. XVI, Fig. 1) the venation is unusually distinct for one of the Pentatomini. The folds or furrows are indicated by two fine impressed lines. One of these is nearest the costal margin, and does not reach the membrane. The veins are indicated by smooth, raised, pale lines. The one in front of the anterior furrow represents subcosta and radius united. At the end of the furrow, the radial sector branches abruptly off toward the center of the wing and curves toward the apex. In *Meneclis* and the other Pentatomini its basal part is not traceable. The posterior furrow, between corium and clavus, is bordered in front by media and behind by cubitus. The veins of the membrane are not shown in the drawings. They seem to be derived mostly from media and the radial sector.

In the fore wing of *Tessaratomia* (Pl. XVI, Fig. 2) the venation is traceable throughout, and is evidently more primitive than in *Meneclis*. It may appropriately be compared with the coreid venation, as in *Anasa* (Fig. 3). In *Anasa* the veins may be traced by transmitted light, but in many coreids (*Alydus*, *Harmostes*, etc.), they are marked by distinct raised lines. The principal difference between the two is in the remarkable length of the radiomedial cross-vein in the pentatomid. There is a suggestion of this cross-vein in the tracheal branching of media in Comstock and Needham's Figure 21 (*loc. cit.*).

The cydneine fore wing is quite like that of the pentatomids in venation of the corium. The veins of the membrane, which are nearly longitudinal in the Pentatomidae, here appear to radiate from its inner angle. The line between corium and membrane is squarely transverse.

In Scutellerinae and Thyreocorinae the fore wings show a remarkable modification related to the enlargement of the scutellum. The triangular area of the corium between the two furrows is invaded by

\* Am. Nat., Vol. 32, p. 250.



membrane, which, however, does not reach the base of the triangle. The remaining chitinous area is sharply limited in front of this membrane, apparently by a vein, which is perhaps media much displaced, although in some cases the remnants of media seem still present on the anterior side of the claval furrow, the narrow clavus remaining chitinized for a large part of its length, bounding the membranous area posteriorly. The Graphosomatinae, also with an expanded scutellum, have the corium similarly reduced, but the claval region is also membranous except at base, the chitinous portions being delimited by a very oblique, nearly straight, line.

The hind-wing venation is more generalized and of considerable systematic importance. The folds are easily confused with the veins, but are recognized as being most distinct at the outer margin, where they end at the retreating angles between the more or less scalloped lobes. The first furrow, that behind media, corresponds to the posterior one of the fore wing.

By far the most primitive hind wing I have seen in the Pentatomidae is that of one of the Coptosomidae (*Brachyplatys*? sp.) from Manila. The stems of subcosta, radius, and media are all complete and apparently simple. In the next lobe, between folds, the two short veins—which in Pentatomidae are often connected basally near the middle of the wing but have no common stem on the basal half of the wing, or at best only a doubtful one—seem to be the posterior branch of media and the anterior branch of cubitus respectively, cut off by the folding of the wing. Behind this are two more very distinct lobes: the first contains cubitus and the first anal; the next and last, the second anal. The strongly lobed wing-outline closely resembles that of Thyreocorinae, but there is no trace on cubitus of the stridulatory organ found in all Cydnidae examined (Pl. XVI, Fig. 6, 8). Radius and media are fairly straight, and are connected by a long discal cross-vein.

In the Scutellerinae (*Homaemus proteus*, Pl. XVI, Fig. 5) the following modification appears, which I have found in all related Heteroptera: radius sags down at the cross-vein to meet media, and media has an upward sinus, thus shortening, nearly obliterating, the cross-vein. In other forms the two stems are usually fused for a short distance. The basal part of radius as far as the beginning of the sinus, closely parallel to subcosta, is very faintly or not at all traceable; but the decurved part persists as a strong curved spur, the hamus, free at its basal end. The second vein in the middle fold is apparently wanting. The wing is evidently related to that of the Coptosomidae.

In Coreidae (*Anasa tristis*, Pl. XVI, Fig. 10) radius is feebly indicated basally, and discally is fused for a short distance with media. An evident hamus is present. Otherwise the venation is essentially as in Pentatomidae.

In the Thyreocorinae (Pl. XVI, Fig. 11), in the Halydinae, in Tesseratoma (Fig. 7), and probably also in Cyrtocorinae, radius seemingly is present, slightly diverging from subcosta. But the clear-cut hamus



in the strongly marked venation of *Sehirus* (Fig. 6), *Brochymena*, and *Tessaratomya*, I believe to be the middle part of radius as in *Homaemus*, and the stem to be that of media and not radius. It remains to account for the vein extending basad along the first furrow from the apical part of media. It seems explainable only as a false vein, developed to strengthen the wing, analogous to the veinlike extension of the angulation of media in *Sarcophaga*.

In the *Pentatominae* (Pl. XVI, Fig. 9), *Asopinae* (Fig. 4), *Graphosomatinae*, and some *Tessaratominae* (*Piezosternum*) the stem of media seems to be complete from base to its union with the radial sector, closely contiguous to subcosta throughout, without trace of any hamus. Without the series at hand showing the gradual substitution of the medial stem in place of that of radius, this vein would be accepted without question as radius, and a divergence in evolution would consequently be assumed; on the one hand radius dominant, on the other, media. The two veins in the middle lobe converge strongly at base and meet in a curve.

An interesting structure in *Corimelaena* (*Thyreocorinae*) is a strongly chitinized sub-basal portion of the first anal vein. This portion is turned slightly so as to be nearly parallel to the long axis of the wing, and has a fine and beautifully regular cross-striation. It is evidently a stridulatory organ.

#### THE NYMPHS

The genera are usually easily recognizable among nymphs; but in some genera at least the separation of species is more difficult than with the adults. The notal color-pattern is useful, for although it is quite variable in extent and shade the fundamental plan does not change. The identity of a species is, of course, best determined by rearing, but can often be safely deduced by careful comparison with the adult, with especial regard to the head and anterior region. The spines and angles of the adult are seldom similarly present in the nymphs; the wings and scutellar structures are undeveloped; but the tergum, of which we see too little in the adult, is revealed with its important and interesting structures. The pleural osteoles of the adult are wanting in the nymph, their function being performed by the tergal scent-glands. The abdominal margin bears on each segment a circular or elliptical differentiated thicker area, lapped over the edge, half of it above and half below. These I call simply lateral plates, usually referring to the dorsal part. Along the middle of the abdomen above and below are similar areas, the median plates, the dorsal ones containing the scent-glands. All these plates are variable in color, but constant in extent in each stage, being proportionately larger in the very young nymphs.

The first scent-gland is on the hind margin of the third dorsal segment. It is unlike the others\*, more simple, and for aught I know may not usually be functional. There is a long transverse "slit," or impressed suture, derived from the suture between the third and fourth segments,

\* In an undetermined pentatomid nymph from Manila this difference is remarkably slight.

ending each side in an oval wrinkled area. The second and third glands, closely resembling each other, follow on the next two segments, and there is a similar transverse slit, more distinct however, ending each side in a hook-shaped groove with raised inner margin. There is often a trace of a fourth gland on the suture between the sixth and seventh segments. There are at least three mediodorsal plates, one for each gland, often a small fourth one, and sometimes more, as in Cydnidae. The plates are sometimes divided medially or are partly confluent (*Corimelaena*).

Behind each abdominal spiracle except the first are usually a pair of large setigerous punctures, the spiracular punctures, which are longitudinally placed in the Thyreocorinae, and included with the spiracle in the lateral plate. In the other subfamilies studied they are outside the lateral plate, placed transversely, except that in Cydnini they become oblique on segments 3-6 from the shifting of the inner one, and in *Perillus* from the crowding of the outer one by the lateral plate.

The genital structures are scarcely differentiated enough in the nymphs for use in classification. The male may be distinguished by the swollen penultimate ventral, which is often longer at middle than near the ends; sometimes there is a triangular depression on the hind margin at middle, notching the swollen portion. In the female this segment is not swollen, nor longer on the median line, and the entire median part is usually separated off to form a small depressed and flattened plate.

In the first and second instars the mesonotum is of nearly equal width throughout; the metanotum is similar, reaching the lateral margin and more or less convexly curved behind. In the third instar the metanotum is still curved behind and laterally tapers to a point near the margin; in the fourth it is nearly straight behind or, in *Scutellerinae*, a little convex at middle, and is overlapped now at each end by the anterior wing-pads, which attain its hind margin. In the fifth and last instar both wing pads project backwards well beyond the middle part of the metanotum, and the scutellum usually attains its hind margin at middle in *Pentatomidae*, but hardly in *Cydnidae*. The characterizations in the nymphal keys apply especially to the last instar, but are constructed so that they will usually answer for the fourth, and often for the third also.

### Superfamily *PENTATOMOIDEA*

The group covered in this paper is the superfamily *Pentatomoidea* of Uhler's check-list and Kirkaldy's Catalogue, and the family *Pentatomidae* of Lethierry and Severin's Catalogue and of Van Duzee's Annotated List and his Catalogue. It is a well-marked group, recognized by the five-segmented antennae, the broad form, and the size of the scutellum, which is always at least moderately large, and often greatly expanded so as to cover nearly the entire dorsum behind the pronotum, as well as all of the elytra except the costal border. The present group includes three families. One of them, *Urolabididae*, is confined to Asia, Australia, and neighboring islands. The other two may be separated as follows.

## KEY TO FAMILIES

## NYMPHS

Hind tibiae nearly glabrous or with soft pale hairs, sometimes with short black spinulose hairs as in *Euschistus*; plantar surface of first tarsal segment rather densely hairy except on basal middle; dorsal abdominal sutures considerably distorted by scent-glands, terminal hooks of glands usually well marked; two spiracular setae transversely placed (rarely obliquely), behind the spiracle...

.....PENTATOMIDAE.

Hind tibiae with distinct and rather long spinules, and some inconspicuous hairs; plantar surface of first tarsal segment smooth and shining, with a few sparse hairs (*Cydniinae*) or a row each side (*Thyreocorinae*); dorsal abdominal sutures easily traced, not greatly distorted, terminal hooks of glands but little developed; slit on anterior scent-gland not longer than slits of the succeeding glands .....

.....CYDNIIDAE.

## IMAGINES

Tibiae not distinctly spinose, [if with short setulae the dorsal surface is longitudinally concave and has a slender ridge on each side;] more than five dorsal segments in addition to the genital series; caecal pockets, when present, in four rows, cubitus of hind wing not modified.....

.....PENTATOMIDAE.

Tibiae evidently spinose, [the dorsal surface rounded or angular, not concave;] only five dorsals in addition to the genital segments; caecal pockets in two rows; cubitus of hind wing bent and finely transversely ridged near base.....

.....CYDNIIDAE.

## Family PENTATOMIDAE

## KEY TO SUBFAMILIES

## NYMPHS

Anterior scent-gland with slit evidently longer than those of the succeeding glands, the terminal pores apparently functional.....

.....SCUTELLERINAE.

Anterior scent-gland feebly developed, as long as the next or slightly shorter; in Murgantia somewhat longer, since the next is unusually short.

Jugal margin in front of eye with evident spine; prothoracic margin with conspicuous large subspinose teeth perpendicular to the margin (*Brochymena*) .....

.....HALYDINAE.

Jugal margin in front of eye with rounded tooth or unarmed; prothoracic margin finely serrate or entire.

Rostrum slender beyond the basal part of first segment; second segment more than twice as long as its narrowest part, seen from below.....

.....PENTATOMINAE.

Rostrum as seen from below very thick, of nearly equal breadth throughout; second segment about twice as long as broad.....

.....ASOPINAE.

## IMAGINES

Scutellum U-shaped, very large, nearly or quite reaching tip of abdomen; frena wanting or extremely short, less than 1/5 length of scutellum; opaque part of corium greatly narrowed.

- Stems of media and subcosta in hind wings more or less divergent basally and remote; base of radial sector persistent as a distinct free recurved spur (hamus).
- Tarsi 3-segmented; frena wanting; stem of media widely separated throughout from that of subcosta; apical part of media rarely with veinlike extension from the angle toward base of wing.....SCUTELLERINAE.
- Tarsi 2-segmented; frena very short; stem of media nearing that of subcosta beyond middle (Calif., Trop. Am.).....CYRTOCORINAE.
- Stems of media and subcosta subparallel, approximate; hamus wanting; no indication of frena; opaque part of corium narrow, triangular, the apical margin very oblique.....GRAPHOSOMATINAE.
- Scutellum subtriangular, rarely approaching tip of abdomen or somewhat U-shaped; frena at least  $1/4$  as long as scutellum; opaque part of corium broad and subtriangular.
- Juga laterally toothed near apex\*; basal part of stems of media and subcosta slightly divergent and separated, hamus distinct but short.....HALYDINAE.
- Juga not laterally toothed.
- Spiracle of first visible ventral (really the second) exposed, a short but evident distance away from the metasternal margin; bucculae subparallel or slightly converging behind, first rostral contained in the groove or partly free and projecting at an angle; stem of media either contiguous to subcosta without trace of hamus, or divergent and somewhat distant from it with well-developed hamus (Mex. to S. Am., Cuba, Asia, Africa, Australia).....TESSARATOMINAE.
- Spiracle of first visible ventral covered, rarely exposed just at the metasternal margin; stems of media and subcosta contiguous and parallel, with very little or no trace of hamus.
- Bucculae subparallel, not united posteriorly, the first rostral not free, occupying the groove between them, at least in its posterior part.
- [Thorax with a longitudinal central ridge on ventral surface between the coxae on entire length; abdomen almost keeled ventrally on its entire length, with a long sharp curved process projecting forward between hind coxae; prothorax produced on venter anteriorly in form of a plate as in Scutellerinae, the inner margins of plates reflexed, forming a ridge on each side of median line; tarsi 2-jointed.....ACANTHOSOMINAE.]
- [Thorax and abdomen normal, without ventral keel or ridge; or if keeled the tarsi are 3-jointed; prothorax produced anteriorly as above in Neottiglossa and Aelia only; caecal pockets present; tarsi 3-jointed .....PENTATOMINAE.]
- Bucculae convergent and united behind, the first rostral thick, free, directed away from the head, only its base being between the bucculae; caecal pockets absent.....ASOPINAE.

\* This should not be confused with the tooth of the side of the head at the base of the antennae.

## Subfamily SCUTELLERINAE

The species of this family exhibit a considerable variation in color-pattern and ground-color, and care must be exercised to draw the specific lines correctly.

[In examining both nymphs and imagines in our collection I have been struck by the fact that the Scutellerinae have the prothorax produced anteriorly on each side on venter in the form of a sharp plate which assumes different outlines in different species, but in all of them the plate of each side is curved caudad just mesad of the outer margin of the fore coxa and forms a ridge on each side of the medial line; in the groove thus formed the rostrum lies in similar manner as in that on venter of head. In none of the other subfamilies except Acanthosominae is there invariably such plate-like anterior extension of the prothorax, the only other exceptions known to me being Trichopepla and Aelia. I have refrained from introducing the character in the subfamily key as I am not sufficiently familiar with the Pentatomidae to judge as to the importance of this character. It is pertinent however to mention that the prothorax in most of the Cydnidae has the same characteristic central ridges anteriorly as in Scutellerinae.]

## KEY TO TRIBES

## NYMPHS

- Mediodorsal plate of anterior scent-gland nearly straight, narrow, slightly broader at each end to contain the terminal pore, but not extended back at the sides of the scent-gland, the pores of the two glands dissimilar (*Eurygaster*) ..... ODONTOTARSINI.
- Mediodorsal plate of anterior scent-gland very narrow in front of the next plate, greatly expanded backward on each side of it, so that the terminal pores of the first gland are laterad of those of the second, all being similar in appearance and similarly prominent (*Homaemus*) ..... TETRYINI.

## IMAGINES

- Venter without stridulatory areas ..... ODONTOTARSINI.
- Venter with median transverse pair of lustrous finely striated stridulatory areas, borne on at least the 4th and 5th ventrals ..... TETRYINI.

## Tribe ODONTOTARSINI

## KEY TO GENERA \*

- Osteole distinct, continued in a narrow canal; connexivum rather broadly exposed ..... 1. *Eurygaster*.
- Osteole indistinct, without evident canal.
- Head gradually narrowed to tip, not truncate anteriorly; body silky-pubescent (Col.) ..... *Fokkeria* Schout.

\* In this key and in those which follow, numbers before generic names indicate genera which are treated in the text.

Head in front broad and subtruncate.

Sides of pronotum sinuate, lateral angles notched.

Surface nearly smooth, pronotal collar slightly arcuate.....2. *Phimodera*.

Surface above corrugated, pronotal collar elevated hoodlike over base of

head (Col.) .....*Euptychodera* Bergr.

Sides of pronotum feebly arcuate, lateral angles entire (Cal., Colo., Nev.,

Wyo.) .....*Vanduzeeina* Schout.

### 1. EURYGASTER Lap.

#### EURYGASTER ALTERNATUS Say

*Tetyra alternata* Say, Am. Ent., Vol. 3, 1828; Compl. Writ. on Ent. N. A., Vol. 1, p. 94.

Taken by the author in the grassy bog at Sun Lake, Lake Co., Ill., August 3 and 9. Other specimens are labeled "N. Ill." We have it also from Minnesota, July 10 (Zetek). Can., U. S. from Me. to Cal., south to N. M. (V. D.).

### 2. PHIMODERA Germ.

#### PHIMODERA BINOTATA Say \*

*Scutellera binotata* Say, Narr. [Keating's] of Exped. [Long's] to Source of St. Peter's Riv., etc., 1823, Vol. 2, App., p. 39. 1825. Also Say's Compl. Writ. Ent. N. A., Vol. 1, p. 198.

Two examples, taken by the author in the Illinois valley sand-region near Havana May 31 and October 29; eleven specimens, Havana, April 6, 1917 (C. A. Hart, J. R. Malloch).

## Tribe TETRYRINI

### KEY TO GENERA

Osteolar opening nearer to hind coxa than to side margin.

Osteole continued in a distinct canal.

Costal border of elytra exposed not farther than middle of scutellum; canal long.

Canal slender, slightly widened apically and curved forwards.....

.....1. *Homaemus*.

Canal greatly expanded apically into a punctate area and bent angularly forward [ventral prothoracic plate as in Pl. XVII, Fig. 18]—Fla., Tex., N. M. (Bol.), Ariz., Trop. Am. ....*Sphyrocoris* Mayr.

Costal border of elytra exposed beyond middle of scutellum.

Sulcus on dorsal face of tibiae divided lengthwise into two sulci by a slight ridge, at least basally.....2. *Stethaulax*.

Sulcus on dorsal face of tibiae simple (Fla., Trop. Am.) ....3. *Symphylus*

Osteole not continued in a distinct canal.

Pronotum without transverse impression near middle—S. C. and Fla. to Tex. (V. D.).....*Diolcus* Mayr.

[\* Mr. Hart was not sure of the identification of this species, but material collected in 1917 leaves no doubt in my mind as to the correctness of the identification.]



Pronotum with distinct transverse impression near middle; small black species.

Sides of pronotum and head entire—Fla., Tex., Ariz., Cal., Vancouver (V. D.) ..... *Camirus* Stål.

Sides of pronotum and head denticulate ..... 4. *Acantholoma*.

Osteolar opening nearer to side margin than to hind coxa, without canal.

Costal border of elytra exposed beyond middle of scutellum.

Connexivum distinctly exposed in part (N. Y., Md., D. C., Fla., Tex., Ariz., Trop. Am.) ..... *Tetyra* Fabr.

Connexivum very nearly or quite covered by scutellum (Cal.?, Mex. to S. Am.) ..... *Pachycoris* Burm.

Costal border of elytra covered by scutellum except basally (S. C., Ga., Fla., Trop. Am.) ..... *Chelysoma* Berger.

# 1. HOMAEMUS Dall.

In our series I have been unable to verify satisfactorily the minute structural specific differences given by Van Duzee, and my previously published key \* depends too much on the form of the color-pattern.

[The shape of the anterior platelike extension of prothorax on venter is very characteristic, and as it is useful in separating the southwestern species *proteus* from the other three I have figured it (Pl. XVII, Fig. 12-15) for all four species.]

## KEY TO SPECIES

### NYPHS

Pronotal lateral margin minutely serrulate, almost entire; an impunctate white callus in front of the terminal pore of each scent-gland.

Lateral plates black on inner half, pale outwardly; callus large and conspicuous; hair sparse, a brassy luster ..... *aenifrons*.

Lateral plates with black line on inner margin, and black dot in outer half; callus reduced, not very conspicuous in the general lighter brown of the dark areas; hair dense and fairly straight; little or no brassy luster ..... *parvulus*.

Pronotal lateral margin rather coarsely acutely denticulate; no white callus; hair dense, curled; lateral plates with a black line on inner margin and a black spot occupying half or a third of the outer margin [Tex., Mex.] ..... *proteus*.

### IMAGINES

Head above bronzy black, sparsely short pubescent, without yellowish border; costal border more or less barred with black; pattern obscure, more or less mottled; length, 7-9 mm. .... *aenifrons*.

Head above black or bronzy black, with yellowish margin or submarginal line; costal border pale; general color pale yellowish, with pattern more or less distinct.

\* Bul. Ill. State Lab. Nat. Hist., Vol. 7, p. 264.

Larger species ( $6\frac{1}{2}$ –8 mm.); head bronzy black, with short sparse pubescence; sides of pronotum straight or slightly arcuate, apical expansion of pale median line of scutellum parallel-sided or narrowed anteriorly, bordered by black shading ..... *bijugis*.  
 Smaller species ( $4\frac{1}{2}$ – $6\frac{1}{2}$  mm.); head black, with rather dense longer whitish pubescence; sides of pronotum concave at middle, hind angles more acute; apical expansion of pale median line of scutellum bordered with a black line and broader anteriorly..... *parvulus*.

#### HOMAEMUS AENIFRONS Say

*Scutellera aenifrons* Say, Narr. [Keating's] of Exped. [Long's] to Source of St. Peter's Riv., etc., 1823, Vol. 2, App., p. 40. 1825. Also Say's Compl. Writ. Ent., N. A., Vol. 1, p. 199.

From the Illinois valley sand-region near Havana and Forest City. Nymphs were taken June 6, and imagines June 27 and 29, August 15 and 20, and September 11 and 20. Also a single specimen from Rock Island in June. Parkdale, Minn., August 28 (Zetek). Taken in sweepings in grassy areas. Ranges across the continent from Canada south to Maryland and New Mexico.

#### HOMAEMUS BIJUGIS Uhl.

*Homaemus bijugis* Uhler, Prel. Rep. [1871] U. S. Geol. Surv. Montana, etc., p. 393. 1872.

One specimen from Union Grove, Ill., in the sandy region along the upper Mississippi, July 13, 6 specimens from Elizabeth, Ill., July 6, 7, 1917 (Hart and Malloch); Fergus Falls, Minn., July 10 and 17 (Zetek). Arid plains, Nevada and Colorado to Nebraska and Iowa (Van Duzee). The males are smaller than the females, and have more obscure markings.

#### HOMAEMUS PARVULUS Germ.

*Pachycoris parvulus* Germar, Zeit. f. Ent., Vol. 1, p. 107. 1839.

*Tetyra grammica* Auct., nec Wolff, Icones Cimicum, Fasc. 5, p. 172. 1811.

Taken in sweepings in southern Illinois at Odin, Dubois, Carbondale, Parker, and Cobden, May 8 to July 20; nymphs, May 30. Col. and Mex. east to N. C. and Fla. (V. D.).

[In addition to characters given in key, *parvulus* may be distinguished from *bijugis* by the longer fifth ventral abdominal segment, which is usually at least half as long as sixth, the presence of lateral black spots on venter, and the shape of the anterior prothoracic ventral extension.]

#### 2. STETHAULAX Bergr.\*

There is but one species of this genus recorded from North America.

#### STETHAULAX MARMORATUS Say

*Tetyra marmorata* Say, Descrip. n. sp. Heter. Hemip. N. A., 1831; Compl. Writ. Ent. N. A., Vol 1, p. 310.

[\* This genus was taken in Illinois subsequent to Mr. Hart's death, and the treatment of it herein is by the editor.]

*Aulacostethus simulans* Uhler, Bul. U. S. Geol. and Geogr. Surv., Vol. 1, No. 5, sec. ser., p. 272. 1876.

The only Illinois specimen in our collection is a female taken at Cobden May 9, 1918, by the writer. The species has been recorded by Van Duzee from N. Y., Md., N. J., N. C., Ga., Tex., and Cal. In the Bolter Collection there are specimens from Arizona.

I can not detect the central ridge on hind tibia in this species even at base, and in this respect it very closely resembles specimens from Florida in the Bolter Collection labeled *Symphylus*, and recorded in the next paragraph. I have figured the dorsal aspect of head (Pl. XVII, Fig. 16), osteolar opening (Fig. 21), anterior outline of ventral lateral portion of prothorax (Fig. 19) and genital segments (Fig. 24) of *Stethaulax marmoratus* and this *Symphylus* species (figures cited in next paragraph) to illustrate the distinctions between them. These Florida specimens undoubtedly represent a species not included in our North American list.

### 3. SYMPHYLUS Dall.

This genus is now included for the first time among the Nearctic genera by reason of several examples of a species in the Bolter Collection labeled *Symphylus*, from Indian River and Point Orange, Florida. [(Pl. XVII, Fig. 17, 20, 22, 23; cf. with figures cited in previous paragraph.)]

### 4. ACANTHOLOMA Stål.

#### ACANTHOLOMA DENTICULATA Stål

*Acantholoma denticulata* Stål, Enum. Hemip., Pt. 1, p. 17. 1870.

Four specimens in Bolter Collection and one in Natural History Survey collection, all labeled "N. Ill."; one specimen, Dubois (S. Ill.), August 8, 1917 (J. R. Malloch); Kan. (Kirkaldy); Ind., Ill., Kan. (V. D.).

### Subfamily GRAPHOSOMATINAE

#### KEY TO GENERA

Side margin of pronotum at anterior angle bearing a tooth.

No metasternal carina.....*Amaurochrous*.

A sulcate metasternal carina (Col.).....*Weda* Schout.

Side margin of pronotum at anterior angle bearing a subquadrate lobe, the apical margin denticulate (Va., Tex., Vancouver).....*Oncozygia* Stål.

#### AMAUROCHROUS Stål (PODOPS Lap.)

Smaller species, male 4½-6 mm., female 6-7 mm.

Anterior pronotal tooth narrow, apical angle about 45°, sides of pronotum with slight sinus near middle, otherwise nearly straight from anterior tooth to apex of posterior tooth, which has an apical angle of about 60°....  
.....*parvulus*.

Anterior pronotal tooth broader, apical angle 60°-90°, sides of pronotum markedly sinuate, nearly transverse behind the sinus, suddenly rounded into an obtuse lobe on the posterior tooth, so that its apical angle is about a right angle.....*cinctipes*.

Larger species, male 7 mm., female 7-9 mm., pronotum about as in preceding species ..... *dubius*.

#### AMAUROCHROUS PARVULUS V. D.

*Podops parvulus* Van Duzee, Trans. Am. Ent. Soc., Vol. 30, p. 22. 1904.

Taken at Normal in central Illinois, March 26 and June 27; also in northern Illinois. Can., Mass., Kan., Col. (V. D.).

#### AMAUROCHROUS CINCTIPES Say

*Tetyra cinctipes* Say, Am. Ent., Vol. 3, 1828; Compl. Writ. Ent. N. A., Vol. 1, p. 94.

Seems to prefer sandy land, and often occurs in driftwood collections. The imagines are found in all sections of Illinois, and throughout the year except in April and the early part of May. Algonquin, Urbana, Homer, Monticello, Havana, Quincy, Carbondale, and Pulaski, March 19, 30; May 19, 24, 28, 31; June 9, 21; July 9; August 16, 19, 20; September 21; October 27, 28, 30; Nov. 14. Occurs in some of the Southern States, but is more especially a species of the northern states and Canada. N. Y., N. J., Can. (V. D.). Duluth, Minn. (Bol.).

#### AMAUROCHROUS DUBIUS P. B.

*Scutellera dubia* Palisot de Beauvois, Ins. rec. en Afr. et en Amér., p. 33. 1805.

This species occurs in the West Indies, and has been reported from N. Y., N. J., Va., and Tex. The Bolter Collection contains a female 8 mm. long, apparently of this species, from Nantucket Island, Mass. [The species may occur in Illinois.]

#### Subfamily HALYDINAE

Includes but one genus in Illinois.

#### BROCHYMENA A. & S.

##### KEY TO SPECIES

##### NYMPHS

- Pronotum with large, irregular lateral thorns, the lateral outline not straight, very conspicuously angularly produced on posterior third, lateral cephalic margin with a short thorn just in front of eye..... *arborea*.  
 Pronotum with small, almost equal-sized lateral teeth, the lateral outline almost straight, only slightly produced near posterior extremity; lateral cephalic margin with a short triangular protuberance just in front of eye... *pustulata*.

##### IMAGINES

- Osteole very small and inconspicuous, the auricle pale and very small or almost absent; pronotum produced in the form of a broad truncate process at lateral posterior angles, its apex with 2 or 3 sharp teeth; the paired plates at base of genital segments of female bulbous, their posterior margins declivitous.....  
 ..... *arborea*.

Osteole large, the auricle dark and well-developed; pronotum either broadly rounded at posterior lateral angles or rather sharply angulated, usually with small denticles; the paired plates at base of genital segments of female slightly convex or flat, their posterior margins not declivitous.

Osteole not surrounded laterally by pale yellowish color; apical dorsal segment of female conspicuously emarginate posteriorly; large species, females averaging 18 mm. in length; color of dorsum as in the other species of the genus but there is a paler area at apex of scutellum and on base of each elytron that is not so evident in any other species before me; lateral margin of metathorax narrowly pale yellow from base to apex.....*cariosa*.

Osteole surrounded laterally by pale yellowish color; apical dorsal segment of abdomen of female transverse or slightly emarginate; lateral margins of metathorax not narrowly pale.....*4-pustulata*.

[The above keys and the record of *B. cariosa* in text are by the editor. Mr. Hart's key to imagines included only *arborea* and *4-pustulata* which were separated on entirely different characters.]

#### BROCHYMENA ARBOREA Say

*Pentatoma arborea* Say, Jour. Acad. Nat. Sci. Phil., Vol. 4, p. 311. 1825.

This also is a widely distributed species, ranging from Canada into Mexico, and over nearly the whole of the United States. Its habits are very similar to those of the preceding species, but it seems to be most abundant later in the season. Examples determined by H. E. Summers were reported to us as spearing on their beaks larvae of the Colorado potato-beetle. Beach, Urbana, Twin Grove; Centralia, Dubois, Metropolis; March 18, May 9, June 10, July 3 (on apple), August 19, September 6-14 (on apple), 20, 22, November 7. G. H. French reported to us that he found *Brochymena* in all stages on willow, apple, and grape, and also took adults on peach and pear, his localities being Centralia, Carbondale, Makanda, Cobden, and Villa Ridge, and the dates August 26, 28, and September 5, 12, 26.

#### BROCHYMENA CARIOSA Stål

*Brochymena cariosa* Stål, Enum. Hemip., Pt. 2, p. 17. 1872.

One female which I found in the series of *4-pustulata* is undoubtedly *cariosa*, agreeing in every respect with Texan examples so named by Mr. Hart.

Locality, Whitesville, Saline Co., Ill., June 29, 1905.

#### BROCHYMENA QUADRIPISTULATA Fabr.

*Cimex quadripustulata* Fabricius, Ent. Syst., sec. ed., Vol. 4, p. 100. 1794.

This is our commonest species. It ranges from the eastern United States to California and is also found in Canada. It occurs in all sections of Illinois, but is perhaps commonest in the southern part. It rests on the branches of trees, protected by its color. We have found it on elm and grape, but it has been noted especially in orchards, on apple and cherry trees. Sanderson has recorded it as preying on the tussock and brown-tail moths; but its abundance in all stages on trees suggests that

it may also feed on the sap. We have never seen any with their beaks inserted, but H. Garman, while an assistant at the State Entomologist's office, found them very abundant on apple trees injured by twig punctures. We have taken them hibernating in December; they occur abundantly on apple, oak, elm, and other trees in May and June; and the nymphs in our collection were taken in late June, July, and August. The adults on apple trees, mentioned above, are perhaps the hibernating generation, the next generation being that taken by us in August, September, and October. Localities are as follows: Milan and Andalusia in Rock Island county; Urbana, Peoria, Havana, Griggsville, and Pegrin; Collinsville, Olney, Clay City, Flora, Odin, Centralia, Richview, Dubois, DuQuoin, Mt. Vernon, Carbondale, Grand Tower, Cobden, Anna, Pulaski, and Villa Ridge, in southern Illinois, the dates being April 7, 17, 19, 20; May 15, 18, 19, 21, 23, 24, 26, 27, 30; June 1, 4, 6, 8, 10, 13, 21, 26, 29; July 8, 17, 25; August 13, 14; September 2, 11, 14, and 20; and October 15, 31. Eggs of *Brochymena*, probably of this species, or of *arborea*, we have collected in late June, and from these we bred two parasites, determined for us by the U. S. Bureau of Entomology as *Anastatus* sp. and *Trissolcus murgantiae* Ashm.

### Subfamily PENTATOMINAE

#### KEY TO TRIBES

##### NYMPHS

- Juga broad, surpassing tylus and in close contact beyond it for a distance about equal to the width of a jugum.....EDESSINI.  
 Juga slender, straight, subacute, surpassing tylus by at least the width of a jugum, nearly or quite in contact beyond it; body elongate.....MECIDIINI.  
 Juga sometimes surpassing tylus, but by much less than a jugal width, and not in contact beyond it.....PENTATOMINI.

##### IMAGINES

- First rostral not evident between the bucculae anteriorly, apparently emerging behind the middle of the head, attaining the fore coxae.....DISCOCEPHALINI.  
 First rostral resting about parallel to the under surface of head, its basal end evidently in front of middle of head.  
 Body regularly ovate, broadest behind middle, margins all explanate; sides of tergum rather broadly exposed.....SCIOCORINI.  
 Body usually broadest at lateral angles of pronotum, margins not uniformly explanate; sides of tergum narrowly or not at all exposed.  
 Metasternum with a median smooth elevated area, strongly notched behind to receive the ventral spine, and prolonged forward as a bifid process; juga usually meeting broadly in front of tylus (Trop. Am., Fla. to La.).....EDESSINI.  
 Metasternum with not more than a simple median carina.  
 Venter with first three segments each side of middle bearing a curved stridulatory band, finely and densely cross-striate; body elongate, about four times as long as its greatest breadth (Mecidea).....MECIDIINI.



Venter without finely striated stridulatory band each side near base; body not over three times as long as its greatest breadth.....PENTATOMINI.

### Tribe DISCOCEPHALINI

#### KEY TO GENERA

Head narrower than apical margin of pronotum; side of head with spinose prolongation in front of eyes.....1. DRYPTOCEPHALA.

Head as broad as apical margin of pronotum; side of head without spinose prolongation in front of eyes.....2. PLATYCARENUS.

#### 1. DRYPTOCEPHALA Lap.

This genus I have added to the list of our fauna because of a nymph showing its peculiar head-structure, taken at Brownsville, Tex., November 21. I have nymphs apparently of the same species from Valles, Mex., near Tampico.

#### 2. PLATYCARENUS Fieb.

Two species of this genus are listed under Discocephala from Texas and Arizona respectively by Banks.\* They belong to the subgenus Platycarenus, which Kirkaldy lists as a genus.

### Tribe SCIOCORINI

#### SCIOCORIS Fall.

#### SCIOCORIS MICROPHthalmus Flor

*Sciocoris microphthalmus* Flor, Rhynch. Livl. etc., Vol. 1, p. 114. 1860.

This European species was taken on the White Mountains by Mrs. Slosson. In the Bolter Collection are two examples; one from Duluth, Minn.; the other from the Lake Superior region. The species is labeled *umbrinus*, but seems quite certainly *microphthalmus*.

### Tribe EDESSINI

The large neotropical genus Edessa is represented in our fauna; Florida to Louisiana.

### Tribe MECIDIINI

It seems possible that this tribe, based by Bergroth on the presence of stridulatory areas, may prove not to be a natural group.

#### MECIDEA LONGULA Stål

*Mecidea longula* Stål, Of. Kongl. Vet.-Akad. Förh., Vol. 11, p. 233. 1854.

This interesting, very elongate pentatomid is known from Texas, New Mexico, Colorado, and Iowa, and its occurrence in the sand areas of western Illinois is a possibility.

\* Cat. Nearctic Hemip.-Het., p. 92.

## Tribe PENTATOMINI

## KEY TO GENERA

## NYMPHS

Hind tibiae glabrous or with soft pale hairs, without short black spinulose hairs or dark points bearing them; third mediodorsal plate (except in *Mormidea*) punctate behind slit of scent-gland, with distinctly impressed punctures.

Third mediodorsal plate punctate behind slit of scent-gland.

First scent-gland not longer transversely than the others.

Tergum, except the chitinous plates, impunctate.

Pleura impunctate, sometimes slightly rugose; part of third median plate behind slit large (as in *Apateticus*).

Notum with broad orange border, sometimes reduced or interrupted at hind pronotal angles; disc next to the border black, central portion, especially on scutellum, broadly or narrowly pale; lateral plates usually black; tergal sutures, true and false, often marked with darker lines ..... *Acrosternum*.

Notum greenish, narrowly bordered with black; pronotal border within the black line feebly orange; disc of notum with pattern of distant black spots; lateral plates large, reaching sutures, pale rose-color ..... *Nezara*.

Pleura punctulate; part of third median plate behind slit short longitudinally.

Notum and tergum without evident pale border; lateral plates oblong, pale, with black inner marginal line; notum with vague black shades, a distinct smooth pale spot at lateral scutellar angles; tergal sutures usually darkened, as described for *Acrosternum*... *Thyanta*.

Notum and tergum with a uniform yellow or pinkish border, including lateral plates; abdominal sutures concolorous.... *Chlorochroa*.

Tergum evidently evenly punctate or punctulate, not merely mottled; smaller species.

Head glabrous or with a few sparse or very short hairs.

Juga considerably exceeding tylus.

Head flat, subtruncate in front, body subcircular; color brownish, a smooth pale notal border, except near hind pronotal angles; margin of head, inner margin of lateral plates, and borders of scent-gland slits narrowly black; punctures large, stellate..... *Dendrocoris*.

Head convex, juga oblique in front; body oval or oblong; color pale, with four longitudinal black stripes, or else black, with median line of notum, a very narrow lateral margin, and intermediate spots, yellowish ..... *Neottiglossa*.

Juga slightly or not at all exceeding tylus; first median plate bearing a pair of distant oval black spots; outline subcircular; color yellowish, base and longitudinal sutures of head black, a discal pair of black spots on pronotum and another pair on scutellum; hind border of pronotum and much of wing pads black.... *Cosmopepla*.

Head with dense erect pubescence; tergum and venter (exclusive of plates) punctulate (not very densely) with dark punctures; body margin often more or less pale.

Juga exceeding tylus, and converging in front of it.....*Peribalus*.

Juga not exceeding tylus.....*Trichopepla*.

First scent-gland longer transversely than the others, which are small; plates all very large, punctate; tergum otherwise impunctate..*Murgantia*.

Third mediodorsal plate smooth, impunctate; pleura coarsely and deeply punctate, tergum and venter impunctate; notum black, its anterior and lateral border whitish yellow, also its median line, and an intermediate stripe running back on the tergum alongside of the scent-glands; tergal margin narrowly pale, disc rose-purple, inwardly subconcentrically streaked .....*Mormidea*.

Hind tibiae with dark points bearing minute black spinulose hairs; part of third median plate behind slit of scent-gland small and indistinct, often mottled, but without definite impressed punctures; pleurae impunctate or sparsely punctulate.

Pronotal lateral outline oblique, nearly straight or even concave, except near the hind angles, where it is prominent and strongly rounded;\* abdomen impunctate.

Lateral plates oblong, pale, not mottled, bordered within by a nearly straight black line; notum with pale border, margined within by a black stripe; on the wing a discal second stripe; antennae black; pronotal lateral outline concave; mediodorsal plates except the last nearly or quite divided by a pale median stripe, leaving a pair of subquadrate black spots on the first plate, and a pair of elongate spots on the second and third plates .....*Solubea*.

Lateral plates semicircular, mottled, without black border, second and third mediodorsal plates each with a pale median line, each side of which is a rounded shining black prominence bearing a short pale oblique dash; antennae basally yellowish, annulate with white at second articulation, not merely narrowly pale yellowish at articulations as usual....*Prozys*.

Lateral plates semicircular, more or less mottled, a black curve within or black dot at intersection of inner side with false suture; mediodorsal plates varying from mottled in older nymphs to solid black with median line and borders of slit pale; antennae partly pale except in very young nymphs .....*Euschistus*.

Pronotal lateral outline quite evenly arcuate, nearly continuous with the curve of the body outline, hind pronotal angles not at all prominent.

The pronotal lateral outline if continued forward would miss the eye by more than its diameter, the anterior angles in line with anterior eye-margins; tergum and venter distinctly and rather densely punctate; last antennal segment black; mediodorsal plates with dark spot at each end; ground-color fuscous .....*Meneles*.

\* This distinction is not evident in very young nymphs.

The pronotal lateral outline if continued forward would pass close to the eye, not less than its diameter from it, the anterior angles not as far forwards as anterior eye margin; ground-color pale yellowish.

Tergum and venter sparsely punctulate, second and third mediodorsal plates black, with median stripe and anterior edge of transverse slit pale; notum with blackish shades, but always a vague pale median stripe; antennae dark fuscous.....*Hymenarcys*.

Tergum and venter impunctate; second and third mediodorsal plates pale, with a pair of oblique black dashes in front of slit, and a pair of transverse ones on the posterior border; notum with only a short longitudinal black dash at base of each wing pad, and the usual sparse black punctures; antennae black.....*Coenus*.

## IMAGINES

Juga straight, acute, surpassing tylus, but not converging in front of it.

Second ventral at middle produced forward in a stout spine between the hind coxae; mesosternum with very prominent median carina prolonged forwards (Cal., Ariz., Tex., Fla.).....*Arvelius* Spin.

Second ventral not produced in a spine.

Femora unarmed (Ariz.).....*Chlorocoris* Spin.

Femora acute at middle of apex above, ending in a minute spine....1. *Loxa*.

Juga obtuse, equaling tylus or converging and nearly or quite meeting in front of it; mesosternum without prominent carina prolonged forwards.

Second ventral at middle produced forwards in a stout spine or well-defined tubercle towards or between hind coxae. [See note at end of key.]

Juga not exceeding tylus.

Ventral spine passing middle coxae, spiracles large, black (Fla., N. Mex.) / .....*Piezodorus* Fieb.

Ventral spine not reaching middle coxae.

First antennal surpassing head (Fla.).....*Vulsirca* Spin.

First antennal not surpassing head.

Second antennal more than half as long as fifth.

Osteolar prolongation acuminate, reaching over half-way to body margin .....2. *Acrosternum*.

Osteolar prolongation subtruncate, reaching less than 1/3 the distance to body margin (Coastal plain, Va.; Tex. (Hart)).....

.....*Nezara* A. & S.

Second antennal less than half as long as fifth; ventral spine sometimes reduced to a broad tubercle.....3. *Banasa*.

Juga surpassing tylus and nearly or quite meeting in front of it.

Osteolar sulcus drawn out laterally and tapering into a narrow ridge at apex .....4. *Dendrocoris*.

Osteolar sulcus short, truncated (Fla.).....*Brepholoxa* V. D.

Second ventral at middle sometimes convexly prominent, but not produced forwards in a stout spine or tubercle.

Osteole without a distinct anterior auricle, the margin of the orifice V-shaped at inner end, exteriorly drawn out into a tapering canal often shading apically into a narrow acuminate ridge arising from the posterior side of the canal.

- Frena exceeding mid-scutellum; diffusion area well developed.
- Osteolar prolongation short, reaching about  $1/3$  the distance from orifice to lateral margin of metasternum; juga not surpassing tylus.....  
.....(*Pentatoma* Auct.)
- Sides of pronotum with distinctly reflexed margin.
- Third rostral shorter than second and about equal to fourth.....  
.....5. *Chlorochroa*.
- Third rostral about equaling second, and longer than fourth.....  
.....6. *Rhytidolomia*.
- Sides of pronotum with margin acute but not reflexed (Atlantic states, Col., Mont., Lower Cal.).....*Liodermium* Kirk.
- Osteolar prolongation reaching half-way or more to lateral margin of metasternum.
- Juga not surpassing tylus.....7. *Thyanta*.
- Juga surpassing tylus and meeting in front of it.....8. *Peribalus*.
- Frena not reaching mid-scutellum; diffusion area very small and ill-defined .....9. *Trichopepla*.
- Osteole with the rounded—rarely elongate—orifice on the outer side of a low elevation, which extends around its anterior side and outwardly, usually as a short raised auricle with a more or less free obtusely rounded apex.
- Head at least  $7/8$  as wide as scutellum. [Prothorax with a sharp plate-like production of anterior margin on each side ventrally which curves ridgelike mesad of coxa but does not extend caudad beyond the latter.]
- Pronotum with median ridge only; [lateral extension of prothorax on venter not extending beyond anterior margin of eye].10. *Neottiglossa*.
- Pronotum 3-ridged, sides straighter; [lateral extension of prothorax on venter extending much beyond anterior margin of eye] (Col. and Neb., northward into Canada.....*Aelia* Fabr.
- Head less than  $7/8$  as wide as scutellum.
- Osteole with inner end nearly in line with outer sides of adjacent coxae, without evident raised auricle or canal or the usual large opaque area .....11. *Murgantia*.
- Osteole about as far laterad of the outer sides of the coxae as the coxal diameter; an evident raised auricle and a well-defined large opaque area present, rarely one or the other not developed.
- Hind tibiae smoothly rounded above, at least on basal half.
- Bucculae strongly arcuate, much exceeded behind by first rostral.
- Scutellar breadth at apices of frena fully twice length of frena.....12. *Cosmopepla*.
- Scutellar breadth at apices of frena at most little more than length of frena.....13. *Mormidea*.
- Bucculae nearly straight-edged, not exceeded behind by first rostral.
- Tylus rounded at apex, not surpassing juga; eyes and pronotum contiguous .....14. *Solubea*.
- Tylus acute at apex, strongly surpassing juga; eyes distant from pronotum about as far as their diameter.....15. *Proxys*.

- Hind tibiae sulcate above, at least on basal half.
- Pronotal hind angles emarginate (Iowa, Col. to Vancouver and Lower Cal., Me.).....16. *Prionosoma*.
- Pronotal hind angles not emarginate.
- Bucculae sloping off at posterior end, without evident posterior lobe.
- Margins of pronotum arcuate and explanate; membrane veins anastomosing .....17. *Menecles*.
- Margins of pronotum sinuate; veins of membrane not anastomosing.
- Frena reaching well beyond mid-scutellum.
- Pronotal margin serrate anteriorly.....18. *Euschistus*.
- Pronotal margin entire (Fla.).....*Padaeus* Stål.
- Frena not reaching beyond mid-scutellum; pronotal margin entire (Kan. to Cal., north to Vancouver.. *Eysarcoris* Hahn.
- Bucculae elevated at posterior end into a distinct lobe, ending abruptly behind.
- Tylus not more prominent above than juga, which converge over it at apex (Col. to Cal., and N. Dak.)....*Carpocoris* Kol.
- Tylus throughout more prominent than juga, which are parallel.
- Distal part of scutellum narrower than elytra.....
- .....19. *Hymenarcys*.
- Distal part of scutellum broader than elytra.....20. *Coenus*.

[It was the intention of the author to arrange his keys according to the natural sequence of the genera, but evidently the attaching of importance to certain characters led him to place between closely related genera one or more genera that are apparently not closely related to the genera which they separate. An example may be seen in the case of *Dendrocoris*, since the genera *Thyanta* and *Banasa* are undoubtedly very closely related while *Dendrocoris*, intervening, is readily separable from them by a number of striking anatomical characters which are in my opinion of paramount importance in this family. The male genitalia are very distinctive in all the species of *Dendrocoris* which I have seen, the deep central excavation and lateral clawlike processes (Pl. XVIII, Fig. 28) being strikingly different from the ordinary forms in *Thyanta* and its allies (Pl. XX, Fig. 70, 72, 75, 77). The genitalia of the females differ from those of *Thyanta* and allied genera in having the basal paired plates entirely covered by the apical ventral segment when in their normal position. In addition to the genital differences mentioned the metasternum of *Dendrocoris* lacks the central ridge except in some cases at its anterior extremity. The male of this genus frequently has no protuberance on the second abdominal sternite, but the above characters will identify such specimens.]

[The arrangement of the genera of Pentatominae and other subfamilies of Pentatomidae has apparently been rather arbitrary if one may judge from the repeated re-alignment of the constituent genera in various



publications, even those issued by the same writer, and it occurs to the editor of this paper that a careful study of all stages of the group would afford a fruitful field for some unbiased student.]

### 1. LOXA, A. & S.

LOXA sp.?

The Bolter Collection contains two examples of a species of *Loxa* labeled "N. Ill." The genus has hitherto been known only from N. Mex. and Tex. (Uhl.) and Fla. (Van Duzee).

### 2. ACROSTERNUM Fieb.

KEY TO SPECIES

Form short-oval, sides of pronotum conspicuously arcuated.....*pennsylvanicum*.  
Form obovate, sides of pronotum nearly straight.....*hilare*.

#### \*ACROSTERNUM PENNSYLVANICUM De G.

*Cimex pennsylvanicum* De Geer, Mémoires pour Serv. à l'Hist. Ins., Vol. 3, p. 330. 1773.

Of this uncommon species we have several examples from northern Illinois in June. Its recorded range is from Massachusetts to Iowa and north into Canada. Banks has taken it on *Ceanothus*.

#### ACROSTERNUM HILARE Say

*Pentatoma hilaris* Say, N. Sp. N. Am. Ins. found by Joseph Barabino, chiefly in La., p. 9, 1832; Compl. Writ. Ent. N. A., Vol. 1, p. 304.

This very common large green species is in our collection from numerous localities in the various sections of the state. It ranges from Canada to Brazil, and from the Atlantic coast to the Pacific. The Bolter Collection contains specimens from California, from which it had not previously been reported. The life history is very evident from the data at hand. The imagines are most frequently taken in May and the early part of June; there are only a few dates in July and August, but they become more frequent in the latter part of September, with records for October and November. The nymphal records are all for July and August and the early part of September. A number of food plants, trees and herbs, are recorded. Our data show the occurrence of the nymph on grape and ash, and of the adult on catalpa and apple.

### 3. BANASA Stål

[There appears to be some uncertainty as to the identity of the species in this genus, and an examination of types appears to me necessary to definitely decide the matter. I have figured one side of the male hypopygium in *calva*, *dimidiata*, and *imbuta* Walker—a Texan species—(Pl. XVIII, Fig. 25, 26, 27), to facilitate identification of the species dealt with in this paper.]

## KEY TO SPECIES

Pronotum without any sharply contrasting color division.

General color dark chestnut or blackish; abdominal marginal incisures with evident black dot; basal angles of scutellum at most with very small smooth spots; [pronotum and basal half of elytra with narrow yellow lateral margins; male hypopygium similar to that of *calva*].....*sordida*.

General color greenish; abdominal marginal incisures without evident black dot; basal angles of scutellum with a smooth pale callus larger than eye; [pronotum and elytra without yellow lateral margins; male hypopygium similar to that of *dimidiata*].....*euchlora*.

Pronotum green or olivaceous in front of a line connecting the lateral angles; back of this line red-brown; the two colors in sharp contrast.

Abdominal marginal incisures with evident black dot; second antennal 2/3 to 3/4 as long as third; [male hypopygium as in Pl. XVIII, Fig 26]....*calva*.

Abdominal marginal incisures with not more than a minute black point; second antennal 1/2 to 2/3 as long as third; [male hypopygium as in Fig. 25] .....?*dimidiata*.

## BANASA SORDIDA Uhl.

*Atomosira sordida* Uhler, Proc. Boston Soc. Nat. Hist., Vol. 14, p. 98. 1871.

Two specimens taken by the author near the Mississippi River at Grand Tower, southern Illinois, June 30 and July 10. The species is recorded from Maine, Vancouver, and Arizona, and from some intermediate states.

## BANASA EUCHLORA Stål

*Banasa euchlora* Stål, Enum. Hemip., Pt. 2, p. 44. 1872.

This is a southern species, one ranging from Florida to Arizona (Bol.), and north to Maryland and Iowa. It was captured on cedar at Summerfield (S. Ill.) May 1, by E. S. G. Titus.

## BANASA CALVA Say

*Pentatoma calva* Say, Descrip. n. sp. Heter. Hemip. N. A., 1831; Compl. Writ. Ent. N. A., Vol. 1, p. 318.

The species is known from Georgia, New York, and Montana. [We have one male from Grand Tower (S. Ill.) July 12, 1909.] Van Duzee says that near Buffalo (N. Y.) it is "tolerably abundant on various deciduous trees from August to October."

## BANASA DIMIDIATA Say

*Pentatoma dimidiata* Say, Descrip. n. sp. Heter. Hemip. N. A., 1831; Compl. Writ. Ent. N. A., Vol 1, p. 318.

This is our commonest species. It ranges from the Atlantic coast to California, and north into Canada. We have it from Algonquin and various other points in northern Illinois; also from Quincy (C. Ill.) May 12, September 9, and November 14, (and from White Heath (C. Ill.) November 22, 1913.]

## 4. DENDROCORIS Bergr.\*

There is but one species of this genus in our Illinois material, though we have apparently six species from the United States in the collection.

## DENDROCORIS HUMERALIS Uhl.

*Liotropis humeralis* Uhler, Bul. U. S. Geol. and Geogr. Surv. Terr., Vol. 3, No. 2, p. 400. 1877.

This species is not uncommonly swept from black-jack oak at Havana, Forest City, and Meredosia. It also occurs under similar conditions at Alto Pass and Dubois. Other localities for Illinois are Galesburg, White Heath, Carbondale; and one specimen is labeled "N. Ill." Other states: Vt., Mass., N. J., Pa., Md., W. Va., Ga., Ohio, Iowa, Kan., Col., Cal.? (V. D.).

Mr. Van Duzee places a question mark after the California record. Possibly the specimen or specimens referred to are identical with one in our collection from Yosemite Valley, Cal., which is closely related to *humeralis* though evidently specifically distinct.

The male hypopygia of the species before me are all of similar structure (Pl. XVIII, Fig 28), and differ strikingly from those of *Thyanta*. The female genitalia differ from those of *Thyanta* and allied genera in having the basal plates concealed beneath the preceding ventral segment.

Mr. W. L. McAtee informs me that he has taken some specimens of *humeralis* that differ from the normal form in having the juga separated at apices. These specimens were taken in the vicinity of Washington, D. C.

Mr. Van Duzee in his recent catalogue lists *Dendrocoris* near the end of its tribe, placing *Arvelius* before it and after *Thyanta*.

## 5. CHLOROCHROA

## CHLOROCHROA UHLERI Stål †

*Chlorochroa uhleri* Stål, Enum. Hemip., Pt. 2, p. 33. 1872.

*Chlorochroa persimilis* Horvath, Ann. Mus. Natl. Hung., Vol. 6, p. 555. 1908.

This species is exceedingly abundant in the Illinois valley sand-regions, swarming on *Opuntia rafinesquii*, and feeding mostly at the tip of the fruits when these are present. I have also taken it in the sand dunes of the Chicago area on dwarf cedar (*Juniperus sabina*). Vestal says that it also occurs on *Chrysopsis*, *Kuhnia*, *Ambrosia psilostachya*, *Lespedeza capitata*, and grasses. In the Illinois valley we have it from Forest City, Manito, Bishop, Havana, Bath, Arenzville, and Meredosia. In the Chicago area we have it from Beach and Waukegan; and there are also single examples from Eureka, near the Illinois valley sands, from Mascoutah, near St. Louis, and from Dubois. The dates are April 1, 4, 9; June 5, 6, 10; August 7, 12, 13, 14, 18, 22, 24; September 28, 30; Octo-

[\* Treatment of this genus is by the editor.]

[† In Mr. Hart's MS. he uses the name *persimilis*, but Van Duzee's Catalogue gives this as a synonym of *uhleri*, in which he is followed here by the editor.]

ber 8, 15, 29, 30; and November 17. Nymphs occurred June 6 to October 30. In the late fall most adults are a dark brownish carmine resembling that of the ripe fruit of the *Opuntia* on which they occur. A few green individuals still remain, and it would seem that the red color is assumed at transformation, while mature adults are not affected. This dark variety was found abundant October 29, 30, and 31, and November 17. The species is common in sandy situations east to the Atlantic coast and in Iowa and Canada. It hibernates as an adult under shelter (Vestal).

[The claspers of the male hypopygia of *uhleri*, *sayi* Stål, *congrua* Uhler, and a species provisionally named *ligata* Say in our collection are very similar in structure, the most striking differences being found in those of the first two species as shown in Figures 29 and 30, Plate XVIII.]

## 6. RHYTIDOLOMIA Stål

### RHYTIDOLOMIA BELFRAGII Stål

*Rhytidolomia belfragii* Stål, Enum. Hemip., Pt. 2, p. 33. 1872.

Three specimens from northern Illinois in April (S. H. Peabody); Ill., Iowa, Neb., Canada (V. D.).

[Judging from the general habitus and hypopygial structure of this and the preceding species one might reasonably question the validity of the generic separation of the insects. The hypopygial claspers are very similar to those of *Chlorochroa* and are shown in Figure 31, Plate XVIII.]

## 7. THYANTA Stål \*

### KEY TO SPECIES

- Pronotal side margin anteriorly uneven and serrulate, usually a distinct black margin, a very distinct pair of black dots on pronotal disc, behind head; punctuation of disc of corium sparser than in the next species; male genital segment with median lobe rounded or subangulate.....*calceata*.
- Pronotal side margin nearly entire, often dark-margined, disc without distinct pair of black dots; punctuation of disc of corium quite dense; male genital segment with median lobe nearly straight-edged.....*custator*.

### THYANTA CALCEATA Say

*Pentatoma calceata* Say; Descrip. n. sp. Heter. Hemip. N. A., 1831; Compl. Writ. Ent. N. A. Vol. 1, p. 320.

Mr. H. G. Barber has recently pointed out † the characters for the recognition of this species, which had been previously confused with *custator*. He states that *calceata* appears to be confined to the region east of the Alleghanies; but the species had already been recognized by Dr. S. A. Forbes as distinct in our collection. The localities are Urbana and Towanda (C. Ill.) and Tamaroa [and Alto Pass] (S. Ill.), and the dates are May 2, [8], and 18, and September 22. We have also specimens from Kentucky and Florida in the Bolter Collection.

\* For synopsis of North American species see Addenda to this paper.  
† Journ. N. Y. Ent. Soc., Vol. 19, p. 108.

## THYANTA CUSTATOR Fabr.

*Cimex custator* Fabricius, Syst. Rhyng., p. 164. 1803.

This common and variable species is easily recognized by its peculiar granulate appearance, caused by the fine and dense punctuation. There are two extreme color-varieties. One is green, often with a red band between the humeri and red lateral border to the pronotum; the other is brownish fuscous, more or less dotted above and below with fuscous, and with a pale median line on the scutellum. There are so many intergrades between these forms that a variety name is not considered necessary. The species is widely distributed over the United States. It feeds on asparagus, corn, and various grasses. Several examples of the dark variety were once captured by C. W. Woodworth on the top of a tower of the University of Illinois about 180 feet high. The species is moderately common in all parts of Illinois, especially on dry or sandy soils. The dates are distributed rather uniformly throughout the season. Collections in November and December indicate that hibernation in the adult stage is usual. Nymphs have been taken from May to July, but much more abundantly from August to October.

## 8. PERIBALUS Muls. &amp; Rey

## KEY TO SPECIES

- Under surface and legs piceous, connexival pale border more or less invaded by large square black spots at incisures; [posterior margin of hypopygial opening as in Figure 32, Plate XVIII].....*piceus*.  
 Under surface and legs pale, connexivum with narrow pale border, line between this and the black discal color more or less sinuated outwardly on the incisures; [posterior margin of male hypopygial opening as in Figure 33].....*limbolarius*.

## PERIBALUS PICEUS Dall.

*Pentatoma? picea* Dallas, List of Specimens of Hemip. Ins. in Coll. Brit. Mus., Pt. 1, p. 236. 1851.

We have numerous specimens from northern Illinois (S. H. Peabody). The species is rather rare, being listed from Canada, Montana, and Iowa.

## PERIBALUS LIMBOLARIUS Stål

*Peribalus limbolarius* Stål, Enum. Hemip., Pt. 2, p. 34. 1872.

This common species ranges across the United States and from Canada to Mexico. We have it from numerous localities in all sections of the state. It is particularly a late-summer and fall species. We have taken it in January, March, April, and May, but especially from June 19 to November 7, the largest number of captures being in October. The nymphs were taken during the summer months. It feeds on goldenrod (Kirkaldy). At Urbana, October 26, the author found twenty-three imagines on a single cauliflower stalk with their beaks inserted, evidently sucking the sap.

## 9. TRICHOPEPLA Stål

## KEY TO SPECIES

- Sides of pronotum arcuate; head scarcely tapering; antennae black, first antennal rufous; basal half of scutellum finely and densely punctate. .... *atricornis*.  
 Sides of pronotum nearly straight; head distinctly tapering, with three pale impunctate stripes; antennae black, basal two or three segments pale; basal half of scutellum coarsely and unevenly punctate. .... *semivittata*.

## TRICHOPEPLA ATRICORNIS Stål

*Trichopepla atricornis* Stål, Enum. Hemip., Pt. 2, p. 34. 1872.

Recorded from Illinois and Wisconsin, west to California and Alaska. Not represented in our collections.

## TRICHOPEPLA SEMIVITTATA Say

*Pentatoma semivittata* Say, Descrip. n. sp. Heterop. Hemip. N. A., 1831; Compl. Writ. Ent. N. A., Vol. 1, p. 319.

Ranges from Canada and Maryland west to Colorado. Our material shows a remarkable variation in size and color. Specimens from southern Illinois are smaller (5-7 mm.) and paler, the square black spots of the connexivum often reduced to rufous shades on a yellowish ground-color, while those from central Illinois measure 7-8.5 mm. and are usually darker, with distinct black connexival spots. One specimen, evidently this species, has the antenna black except the basal joint. Dubois, Carbondale, Alto Pass, Cobden, Parker, Dongola, Brownfield (S. Ill.); Urbana and Seymour (C. Ill.)—June 7-22, July 3, 16, 17, 18, August 24, 30, and October 7. On the latter date they were abundant near Urbana in all stages, and Van Duzee so found them near Buffalo, N. Y., November 3. The food plant is the common wild carrot.

## 10. NEOTTIGLOSSA Kirby

[This genus and *Aelia* are exceptions to the general rule in this subfamily in having the prothorax produced anteriorly on venter in the form of a thin plate on each side, each plate being reflexed near its inner margin and continued caudally in the form of an erect slender ridge as in *Scutellerinae*. The other structures in the genera are, however, similar to those of the *Pentatominae*, and as the nymphs agree better with those of the latter than with *Scutellerinae*, in having the anterior tergal scent-glands in line with the posterior pairs, it appears to me inadvisable with the available data to suggest any change in the subfamily arrangement.]

## KEY TO SPECIES

## NYMPHS

- Dorsal surface of head evenly rounded. .... *sulcifrons*.  
 Dorsal surface of head with a large circular depression on disc. .... *cavifrons*.

## IMAGINES

- Head dorsally evenly convex transversely and longitudinally, at sides narrowly elevated above lateral carina; general color pale, fusco-punctate; head with pale median line. .... *undata*.



Head dorsally each side in front of eyes very tumid and greatly elevated above lateral carina; colors testaceous and black; head black, often with a testaceous mark each side, but without pale median line.

Deflexed anterior part of head flattened, uneven, slightly impressed on tylus; scutellum broadly testaceous laterally, the base and a median stripe broadly black .....*sulcifrons*.

Deflexed anterior part of head occupied by a subcircular evenly concave densely punctate excavation; scutellum black, often with narrow pale margin on apical portion.....*cavifrons*.

#### NEOTTIGLOSSA UNDATA Say

*Pentatoma undata* Say, Descrip. Heter. Hemip. N. A., 1831; Compl. Writ. Ent. N. A., Vol. 1, p. 319.

Quebec to Vancouver, south to Col., Neb., Ill., and N. J., common in northeastern U. S. Algonquin (N. Ill.); Havana, Bloomington, Normal, Champaign, Urbana, St. Joseph, Homer, and Oakwood (C. Ill.); none taken in southern Illinois. Taken in Iowa on mullein. The imagines were all captured in April, May, and June except a few in November.

#### NEOTTIGLOSSA SULCIFRONS Stål

*Neottiglossa sulcifrons* Stål, Enum. Hemip., Pt. 2, p. 18. 1872.

A southern species, ranging north as far as Utah, Nebraska, Iowa, and the District of Columbia. It occurs in southern Illinois, and is also taken in the central Illinois sand-regions at Havana and Forest City. The southern Illinois localities are Plainview, Carbondale, Makanda, and Cobden. Taken later than the preceding species—May to August.

#### NEOTTIGLOSSA CAVIFRONS Stål

*Neottiglossa cavifrons* Stål, Enum. Hemip. Pt. 2, p. 18. 1872.

This species is quite rare in collections, but is not uncommon in southern Illinois. It is listed from Texas, Utah, and California. The Illinois localities are Odin, Ashley, Dubois, Carbondale, Makanda, Anna, and Dongola, all in the southern fourth of the state. The dates range from April 28 to July 21, with nymphs on June 20 and July 9. One of these was taken on *Pycnanthemum*. The species is quite distinct from *sulcifrons*.

### 11. MURGANTIA Stål

#### MURGANTIA HISTRIONICA Hahn

*Strachia histrionica* Hahn, Wanz. Ins., Vol. 2, p. 116. 1834.

This is a common pest of cabbage and other Cruciferae in the South and in extreme southern Illinois, but it is seldom taken north of the center of the state. It has been known to feed on corn and a few other plants, probably in the absence of its natural food. It requires, of course, a spray of contact poison, and since it is very resistant to such treatment it is a difficult pest to combat. We have it from Willard, Grand Tower, Aldridge, Murphysboro, Anna, Metropolis, Mascoutah, and Edgewood in

southern Illinois, on cabbage, rape, turnip, and wild peppergrass, May 16 and 23, June 2, July 24 and 25, August 3, 5, 6, 10, and 11; and from Edgar, Urbana, and Springfield (C. Ill.) June 23, September 8 to 28, and in October, both young and old having been found on rape at Urbana and imagines on mustard at Edgar. The Bolter Collection contains one example from northern Illinois, and the species has been taken by us in Chicago. It is listed from Iowa (Stoner).

## 12. COSMOPEPLA Stål

### COSMOPEPLA BIMACULATA Thom.\*

*Pentatoma bimaculata* Thomas, Trans. Ill. State Agr. Soc., Vol. 5, p. 455. 1865.

*Cimex carnifex* Fabricius, Ent. Syst., Suppl., p. 535. 1798. (Preoccupied.)

*Cosmopepla lintneriana* Kirkaldy, Cat. Hemip. (Heter.), with Biol. and Anat. Ref., Vol. 1, p. 80. 1909.

Abundant and generally distributed in Illinois. Taken in every month from March to November. Unlike most species it was most frequently taken in the summer months. Nymphs were collected in June and August. Kirkaldy lists as food plants, *Scrophularia nodosa*, Ranunculus, currant, blackberry, mint, mullein, potato, raspberry, and moth mullein; and to these I add from our records Stachys and pokeberry. The recorded range is the United States and Canada east of the Rocky Mountains, also Washington. We have several typical specimens from Monterey, Mex., and two from New Mexico.

## 13. MORMIDEA A. & S.

### MORMIDEA LUGENS Fabr.

*Cimex lugens* Fabricius, Ent. Syst., sec. ed., Vol. 4, p. 125. 1794.

This species also is abundant in all sections of Illinois. Common in the United States and Canada, especially east of the Rocky Mountains. Like the preceding species it is notably most abundant in the summer months. Nymphs also were common in summer after June 21, and a few were taken in September and October. Imagines occurred in November, December, March, and April, indicating hibernation as adult. Food plant, Verbascum (Kirkaldy).

## 14. SOLUBEA Bergr.

### SOLUBEA PUGNAX Fabr.

*Cimex pugnax* Fabricius, Ent. Syst., sec. ed., Vol. 4, p. 100. 1794.

A southern and tropical species (Pl. XXI, Fig. 78). It ranges from Long Island to Iowa, thence to Brazil. It has not been taken in northern Illinois and only rarely in central Illinois (at Urbana, Mahomet, and Topeka), but it is very common in the state south of the latitude of St. Louis. It is recognized as a pest of grasses in Kentucky,\* and corn,

[\* The synonymy herewith is that given by Van Duzee in his recent Catalogue. Mr. Hart used the name *lintneriana* in his MS.]

\* Garman. *Psyche*, Vol. 6, p. 61.

wheat, *Panicum*, and *Setaria* are listed as food plants. We have taken it from May to November, especially in midsummer; the nymphs from July to October. It is also recorded as attacking the cotton-worm (*Aletia*).

#### 15. PROXYS Spin.

##### PROXYS PUNCTULATUS P. B.

*Halys punctulata* Palisot de Beauvois, Ins. rec. en Afr. et en Amér., p. 138. 1805.

This species ranges from Florida to Oklahoma and Texas, and southward into Central America, with one record for Philadelphia. The species was taken by the author in extreme southern Illinois June 4 to 10, at Parker, Pulaski, and Cairo, in the latter place under electric street-lights. The food plant is given as cotton, but there is very little or none of this in the vicinity of the localities named. It is also said to prey upon the cotton-worm.

#### 16. PRIONOSOMA Uhl.

##### PRIONOSOMA PODOPIOIDES Uhl.

*Prionosoma podopioides* Uhler, Proc. Ent. Soc. Phil., Vol 2, p. 364. 1863.

The range usually recorded for this species is from western Canada to Lower California, west of the Rocky Mountains. Stoner records it, however, from Iowa City and Ft. Madison, Iowa, in sandy ground. Since the latter locality is on the Mississippi River opposite Illinois the species should be looked for in the extensive sand-regions on the Illinois side of the Mississippi in this vicinity.

[There is one specimen without a locality label in our collection.]

#### 17. MENECLIS Stål

##### MENECLIS INSERTUS Say

*Pentatoma inserta* Say, Descrip. n. sp. Heter. Hemip. N. A., 1831; Compl. Writ., Ent. N. A., Vol. 1, p. 317.

Recorded from Canada, and ranging across the northern United States from Massachusetts to California, south as far as Arkansas. "Apparently nowhere abundant." (V. D.) In our collection from northern Illinois; from Quincy, White Heath, Urbana, St. Joseph, Homer, Muncie, and Hillery, in central Illinois; and from Dubois and Anna (S. Ill.). Nymphs in June; imagines from March to November. Its infrequency in collections is doubtless due to its arboreal habits. Van Duzee records its capture in numbers from small hickory trees; and in late October and early November we found it very abundant on sidewalks on the campus of the University of Illinois under a row of hard maple trees, which it was presumably leaving for hibernation.

#### 18. EUSCHISTUS Dall \*

The structure of the male hypopygia in this genus is similar in all of the species, the principal distinctions being found in the shape of the

[\* The key, with the exception of the bracketed matter, is by Mr. Hart. The remainder of the text, including records and description of species, is by the editor.]

ventral plate, as shown in Figures 34 to 39, Plate XVIII. The form of this plate in *impictiventris*, *euschistoides*, *ictericus*, and *servus* is almost identical, the central emargination being almost evenly rounded off laterally. In addition to this character all of the species of this group have a distinct central notch in the thin plate which projects from the caudal margin of the upper plate of the hypopygium, the notch varying slightly in depth in the different species (Fig. 37). The two species *tristigmus* and *pyrrhocerus* have the hypopygia of slightly different form, the ventral plate having a slight but distinct angle at each side of the central emargination, and the thin plate above referred to sharply produced in center, not notched (Fig. 35). Other forms of the hypopygial structures are shown in Figures 34, 36, 38, and 39.

#### KEY TO SPECIES

A distinct black dot in each anterior angle of the ventral segments.†

[Juga with a few sparse punctures along the lateral margins and between ocelli; disc of pronotum and elytra largely impunctate; antennae pale.....  
.....*subimpunctatus*.]

Juga above densely punctate; in side view obliquely truncate, not exceeding the obtuse median anterior profile formed by the tylus and labrum; margin of male genital segment, as viewed from behind, with distinctly limited median notch; antennae usually pale or reddish; 9 or 10 mm.

Side margin of pronotum nearly straight to the obtuse lateral angles, an evident pale edge, sharply contrasting above with a well-defined dark border; head above with dark margin; no median ventral spots; notch in male genital segment V-shaped, a similar, very small incision each side of it.....*politus*.

Side margin of pronotum deeply sinuate, pale edge narrow, dark border shading off very gradually inwards, none on head; venter in front of genital segment with one or more median spots, rarely none; last tarsal usually black-tipped; notch in male genital segment semicircular, limited each side by a small tooth.

Lateral pronotal angles rounded or subacute; ventral spots 2-4; darker, antennae often black apically; imagines common before and after July.....*tristigmus*.

Lateral angles spinose or acute; ventral spots 0-2; paler, antennae pale; common southward, especially during July.....*pyrrhocerus*.

Juga above rather sparsely punctate along the middle of the disc; margin of male genital segment, viewed from behind, broadly concave without definitely limited notch; antennae pale or apically black; length about 12 or 13 mm.

Juga in side view acutely projecting more or less beyond the median profile, as seen from above usually exceeding tylus; male genital segment without black spot; width across elytra 7-8 mm.

† Turn apex of abdomen to the light to avoid shadows at the anterior angles.

Apical notch between juga shallow; connexivum partly exposed beyond elytral margin; antennae pale or reddish; margino-ventral dots elongate, invading adjacent hind angles of preceding segment; legs feebly dotted; lateral pronotal angles acute or subspinose.....*servus*.

Apical notch deep; connexivum covered by elytra; antennae black apically; margino-ventral dots not evidently invading hind angles of preceding segment; legs strongly dotted; lateral pronotal angles rounded or subacute .....*euschistoides*.

Juga in side view hardly exceeding median profile, and as seen from above not exceeding tylus; male genital segment with mediobasal rounded black spot; antennae apically black; width across elytra 6 or 7 mm.; lateral pronotal angles acute or subspinose.....*variolaris*, var.

No black dot in the anterior angles of the ventral segment; juga in side view hardly exceeding medial profile, and as seen from above not exceeding tylus; antennae apically black; width across elytra 6 or 7 mm.; lateral pronotal angles acute or subspinose.

No evident raised smooth interhumeral line; spiracular rings pale; male genital segment with mediobasal rounded black spot; [no small black dots on disc of venter of thorax].....*variolaris*.

An evident smooth interhumeral line, usually raised; spiracular rings black; male genital segment without spot; [4 small black dots on each side of disc of thoracic venter].....*actericus*.

#### EUSCHISTUS SUBIMPUNCTATUS, n. sp.

*Female*.—Yellowish testaceous, dorsum with brown punctures. Antennae slightly reddish on apical half; rostrum black on greater portion of apical joint. Venter of thorax with the usual 5 black dots on each side, 4 of which are on disc. Abdomen without black median ventral spots; extreme apices and bases of lateral margins of ventral segments glossy black; dorsum dark brown, with a subquadrate pale spot in middle of lateral margin of each segment. Membrane of wings unspotted. Legs with minute brown spots at bases of the setulae.

Tylus as long as juga, slightly pointed in front, the juga narrowed anteriorly, their lateral margins sinuate; second antennal joint a little shorter than third; dorsum of head almost impunctate, only a few scattered punctures along margins and between ocelli; ventral surface almost impunctate. Pronotum with rather large but not dense punctures on lateral margins and on median two-thirds of posterior margin, the remainder impunctate except for a few sparse punctures in middle near anterior margin; lateral margins slightly sinuate, with a few small protuberances on anterior half, not vertically rugose, posterior lateral angles produced in the form of a short tooth which is not so acute as in *pyrrhocerus*; scutellum with a large group of punctures on middle of each lateral margin; venter of thorax sparsely punctate. Elytra very sparsely punctate along inner margin, with rather close punctures on outer portion beyond vein, and with a few punctures at apex. Venter of abdomen with very small punctures, basal genital plates sinuate on their apical margin,

the inner apical angle slightly produced, the general habitus as in *euschistoides*.

Length, 11.5 mm.

Type, Anna, Ill., July 22, 1883. One specimen.

This species differs from any other *Euschistus* known to me in having the dorsum very sparsely punctate.

I found this specimen among some material that Mr. Hart had not incorporated in the collection.

#### EUSCHISTUS POLITUS Uhl.

*Euschistus politus* Uhler, Can. Ent., Vol. 29, p. 117. 1897.

This species has been recorded by Uhler from Massachusetts, Rhode Island, Pennsylvania, Maryland, and the District of Columbia. It has been recorded by other workers from Ohio, New Jersey, and New Hampshire.

In our collection there is a male<sup>o</sup> from Dubois—August 19; one female from Muncie—July 6; another from northern Illinois; and one without locality which is labeled "*Euschistus pallidus* Uhler MS."

In addition to these, there is a much darker female specimen from Minnesota, labeled by Mr. Hart "*politus*?"

#### EUSCHISTUS TRISTIGMUS Say

*Pentatoma tristigma* Say, Descrip. n. sp. Heter. Hemip. N. A., 1831; Compl. Writ. Ent. N. A., Vol. 1, p. 314.

Recorded from northern Canada to southern Mexico. Distributed generally throughout Illinois but more common in the northern half of the state. Our specimens bear various dates ranging from April 11 to November 12, all the intervening months being represented. We have in addition to Illinois examples, specimens from Wisconsin, District of Columbia, New York, and Minnesota.

The editor is of the opinion that *luridus* Dallas is distinct from *tristigma* Say. The regularly rounded humeri of the former are very conspicuously different from the angular ones of *tristigma*, and with the naked eye it is possible to recognize the forms very readily. The apical two antennal joints in *luridus* are usually conspicuously darker than the others, but this character is not a dependable one.

The typical form of *tristigma* is common in the southern half of Illinois, while *luridus* is found in the northern portion, our localities including Algonquin, Chicago, and Savanna. We have specimens of *luridus* from Buffalo, N. Y., Omaha, Neb., Duluth, Minn., and Lone Rock, Wis.

#### EUSCHISTUS PYRRHOCERUS H.-S.

*Cimex pyrrhocerus* Herrich-Schaeffer, Wanz. Ins., Vol. 6, p. 71. 1842.

This form is considered as a variety of *tristigma*, and appears to replace it to a very large extent in the southern portion of the United States. I consider *pyrrhocerus* a distinct species.

In Illinois we have found it common at Murphysboro, Cobden, Grand Tower, Pulaski, East St. Louis, Dubois, Clay City, and Havana, all south of the middle of the state. The most northern records we have for the form are Urbana and Hillery. The only months represented by our collections are June, July, and August.

#### EUSCHISTUS SERVUS Say

*Pentatoma serva* Say, Descrip. n. sp. Heter. Hemip. N. A., 1831; Compl. Writ. Ent. N. A., Vol. 1, p. 314.

This species is cited by Van Duzee for the southeastern states as far north as New Jersey, and west to Texas, Kansas, and New Mexico.

In Illinois the species appears to be much more numerous in the southern portion of the state, ranging from Urbana southward, only two examples in our collection bearing the label "N. Ill." The dates on our specimens range from May 13 to August 25, and include all intervening months.

In addition to the Illinois material we have specimens from Alabama, Tennessee, Florida, and Texas.

In our collection there is a large series of specimens standing as *impictiventris* Stål, named by Mr. Hart. As the species is not in Mr. Hart's key I made a search to discover if any light could be thrown upon the omission by notes not contained in the manuscript. I find the following note in some manuscript not directly connected with the present work:

"My *impictiventris* is perhaps intermediate between *servus* and the true *impictiventris*. These three forms, although usually distinguishable, intergrade so much that they are probably only geographic subspecies.

"*Pyrrhocerus* is usually considered a variety of *tristigmus*. The differences are similar to those in the group above mentioned, and although more marked and more constant than any in that group, are probably only of subspecific value."

As indicated above there is some doubt as to the specific distinctness of the forms, a fact borne out by a perusal of Van Duzee's notes on *impictiventris*.\*

The specimens standing as *impictiventris* in our collection are from the same localities as those of *servus*, with the exception that the most northern examples are from Muncie. The dates range from June 28 to August 24. We also have specimens from Tennessee, Kansas, and California.

#### EUSCHISTUS EUSCHISTOIDES Voll.

*Diceraeus euschistoides* Vollenhoven, Versl. Med. Kong. Akad. Wetens. Amst., ser. 2, Vol. 2, p. 180. 1868.

*Euschistus fissilis* Uhler, Proc. Boston Soc. Nat. Hist., Vol. 14, p. 96. 1871.

This species is distributed throughout the North American continent from Quebec to Vancouver Island, and from Florida to Texas.

\* Trans. Am. Ent. Soc., Vol. 30, p. 45. 1904.



One of the commonest species in Illinois; generally distributed. Found in the imago stage throughout the year.

*EUSCHISTUS VARIOLARIUS* P. B.

*Pentatoma variolaria* Palisot de Beauvois, Ins. rec. en Afr. et en Amér., p. 149. 1805.

This species is found almost everywhere in the United States and Canada, being especially abundant in the Northern States. It is the commonest species of the genus in Illinois, and is found in the imago stage throughout the year in all parts of the state.

The variety with black dots on lateral margins of abdomen included in the key is represented in our collection by three males and two females. Four of these are Illinois specimens, the locality labels reading, Ottawa, Carbondale, Dubois, and "N. Ill." One male is without label. The three specimens bearing dates were taken in July. Mr. W. L. McAtee has specimens of this variety from Riverhead, N. Y., West Cornwall and Westport, Conn., and from Mendham, N. J.

*EUSCHISTUS ICTERICUS* Linn.

*Cimex ictericus* Linné, Cent. Ins. Rar., p. 16. 1763.

Found in the northern United States and Canada across the whole of the continent.

Our Illinois specimens are from Channel Lake, Beach, Cedar Lake, Algonquin, Lake Villa, La Prairie, and Urbana. The dates range from June 19 to August 14. We also have one specimen from Nantucket Island, Mass.

19. *HYMENARCYS* A. & S.

KEY TO SPECIES

Sides of thorax straight or slightly concave; lateral angles subacute; veins of membrane rarely anastomosing; spiracles distant from ventral margin about 1/2 length of segment; length 6.5-8 mm. .... *aequalis*.

Sides of thorax evenly arcuate, lateral angles broadly rounded; veins of membrane freely anastomosing; spiracles distant from ventral margin about 3/4 length of segment; length 8.5-10 mm. .... *nervosa*.

*HYMENARCYS AEQUALIS* Say

*Pentatoma aequalis* Say, Descrip. n. sp. Heter. Hemip. N. A., 1831; Compl. Writ. Ent. N. A., Vol. 1, p. 319.

This species tends to be somewhat southern in distribution, ranging from New York to Colorado and Montana and southward. It is quite abundant in southern and central Illinois, but there are very few records of it for the northern part of the state. Nymphs have been taken from May to August. We have taken the imagines in all the months from February to December, most abundantly from July to November. An imago was taken April 19 by E. O. G. Kelly under a corn husk.

## HYMENARCYS NERVOSA Say

*Pentatoma nervosa* Say, Descrip. n. sp. Heter. Hemip. N. A., 1831; Compl. Writ. Ent. N. A., Vol. 1, p. 321.

The range of this species is about the same as that of the preceding one, but it has been taken in Canada. Our collection contains specimens from numerous localities in southern and central Illinois, but none from northern Illinois. The nymphal dates are June 21 and 22 and July 17. Imagines have been taken from March to December, the occurrences being quite uniformly distributed through the period. Cotton is recorded as a food plant.

## 20. COENUS Dall.

## COENUS DELIUS Say

*Pentatoma delia* Say, Descrip. n. sp. Heter. Hemip. N. A., 1831; Compl. Writ. Ent. N. A., Vol. 1, p. 320.

This common species is widely distributed from Quebec to Vancouver, south to Florida and Texas, but is not numerous, and as Van Duzee says, is "apparently precinctive." Our collection shows numerous records for northern and central Illinois, but only one, Dubois, for southern Illinois, indicating that it is at least rare in the Ozarkian faunal district. Our nymphs were taken in June and July. The imagines were taken in every month from February to November, most abundantly, not in the summer months but in May and September. Olsen has kept imagines alive by feeding them on moth mullein (*Verbascum blattaria*).

## Subfamily ACANTHOSOMINAE \*

There are but two genera of this subfamily recorded from North America. We have both genera represented in our collections.

The generic key which follows is based upon characters of the two species before me, and may not be serviceable in separating the other species.

## KEY TO GENERA

Pronotum slightly but distinctly produced posteriorly on caudal margin laterad of base of scutellum, not forming an angle from basal line to lateral angle of pronotum; osteole short and broad, not extending more than midway to margin of metathorax; basal genital plates of female much longer than broad, almost oblong ..... *Meadorus lateralis*.

Pronotum not produced caudad laterad of base of scutellum, forming a straight line from base to lateral angle of pronotum; osteole long and narrow, extending over two-thirds of the distance to margin of metathorax; basal genital plates of female as long as broad, subtriangular. .... *Elasmotethus cruciatus*.

## MEADORUS LATERALIS Say

*Edessa lateralis* Say, Descrip. n. sp. Heter. Hemip. N. A., 1831; Compl. Writ. Ent. N. A., Vol. 1, p. 312.

This species has not been found so far as I am aware in Illinois, but as we have specimens in our collections from Lake Superior and Minne-

[\* Treatment by editor.]

sota it is probable that it will be found in the northern part of the state. Our other specimens are from the following localities: Clark's Station and Colton, Cal., and Vancouver, B. C., all but the last being unmentioned in Van Duzee's Catalogue.

#### ELASMOTETHUS CRUCIATUS Say

*Edessa cruciata* Say, Descrip. n. sp. Heter. Hemip. N. A., 1831; Compl. Writ. Ent. N. A., Vol. 1, p. 311.

We have one specimen of this species from northern Illinois in our collections. Our other specimens are from the following localities: Spokane, Wash., Victoria, B. C., Texas, Yosemite Valley and Fresno Flats, Cal., Las Vegas, N. Mex., and District of Columbia. With the exception of New Mexico and British Columbia Van Duzee gives none of these localities.

#### Subfamily ASOPINAE

The members of this subfamily have very stout beaks, and are predaceous upon various insects, especially soft-bodied caterpillars and grubs, and are sufficiently abundant to render valuable service in destroying injurious larvae.

#### KEY TO GENERA

Fore femora with small spine beneath, near outer third or fourth, the spine often blunt at apex, minute but distinct in *Andrallus*; male with silky-pubescent patch on venter each side of middle, except in *Alcaeorrhynchus*. Pronotal lateral angles rounded; frena about 1/2 length of scutellum or less, apical part of scutellum U-shaped; above black or dark brown, with pattern of red to pale yellow markings.

Ventral spine reaching middle coxae.

Scutellum as a whole nearly U-shaped, frena about 1/4 its length, apical part over twice as wide as elytra (*Discocerini* Schouteden). 1. *Stiretrus*.

Scutellum subtriangular, frena about 1/2 its length, apical part not wider than elytra (Tex., Ariz.).....*Oplomus* Spin.

Ventral spine not passing hind coxae.....2. *Perillus*.

Pronotal lateral angles sharply and prominently spinose, a small spine behind these; frena nearly 2/3 length of scutellum, apical part of scutellum small, subacute; above brownish, mostly vaguely marked.

Second ventral at middle with a broad flattened tubercle, its apex rounded-truncate; femoral spine evident; male without pubescent patches on venter—Fla., Trop. Am. (*Mutya* Stål).....*Alcaeorrhynchus* Bergr.

Second ventral at middle with a low subconical prominence, femoral spine minute; male with pair of pubescent patches on venter (Tex., Mex.)....  
.....3. *Andrallus*.

Fore femora without trace of spine beneath, near the outer third or fourth.

[Head nearly as long as pronotum, juga exceeding tylus; pronotum with 2 angular protuberances on posterior lateral angle; eyes not contiguous to anterior margin of pronotum (Tex.).....*Heterosceloides* Sch.]

[Head much shorter than pronotum, the latter with at most 1 protuberance on lateral angle; eyes usually contiguous to anterior margin of pronotum.]

Second ventral in side view with distinct spine or tubercle projecting anteriorly towards or between hind coxae.

Fourth rostral about as long as third; above gray to brown. 4. *Apateticus*.\*

Fourth rostral about twice as long as third; above black with red or yellow pattern ..... 5. *Mineus*.

Second ventral in side view with not more than a slight obtuse angulation at middle.

Juga not meeting in front of tylus; osteole with distinct curved prolongation; bucculae not overhanging behind.

Second rostral 1/2 longer than third; metallic dark blue above..... 6. *Zicrona*.

Second rostral more than twice as long as third; metallic blue to green above, with red to brown markings (Pa., Tenn., and southward, Trop. Am.) ..... *Euthyrhynchus* Dall.

Juga meeting in front of tylus; osteolar prolongation subobsolete; bucculae strongly elevated, in side view overhanging behind..... 7. *Rhacognathus*.

## 1. STIRETRUS Lap.

### STIRETRUS ANCHORAGO, var. FIMBRIATUS Say

*Tetyra fimbriata* Say, Am. Ent., Vol. 3, 1828; Compl. Writ. Ent. N. A., Vol. 1, p. 93.

The species occurs in the Southern States, ranging north as far as Iowa and Massachusetts, and south to Panama. It is uncommon in Illinois so far as our experience goes. There are several specimens from northern Illinois in the Bolter Collection, and we have it from Algonquin (N. Ill.; Nason), Charleston (C. Ill.; C. C. Adams), and Thebes (S. Ill.; C. A. Hart), July 3 and August 23. The variety *violaceus* is known from Pennsylvania, and should be looked for in southern Illinois.

## 2. PERILLUS Stål

The species of this genus are black, varied with reddish, and marked with red, carmine, or pale yellow, notably a pale or red U- or V-shaped scutellar border. My material is not any too extensive, as the species are not usually abundant; but the pattern seems fairly constant, and I have ventured to use it freely in the following key.

### KEY TO SPECIES

Pronotum with anterior transverse black bar not interrupted at middle; costal border of corium pale; femoral spine a small tooth or tubercle, not longer than thick; basal margin of scutellum black..... *exaptus*.

[\* See Addenda for generic subdivisions.]

Pronotum with a median pale vitta from anterior pale border, dividing anterior black bar into two transverse marks; costal pattern variable; femoral spine finger-like, longer than thick; basal margin of scutellum narrowly pale.

Second antennal black, venter with submarginal row of black spots (female) or a large central black patch containing the stridulatory areas (male); a broad distinct arcuate pale band between the humeri.

Black, with red markings; elytra black, costal border red towards base....  
.....*bioculatus*.

More or less rufous or brownish, with pale yellowish markings; corium with broad pale costal, apical, and inner border, except inner margin, which is narrowly black.....*bioculatus*, var. *clauda*.

Second antennal pale, venter with broad submarginal black stripe; pale band between humeri absent, obscure, or irregular, costal border of corium pale, often a pale streak near inner margin.....*circumcinctus*.

#### PERILLUS EXAPTUS Say

*Pentatoma exapta* Say, Jour. Acad. Nat. Sci., Phil., Vol. 4, p. 313. 1825.

Quebec to Vancouver, southward to New Jersey and New Mexico. In our collections from northern Illinois and from Urbana, early in the season.

#### PERILLUS BIOCULATUS Fabr.

*Cimex bioculatus* Fabricius, Ent. Syst., sec. ed., Vol. 4, p. 120. 1794.

This species is listed as ranging from California and Oregon to Iowa. The typical form is in our collection from Algonquin (Nason). The variety *clauda* has not been taken in Illinois, as far as I know. The two forms appear to be quite constant and distinct, and are perhaps valid species.

#### PERILLUS CIRCUMCINCTUS Stål

*Perillus circumcinctus* Stål, Stett. Ent. Zeit., Vol. 23, p. 89. 1862.

Eastern United States and Canada, as far west as Manitoba and Missouri, and perhaps Mexico. Fergus Falls, Minn., July 10 (Zetek). In Illinois it seems to occur only in sandy areas. In the Illinois valley sand-region we have found it common on the low sumac (*Rhus canadensis illinoensis*) of the sands, associated with the larvae of *Blepharida rhois*, on which it was probably feeding. Our localities are northern Illinois (several specimens); the lake beach at Chicago; and Manito, Forest City, and Havana in the Illinois valley sands, the dates being April 28, June 6, 8, and 10.

#### 3. ANDRALLUS Bergr.

A fine example of *A. spinidens* was captured by me at Brownsville, Tex., and the genus is therefore included in the key as a member of our fauna. The single species inhabits Ethiopian Africa, Madagascar, Asia Minor, India, Java, Borneo, Australia, New Caledonia, Fiji, and Tahiti,

and, says Schroeder, "has even been reported by Stål from Mexico; but this habitat seems not to have been confirmed. Ellenrieder gives rice as the food plant.

#### 4. APATETICUS Dall.

##### KEY TO SPECIES

Larger species, 14–20 mm. to tip of elytra; venter without median black spots; membrane without dark streak; female genital segment with three basal plates (Apocilus).

Mediobasal genital lobe of female subquadrate; lower appendage of male broad, flattened, bent, upper appendage dissimilar, palpus-like, small, nearly straight, about half as long as lower; tuberculate plate not prolonged below appendages; connexivum usually covered by elytra; above pale brownish; lateral pronotal angles acute,  $50^{\circ}$ – $60^{\circ}$ .....*cynicus*.

Mediobasal genital lobe of female subtriangular; lower appendage of male, narrow, curved, upper appendage similar, about equally long; tuberculate plate prolonged in an obtuse horn below lower appendages; connexivum more or less visible from above, especially in the female.

Lateral pronotal angles acute, about  $50^{\circ}$ – $60^{\circ}$ ; color as in *cynicus*; venter very coarsely dotted at punctures, black spots at marginal incisures.....*crocatus*.

Lateral pronotal angles about  $90^{\circ}$ ; tips of juga, pronotum posteriorly, scutellum, and elytra blackish, the two latter mottled with red-brown; head and pronotum anteriorly more yellow-brown; venter not very coarsely dotted at punctures, spots at incisures extended inward along sutures.....*bracteatus*.

Smaller species, 8–13 mm.; female genital segment with two basal plates (Podisus).

No dark subapical streak in membrane nor medioventral black spots; lateral pronotal angles blunt, about  $90^{\circ}$ .....*placidus*.

A membranal dark streak and one or more medioventral black spots.

Lateral pronotal angles acute or spinose, the angle formed by the sides evidently less than  $90^{\circ}$ .

Hind femora immaculate; lateral pronotal angles acute or very narrowly rounded, edge immediately in front of angle strongly arcuate; ventral spine short; length usually less than 10 mm.....*modestus*.

Hind femora with two subapical black spots; lateral pronotal angles prolonged, spinose or subspinose; edge in front of angle concave or nearly straight; ventral spine longer; length usually over 10 mm.....*maculiventris*.

Lateral pronotal angles  $90^{\circ}$  or over; hind femora darker apically, or with subapical dark annulus; ventral spine very short; a dark spot or bar on disc of elytra and one on base of scutellum, besides others on pronotum; size of preceding species.....*serieventris*.

## APATETICUS [APOECILUS] CYNICUS Say \*

*Pentatoma cynica* Say, Descrip. n. sp. Heter. Hemip. N. A., 1831; Compl. Writ. Ent. N. A., Vol. 1, p. 312.

Eastern United States and Canada, Tex. This species has been taken by us most frequently in northern Illinois near Chicago, and is quite often washed up by the waves along the beach of Lake Michigan. The author has taken it at electric street-lights in Urbana. Other localities are Galesburg and Dubois, the latter in southern Illinois. The dates range from May 31 to August 24.

## APATETICUS [APOECILUS] CROCATUS Uhl.

*Podisus crocatus* Uhler, Trans. Md. Acad. Sci., Vol. 1, p. 384. 1897.

The specimens agreeing with *bracteatus* quite closely in male and female genitalia but similar to *cynicus* in general color and pronotal lateral angles I am calling *crocatus*, accepting Van Duzee's identification of Uhler's species. This, Van Duzee suggests, may be the southern form of *bracteatus*, but the marked difference in pronotal angles as well as in color-pattern inclines me to accept it as a distinct species, especially since the localities do not indicate a southern distribution. The range of the species according to Van Duzee is in the Rocky Mountain region from Manitoba to Arizona. Our specimens are from Minnesota, Michigan, New York, Nantucket Island, and northern Illinois, one being from Chicago.

## APATETICUS [APOECILUS] BRACTEATUS Fitch

*Arma bracteata* Fitch, Trans. N. Y. State Agr. Soc., Vol. 16, p. 336. 1856.

The six specimens in the Bolter Collection which I identify as this species are all from Victoria, Vancouver Island. The color-pattern and short pronotal angles make them easily separable from *crocatus*, although the male and female genitalia of the two species are very similar.

## APATETICUS [PODISUS] PLACIDUS Uhl.

*Podisus placidus* Uhler, Ann. Ent. and Bot., Vol. 2, p. 203. 1870.

The distribution of this species—Canada, Mass., N. Y., Mich., Iowa, Col. (V. D.), Minn. (Bol.)—indicates that it will probably be found in Illinois also. May–September (Olsen).

## APATETICUS [PODISUS] MODESTUS Dall.

*Arma modesta* Dallas, List of Specimens of Hemip. Ins. in Coll. Brit. Mus., Pt. 1, p. 101. 1851.

Common in the northeastern United States and Canada, and listed as far west as Vancouver, Montana, Colorado, and Mexico (V. D.). Our specimens are from Vancouver and Minnesota with the exception of four which are definitely labeled as from Illinois. One was found preying upon a caterpillar at Centralia (S. Ill.) August 7; another was taken at Urbana September 20. June–September (Olsen).

[\*The bracketed names are inserted by the editor.]



## APATETICUS [PODISUS] MACULIVENTRIS Say

*Pentatoma maculiventris* Say, Descrip. n. sp. N. Am. Ins. found in La. by Joseph Barabino. Mar. 1831. Reprint, *Psyche*, Vol. 8, 1999, p. 307.

Ranges across the United States and Canada, commoner east of the Rockies. Found in all sections of Illinois from April 2 to November 22; nymphs, from May 28 to October 23; nymphs and imagines both most numerous in June and July and the first half of August. It is the most useful of our predaceous Hemiptera, and is frequently seen feeding on the larvae of the Colorado potato-beetle. We have also found it feeding on the 12-spotted cucumber-beetle (*Diabrotica 12-punctata*) and on the larvae of *Canarsia hammondi*, *Hyphantria textor*, and *Datana ministra*. The nymph, however, according to Olsen, is principally vegetarian, feeding on apple, etc. He gives as the food plant, *Onagra biennis*.

*A. modestus* and *sericeiventris* are quite close to *maculiventris* and recognizable more by a combination of characters than by any one character. *A. sericeiventris* has the shortest pronotal hind angles, and a vague dark pattern formed by unevenly aggregated dark punctures on a whitish or grayish ground-color. The legs and venter have the black markings most strongly developed. *A. modestus* has the least black on legs and venter; the pronotal side angles are never spinose as in *maculiventris*, but only acute, the two sides approaching at an angle of about  $60^\circ$  ( $2/3$  of a right angle) instead of at approximately a right angle as in *sericeiventris*. The angles in *maculiventris* although usually spinose are often no darker than in *modestus*, but the distinctive feature of the angle in *modestus* seems to be that the anterior side of the angle is decidedly arcuate, while in *maculiventris* both sides are very nearly straight, or the anterior a little concave. *Modestus* averages a little smaller than *maculiventris*, but *sericeiventris* is about the same size.

## APATETICUS [PODISUS] SERIEVENTRIS Uhler.

*Podisus sericeiventris* Uhler, Proc. Boston Soc. Nat. Hist., Vol. 14, p. 94. 1871.

I have little doubt that this is the true *sericeiventris* as described by Uhler. It is not at all common. Van Duzee reports it from Vancouver, Montana, and New Hampshire. We have it from the Lake Superior region, Vancouver, Wyoming, and Minnesota (Bol.); also from Michigan, and two from northern Illinois—one from the Lake Michigan shore near the Wisconsin line; Long Island; May–September. It feeds on larvae of *Callosamia promethea*, *Clisiocampa americana* and *disstria*, *Hyphantria cunea*, dead imagines of *Limenitis ursula* and *Pyrophila pyramidoides*, also *Apateticus cynicus* and *Menecles insertus*, and all stages of *Porthetria dispar* (Olsen).

## 5. MINEUS Stål

## MINEUS STRIGIPES H.-S..

*Podisus strigipes* Herrich-Schaeffer, Wanz. Ins., Vol. 9, p. 338. 1853.

New York to Georgia, Massachusetts, Ohio, Texas, New Mexico, Colorado. Examples are in the Bolter Collection from Florida and north-

ern Illinois; and we have it from Havana and Carbondale in Illinois, July 31, October 5, and December 13.

The ground-color is black, marked with red or orange. The scutellar mark is V-shaped; the costal margin is narrowly pale; the pronotum is black, with red median line and front and side border connecting with the scutellar mark.

#### 6. ZICRONA A. & S.

ZICRONA CAERULEA Linn.

*Cimex caeruleus* Linné, Syst. Nat., ed. 10, Vol. 1, p. 445. 1758.

This beautiful metallic greenish, purplish, or bronzy black species may occur in Illinois. Although a western form, ranging from Idaho to New Mexico and California, it has been reported from Mt. Washington, N. H., and we have it from Michigan (Nason), identified by Osborn as the variety *cuprea*; but the color is purplish rather than bronzy.

#### 7. RHACOGNATHUS Fieb.

RHACOGNATHUS AMERICANUS Stål

*Rhacognathus americanus* Stål, Enum. Hemip., Pt. 1, p. 33. 1870.

A rare species, listed only from Winnipeg (Can.), Illinois, and Ohio. The Bolter Collection contains five examples from northern Illinois.

### Family CYDNIDAE

#### KEY TO SUBFAMILIES

##### NYMPHS

- Spiracles not included in the lateral plate, the two setae obliquely or transversely placed behind it, forming a triangle; mediodorsal plates of scent-glands distinct .....CYDNINAE.
- Spiracles and their setae included in the lateral plate, the three nearly a straight line; mediodorsal plates of scent-glands with at least the first and second confluent .....THYREOCORINAE.

##### IMAGINES

- Scutellum of moderate size, subtriangular, not reaching tip of abdomen, frena long; corium exposed, broadly triangular; hind wing lobes about equal, separated by shallow notches.....CYDNINAE.
- Scutellum very large, covering abdomen to apex, frena short; corium largely membranous, the exposed opaque part narrow; hind wing lobes deeply incised, the second large and very prominent.....THYREOCORINAE.

#### Subfamily CYDNINAE

##### KEY TO TRIBES

##### NYMPHS

- Spiracular setae on segments 3-7 placed transversely \*.....*Sehirini*.

\* I have not seen a nymph of this tribe; the character has merely been deduced by analogy from a comparative study of adults which in other species have this structure the same as in the nymphs.

Spiracular setae transverse on segment 7, but the larger (inner) seta on the 6th and preceding segments progressively moved forward, carrying the false suture before it, reaching the side of the spiracle on the 5th or 4th, and passing well in advance of it on the 3d.....*Cydnini*.

## IMAGINES

Margin of head and lateral margin of pronotum above without bristles or spines; hamus present; [rostrum not lying between 2 parallel ridges on venter of prothorax].....*Sehirini*.

Margin of head and lateral margin of pronotum above with spines or bristly hairs; hamus absent; [rostrum lying between 2 parallel ridges on venter of prothorax].....*Cydnini*.

## Tribe SEHIRINI

## KEY TO GENERA

## IMAGINES

Lateral margin of pronotum and elytra ivory-white; veins of hind wings conspicuously dark and thick, hamus present; rostrum not attaining the abdomen; osteolar prolongation broad, curved, reaching two-thirds of the distance from orifice to body margin.....1. *Sehirus*.

Lateral margin of pronotum and body black; rostrum attaining middle of abdomen; head very large, subtriangular; osteolar scale placed far out on the episternum, near its outer margin (Tex.).....*Lobolophus* Bergr.

## 1. SEHIRUS A. &amp; S. (CANTHOPHORUS M. &amp; R.)

## SEHIRUS CINCTUS P. B.

*Pentatoma cincta* Palisot de Beauvois, Ins. rec. en Afr. et en Amér., p. 114. 1805.

Canada to Mexico (V. D.). In our collection from several localities in northern Illinois, but in central Illinois only from the sandy region about Havana, where, many years ago, I saw it very abundant on the stems of the pale horsemint (*Monarda punctata*). We have also taken it on sweet clover and Stachys. The dates are from April 8 to May 2, and from July 21 to August 22. The earlier period is no doubt that of hibernated individuals, and the interval one of nymphal development.

## Tribe CYDNINI

## KEY TO GENERA

## NYMPHS

Hind tibiae rather slender, not dilated apically; tergal plates alutaceous.....*Pangaeus*.

Hind tibiae thick, broadly dilated in apical half; tergal plates smooth and shining.....*Cyrtomenus*.

## IMAGINES

Osteole with auricle or overhanging ledge, not extending to near body margin in a long narrow canal; apical part of media in hind wings joined to radio-medial stem, as usual.

No deep groove on head above, just within the reflected margin.

Hind tibiae slender, nearly straight, uniformly spined.

Pronotum not margined in front.....1. *Geotomus*.

Pronotum with impressed submarginal line in front, costal margin rarely with 3 or 4 setigerous punctures.....2. *Pangaeus*.

Hind tibiae strongly flattened and curved; lower side bristly, upper side beset with short stout spinules.....3. *Cyrtomenus*.

A distinct groove on head above, just within the recurved margin, beset with bristles and short spinules.

Pronotum distinctly margined in front.

Scutellum about as long as broad, tip acuminate (Cal.) *Macroporus* Uhler.

Scutellum longer than broad, tip narrowly rounded (Col., Tex.).....  
.....*Homoloporus* Uhler.

Pronotum not distinctly margined in front.....4. *Aethus*.

Osteolar canal long, narrow, and distinct, reaching three-fourths of the way from orifice to body margin; head margin with row of short thick comb-teeth; [metasternum carried caudad in the form of a thin plate which is broadened laterally, covering 2 or 3 of the abdominal segments;] scutellar apex mucronate, apical part of media in hind wings not connected with radiomedial stem (Amnestini).....5. *Amnestus*.

## 1. GEOTOMUS M. & R. (MELANAETHUS Uhl.)

### GEOTOMUS PENNSYLVANICUS Sign.

*Geotomus pennsylvanicus* Signoret, Ann. Soc. Ent. Fr., Ser. 6, Vol. 3, p. 207. 1883.

*Melanaethus picinus* Uhler, Bul. U. S. Geol. and Geogr. Surv. Terr., Vol. 3, No. 2, p. 391. 1877. Preoccupied.

One specimen, Urbana, Oct. 21. Pa. (V. D.).

## 2. PANGAEUS Stål

### PANGAEUS BILINEATUS Say

*Cydnus bilineatus* Say, Jour. Acad. Nat. Sci. Phil., Vol. 4, p. 315. 1825.

Eastern and Southern States to Texas and Utah, also Iowa and Oregon (V. D.), and Missouri and Arizona (Bol.). In our collections from numerous localities in central and southern Illinois, but from northern Illinois I find only a single example so labeled—in the Bolter Collection. The dates range from March 8 to June 30, and from August 18 to October 30.

[A group of nymphs found by Mr. Hart under a piece of board in a sandy hollow near Havana, Ill., August 19, have the head structure of *Aethus* imagines, but notwithstanding these structural details they are undoubtedly the nymphs of *Pangaeus bilineatus*. The above nymphs are

listed by Mr. Hart as "*Cydnus sp.*" in his discussion of the sand insects of the Havana region.\* I obtained one nymph at Urbana, September 10, 1917.]

### 3. CYRTOMENUS A. & S.

#### CYRTOMENUS MIRABILIS Perty

*Cydnus mirabilis* Perty, Del. Anim. Artic., p. 166. 1834.

S. C., Ga., Tex., N. M., S. Am. (V. D.). One example taken at street light, Cairo, Ill., August 1. Adults and numerous nymphs were sent me by Prof. E. L. Worsham from Georgia as injurious to the chufa, or edible sedge-root (*Cyperus esculentus* L.).

### 4. AETHUS Dall.

#### AETHUS OBLIQUUS Uhl.

*Microporus obliquus* Uhler, Prel. Rep. [1871] U. S. Geol. Surv. Montana, etc., p. 394. 1872.

Colorado, Utah, New Mexico, Texas (V. D.), Nebraska (Zimmer), Iowa (Stoner), New Jersey, Long Island (Davis), Rocky Mountains to Atlantic Coast (Vestal).† Two specimens in our collection from sandy areas near Havana, one from Texas, two from northern Illinois, and 8 from Oregon, Ill., June 21, 1917, taken under a board in a sand "blowout" by J. R. Malloch and the writer. All of Stoner's specimens found in the sand about the roots of a bunch-grass, *Sporobolus crypandrus*.

### 5. AMNESTUS Dall.

The genital structures are extraordinarily unlike the usual heteropterous type. The sex which bears the large spine on fore or hind femora has been called the female; but, judging from analogy and from careful study of the genitalia, I consider it the male. [Unquestionably it is.] In this sex the anterior part of the pronotum is distinctly tumid and shining and very obsoletely punctulate, while the same area in the female is scarcely elevated above the posterior part, and its surface is distinctly punctulate. At least the two smaller species are occasionally taken at lights in considerable numbers. [The peculiar platelike extension of the metasternum, included as a character in the key, I have seen in no allied genus nor in Pentatomidae.]

#### KEY TO SPECIES

Fore femora of male beneath with large sub-basal bifid spine; hind femora with small subapical spine; in female both unarmed; jugal spines 5 (sometimes 6 in *spinifrons*).

Pronotum piceous black, elytra concolorous or paler; spine of male hind femora well developed; length about 3 mm., breadth, 2 mm. .... *spinifrons*.

Pronotum and elytra light ferruginous brown; spine of male hind femora very small; length about 2 mm., breadth  $1\frac{1}{4}$  mm. .... *pallidus*.

\* Bul. Ill. State Lab. Nat. Hist., Vol. 7, p. 239.

† Bul. Ill. State Lab. Nat. Hist., Vol. 10, p. 30.

Fore femora of male unarmed, hind femora with immense spine nearly half as long as tibia; female fore femora unarmed, hind femora with small but usually evident spine; jugal spines 4; color paler and size slightly less than in *pallidus* ..... *pusillus*.

#### AMNESTUS SPINIFRONS Say

*Cydnus spinifrons* Say, Jour. Acad. Nat. Sci. Phil., Vol. 4, p. 316. 1825.

United States, west to Colorado and Texas (V. D.), Long Island (Olsen). Taken by us in central and northern Illinois from March to June 28, and also in November.

#### AMNESTUS PALLIDUS Zimmer

*Annectus* [lapsus] *pallidus* Zimmer, Can. Ent., Vol. 42, p. 166. 1910.

Described from Kansas as *Annectus* (!) *pallidus*. In our collections from Algonquin (N. Ill.); Havana, Bloomington, Normal, Champaign and Urbana (C. Ill.); Centralia and Anna (S. Ill.). Dates from April 18 to June 19, and October 3 and 5 and December 4. Apparently the same species was taken in large numbers at a lamp in Fort Brown, Brownsville, Tex., in June.

#### AMNESTUS PUSILLUS Uhl.

*Amnestus pusillus* Uhler, Bul. U. S. Geol. and Geogr. Surv. Terr., Vol. 1, No. 5, sec. ser., p. 278.

Common in the eastern United States, west to Kansas and Iowa, and also listed from Lower California and Trinidad (V. D.). The northernmost records are New Hampshire, New York, Indiana, and Iowa. It does not appear in our collections from northern Illinois, but has been taken at lights, and otherwise, in the central and southern parts of the state. It seems to occur later in summer than the other two species, the dates running from May 3 to August 20; also December 4.

The comb teeth of the head margin are paler and longer than those of *pallidus*, and the pronotal transverse impression is deeper than in that species. [A male taken at Urbana, August 20, 1914, has the spine on hind femur about as long as the femoral diameter.]

#### Subfamily THYREOCORINAE \*

The negro-bugs are plentiful and sometimes cause serious injury to vegetation. Their oval to circular form, very large scutellum, black color, and beetle-like appearance make them readily identifiable in the field. The species are numerous and require considerable care in their separation.

Listed under the name *Thyreocoris* in Van Duzee's Catalogue are several well-marked groups\* which I consider are entitled to distinct generic rank. I have before me the European species *scarabacoides* Linné, the genotype of *Thyreocoris*. There is no described American species that agrees with it in certain characters which appear to me as of generic importance in this family. I have drawn up a synopsis of the differentiat-

[\* The following treatment of this subfamily is entirely by the editor.]

ing characters of the groups now listed as *Thyreocoris* and present it in the hope that it may cause some student of the family to investigate further into the status of these segregates.

# KEY TO GENERA

## NYMPHS

- Lateral margins of pronotum and bases of wing pads with a fringe of long hairs; hind tibia with 5 series of stout spines; spiracles not in straight series (Pl. XIX, Fig. 42).....*Cydnoides*.
- Lateral margins of pronotum and bases of wing pads without a fringe of long hairs.
- Spiracles \* of all except the penultimate ventral segment in a straight row, the anterior one on every segment far removed from lateral margin (Fig. 40).....*Galgupha*.
- Spiracles on all segments in an angulated series, the anterior one very close to or in lateral margin on the third, fourth, and fifth visible segments (Fig. 41).....*Corimelaena*.

## IMAGINES

- Juga contiguous in front, obliterating tylus at apex; chitinized part of wing broad from base to apex, the apex broadly rounded, costa with a deep longitudinal groove from base to apex; femora without spines; hind tibia with a few short spines on antero-ventral, antero-dorsal, postero-dorsal, and postero-ventral surfaces, the spines much shorter than diameter of tibia; basal plate of female genital segments with a longitudinal central carina.....1. *Thyreocoris*, sens. str.
- Juga separated to apices; chitinized portion of wings narrowed very much from base to apices, or if not so the lateral margins of pronotum and of chitinized portions of wings are fringed with long hairs, the costa is rounded, without a longitudinal groove, or the hind tibia has 5 series of long spines.
- Lateral margins of pronotum and of chitinized portions of wings with long hairs; apices of chitinized portions of wings obtuse; hind tibia with long spines on antero-ventral, anterior, antero-dorsal, postero-dorsal, and postero-ventral surfaces; at least fore and hind femora without spines.2. *Cydnoides*.
- Lateral margins of pronotum and of chitinized portions of wings without long hairs.
- Femora with stout spines; hind tibia with long spines on five surfaces as in *Cydnoides*, the posterior surface with a linear ridge from base to apex on posterior surface; apices of chitinized portions of wings acute; the costa with a longitudinal groove.....3. *Galgupha*.
- Femora with a few slender bristly hairs; hind tibia with very short widely placed spines on four surfaces, none on anterior surface, the posterior surface without a longitudinal ridge; costa without a longitudinal groove.....4. *Corimelaena*.

\* The term "Spiracles" in this connection includes the true spiracle and the two sensory setigerous punctures, the "anterior spiracular puncture" referred to under *Corimelaena* being the true spiracle.



## 1. THYREOCORIS Schr.

I have before me several specimens of the genotype of *Thyreocoris*, which, as shown in synopsis in this paper, differs from all the other groups now listed under the same generic name.

## 2. CYDNOIDES, gen. n.

Differs from all other genera in the group in having the lateral margins of pronotum and of the greater portion of chitinized parts of wings fringed with long hairs; the femora of at least the fore and hind legs have bristly hairs on their antero-ventral surface but no stout spines; the chitinized portion of wings is broad to apex, the tip obtuse.

Genotype, *Corimelaena ciliata* Uhler.

Besides the genotype there are in our collections two other species, *renormata* Uhler and *sayi* V. D.; *obtusa* Uhler belongs to this genus, but I have not seen it.

## KEY TO SPECIES

Entirely black species with bronzy tinge, the surface of scutellum subopaque; mid femur with a few very short antero-ventral spines.....*ciliatus*.

At least a portion of the chitinized part of wings yellowish white; mid femur with a few moderately long bristly hairs on antero-ventral surface.

Head distinctly flattened on anterior half of dorsum; pronotum black; only the base of chitinized portion of wings white.....*renormatus*.

Head convex on dorsum; pronotum black with a brassy or greenish tinge, the lateral and posterior margins yellowish white; all of chitinized portions of wings white (Tex.).....*sayi*.

## CYDNOIDES CILIATUS (Uhl.)

*Corimelaena ciliata* Uhler, Proc. Ent. Soc. Phil., Vol. 2, p. 156. 1863.

Colorado, Kansas, Florida (V. D.). There is in Illinois a characteristic and very common species of the sand areas, taken at Bishop, Topeka, Havana, Meredosia, and Arenzville June 7 to October 29. In August it was often common on the stems of various plants, but its most curious habit was that of burrowing in the loose drifting sand about the roots of tufts of grass. Where there was no sign of individuals above ground, a single turn of the finger in the sand around a grass plant would frequently bring two or three to the surface. Nymphs were taken at Havana September 20, 1911.

Its finely wrinkled and punctate surface, make it very easily recognizable.

## CYDNOIDES RENORMATUS (Uhl.)

*Corimelaena renormata* Uhler, Hemip. Col., Bul. 31. Col. Agr. Exper. Sta., p. 11. 1895.

Colorado (V. D.). One male example from northern Illinois (S. H. Peabody).

## CYDNOIDES SAYI (Van Duzee)

*Thyreocoris albipennis* Say, Descrip. n. sp. Heter. Hemip. N. A., 1831;  
Compl. Writ. Ent. N. A., Vol. 1, p. 311.

*Corimelaena sayi* Van Duzee (n. n. for *albipennis*, preoc.), Trans. Am. Ent.  
Soc., Vol. 30, p. 10. 1904.

Van Duzee notes \* Gillette's rediscovery of Say's *T. albipennis* in Colorado, proposing the name *sayi* in place of *albipennis*, the latter being preoccupied in the genus. I take this opportunity to extend its hitherto known range by recording the collection of three fine female specimens of *sayi* at Fort Brown, Brownsville, Tex., November 29 and December 9, 1910, by Mr. Hart.

## 3. GALGUPHA A. &amp; S.

I have placed in this genus all entirely black species of Thyreocorinae which have the following characters: all the femora with short stout spines on the antero-ventral surface; the hind tibia with 5 series of spines and with a longitudinal carina from base to apex; and the spiracles on all abdominal segments except the last in a nearly straight row.

## KEY TO SPECIES

## NYMPHS

- Glossy black species; head almost entirely impunctate; abdomen glossy black except a narrow submarginal stripe on each side of dorsum and venter.....  
.....*denudata*.  
Yellowish testaceous species, the dorsum of abdomen sometimes brown on the chitinated areas, if so the pale stripes are very broad; legs glossy black; head distinctly punctured on dorsum.....*nitiduloides*.

## IMAGINES

- Fore femur with 2 short stout spines on apical third of antero-ventral surface; fore tibia with 6 or 7 strong spines and 1 weak setula on antero-dorsal surface (Pl. XIX, Fig 50); chitinated portion of wing obtusely pointed at apex (Fig. 45); dorsum of head, pronotum, and scutellum shagreened, not highly polished, the punctures contiguous or subcontiguous on margins; hypopygial plate as in Figure 51; spiracular punctures not in straight series.....*nigra*.  
Fore femur with at least 3 short spines; dorsum more or less distinctly polished; spiracular punctures in straight series; chitinated portion of wing acutely pointed at apex.  
Scutellum acute at apex (Fig. 62); dorsum of head, pronotum, and scutellum very minutely and sparsely punctured except on margins; hypopygial plate of male as in *nigra*, but impunctate or almost so; fore femur and fore tibia as in *atra*.....*denudata*.  
Scutellum rounded at apex (Fig. 63).  
Hypopygial plate not over 3 times as broad as long (Fig. 49); fore femur with 3 antero-ventral spines, their length not strikingly dissimilar; fore tibia with 5 or 6 strong spines and 1 or 2 weak setulae on antero-dorsal surface (Fig 48); chitinated portion of wing as in Figure 57.....*atra*.

\* Trans. Am. Ent. Soc., Vol. 30, p. 10.

Hypopygial plate much more than three times as wide as long; fore tibia with bristles on entire length of antero-dorsal surface, no weak setulae at apex.

Fore femur, with the median antero-ventral spine strikingly longer than the other two; fore tibia with 5 or 6 long stout spines and apical of these 2 short ones on antero-dorsal surface (Fig. 46); hypopygial plate of male not strikingly concave on upper margin (Fig. 47); venation of chitinized portion of wing as in Figure 44; scutellum when viewed in profile not abruptly declivitous beyond middle (Fig. 55)...*nitiduloides*.

Fore femur with the first and second spines equal or subequal in size; fore tibia with 6 or 7 strong spines on antero-dorsal surface (Fig. 52); venation of chitinized portion of wing as in Figure 43; hypopygial plate very conspicuously concave on upper margin (Fig. 53); scutellum when viewed in profile rather abruptly declivitous beyond middle (Fig. 54)...

.....*aterrima*.

#### GALGUPHA NIGRA Dall.

*Corimelaena nigra* Dallas, List of Specimens of Hemip. Ins. in Coll. Brit. Mus., Pt. 1, p. 57. 1851.

Canada and Colorado (V. D.). Brownsville, Tex. (Hart). Found throughout Illinois, but not common. Chicago, Savanna (N. Ill.); Urbana, Galesburg (C. Ill.); Grand Tower, Metropolis, (S. Ill.). The dates are notably late in the season—July 9 to October 17.

The species has nearly the form of *atra*, but is smaller, and is more opaque than either that species or *nitiduloides*. It is easily recognized by characters given in key, and by its almost subopaque color.

#### GALGUPHA DENUDATA Uhler

*Corimelaena denudata* Uhler, Proc. Ent. Soc. Phil., Vol. 2, p. 157. 1863.

This species was originally described from a male obtained in Louisiana. I have before me a male imago and a nymph from Monterey, Mexico, July 5, 1908.

#### GALGUPHA ATRA A. & S.

*Galgupha atra* Amyot and Serville, Hémip., p. 68. 1843.

Canada, U. S. to Kan. (V. D.); Me. (Parshley). In our collection from all sections of Illinois, and from Ky., Mo., Tex., and Col. Dates, April 8 to November 3; most numerous in June and July.

This species is much more obsoletely punctured than *nitiduloides*, and more polished.

#### GALGUPHA NITIDULOIDES Wolff

*Cimex nitiduloides* Wolff, Icones Cimicum, Fasc. 3, p. 98. 1802.

More characteristic of the western fauna, but found occasionally throughout the East (V. D.), Me. (Parshley), Mex., Guatemala (Distant). Found throughout Illinois, but especially common at Dubois in southern Illinois. Taken from March 10 to December 10, being com-

monest in June and July. Nymphs were common at Dubois in August, 1917.

GALGUPHA ATERRIMA, sp. n.

*Male and Female*.—Similar in color to *nitiduloides*.

Structurally similar to *nitiduloides*, differing as stated in key, and also in having the tylus more distinctly beaded at apex above, and the upper margin of the hypopygial plate of male decidedly reflexed.

Length, 4.25–5 mm.

Type, Odin, Ill., May 12, 1902. Paratypes: Havana, Ill., August 15, 1907; Dongola, May 10, 1917; Normal, June 14, 1882; and one male without data. Allotypes: White Heath, June 18, 1906; Grand Tower, June 27, 1906; Urbana, June 30, 1888; Cobden, April 12, 1883; one labeled Southern Ill.; one labeled N. Ill.; and two without data. All the foregoing specimens with data are from Illinois. I have also before me a male and female from Beltsville, Md., April 30, 1916, and June 15, 1913 (W. L. McAtee).

This is very probably the species referred to by Van Duzee as *nitiduloides* var. in his Annotated List of the Pentatomidae, page 5.\*

4. CORIMELAENA White

In addition to the characters listed in the key for the separation of *Corimelaena* from its allies, the chitinized portions of the wings present venational characters that are valuable. The costal region lacks the linear depressions that are so evident in the species of the other genera and only two distinct sutures are present, as indicated in Figure 56, Plate XIX. The scutellum differs from that of allied genera in having an impressed line on basal half near to lateral margins, and the pronotum is distinctly impressed near posterior lateral angle, causing its margin here to be nearly vertical.

KEY TO SPECIES

Chitinized portion of wing entirely black, punctate to lateral margin; basal genital plate of female about twice as wide as its greatest length; median transverse depression of pronotum very faint; fore tibia with 5 postero-dorsal spines in addition to the apical one.....*anthracina*.

Chitinized portion of wing partly yellow or white, or species not as above.

Hind tibia with 3 or 4 postero-dorsal spines, the basal one very small, close to base; if all spines are very small or absent the chitinized portion of wing is rounded at apex, and the pale color extends mesad of cubitus.

Large species, averaging 4 mm. in length; pale border of wing not broadened near base, or if so the apex of elytra is acute.

Pale border of wing not broadened near base; dorsum of pronotum with sparse large punctures and numerous very small interspersed punctures on disc.

Basal genital plates of female much wider than long (Pl. XIX, Fig 65); penultimate segment before genital plates without a lateral carina...  
.....*polita*, sp. n.

\* Trans. Am. Ent. Soc., 30, No. 1. 1904.

- Basal genital plates of female as broad as long (Fig. 64); penultimate segment before genital plates with a sharp lateral carina; male hypopygial plate as in Figure 59.....*lateralis*.
- Pale border of wing broadened near base, the pale margin very noticeably punctate; hypopygial plate as in Figure 61; dorsum of pronotum with large closely placed punctures on entire disc (Neb., Col., Ut., Wyo., Cal., Wash., Ariz.) .....*montana*.
- Smaller species, rarely over 3 mm. in length; pale border of wing always broadened near base, apex of chitinized portion rounded.
- Anterior margin of pronotum as distinctly punctured as posterior portion of head; hypopygial plate of male (Fig. 60) narrow, slightly emarginate above, with an overhanging lip or flange on each lateral third, the central third of disc usually highly glossy and impunctate, seen from above the areas on each side of caudal opening are each as broad as the opening; female genital plates broader than long; anterior spiracular puncture just clear of margin on all segments of abdomen; scutellum usually a little pointed at apex.....*pulicaria*.
- Anterior margin of pronotum with the punctures very much smaller and weaker than those on posterior portion of head—subobsolete.
- Pronotum highly polished, the punctures almost obsolete; hypopygial plate of male similar to that of *harti*, but the central elevation of upper margin is less developed and the disc is closely punctured throughout; the whitish yellow mark on wing is broadly interrupted in center; tibiae almost black, the spinules on postero-dorsal surface of hind pair strong.....*interrupta*.
- Pronotum not highly polished, microscopically shagreened, the punctures distinct but small, shallow, and closely placed on anterior third; hypopygial plate of male broadly emarginate above, with less evident lateral flange than in *pulicaria*; pale mark on wing complete, broader than in *pulicaria*; tibiae yellowish testaceous, the spinules on hind pair minute.....*minutissima*.
- Hind tibia without postero-dorsal spinules, rarely with minute setulae present; chitinized portion of wing acute at apex.
- Scutellum about as broad as long, without indication of a central impunctate longitudinal line; yellow margin of wing not extending mesad of cubital vein; anterior abdominal spiracular puncture mesad of lateral carina.
- Smaller species, averaging 2.5 mm. in length; hypopygial plate of male entirely black.
- Head almost angularly emarginate in front of eyes, more pronouncedly so in male (Pl. XX, Fig. 68); male hypopygial plate with broad central emargination; female genital plates broader than long...*nanella*.
- Head not almost angularly emarginate in front of eyes, slightly concave (Fig. 67); male hypopygial plate doubly emarginate (Pl. XIX, Fig. 58); female genital plates subtriangular (Fig. 66).....*harti*.
- Larger species, averaging from 3 to 4 mm. in length; hypopygial plate in male yellowish along upper margin, the outline broadly concave, with

a less pronounced central projection than in *harti*; female genital plates as in *harti*; hind tibia frequently with 1 or 2 weak postero-dorsal setulae.....*agrella*.

Scutellum distinctly longer than broad, with a more or less distinct impunctate longitudinal central line; yellow margin of wing extending mesad of cubitus; female genital plates similar to those of *harti* but more broadly punctate; male hypopygial plate similar to that of *pulicaria* but regularly punctate on entire surface and not so much reflexed laterally; anterior abdominal spiracular puncture in lateral carina except in basal series (Col., Utah, Dak., Ariz., Ore., Mexico).....*extensa*.

#### CORIMELAENA ANTHRACINA Uhler

*Corimelaena anthracina* Uhler, Bul. U. S. Geol. and Geogr. Surv. Terr., Vol. 1, No. 5, sec. ser., p. 270. 1876.

Despite the black color of this species it belongs to *Corimelaena* and is separable from its allies as indicated in key. It has not been taken in Illinois as far as our records show, but we have a specimen labeled "L. Sup." (Lake Superior), and it is possible that it occurs in the northern part of the state.

#### CORIMELAENA POLITA, sp. n.

*Female*.—Similar in color to *lateralis*, the two segments anterior to genital plates with pale yellow border.

Structurally similar to *lateralis*, differing as follows: the head is more narrowed anteriorly, the sides in front of eyes are more noticeably sinuated, the tylus is slightly longer than the juga, its surface convex anteriorly, glossy and almost impunctate; dorsum of pronotum with large punctures on lateral margins, in transverse depression, and on disc behind the latter, otherwise with small subobsolete punctures. Scutellum more sparsely punctate than in *lateralis*. Genital plates as in Figure 65, Plate XIX. For other details see key.

Length, 4 mm.

Type, Brownsville, Tex., July 10, 1908.

I have no males of this species before me.

#### CORIMELAENA LATERALIS Fabr.

*Tetyra lateralis* Fabricius, Syst. Rhyng., p. 142. 1803.

Widely distributed but usually not abundant; not as common as *pulicaria*. N. J., Md., D. C., Ohio, Okl., Tex. (V. D.); Brownsville, Tex. (Hart); Chicago, Algonquin, Rock Island (N. Ill.); Arenzville, Homer, and Muncie (C. Ill.); Grand Tower, Carbondale, Makanda, and Pulaski (S. Ill.). April 24 to September 11.

The chitinized portions of wings have an even, narrow ivory-white border. In seven of the specimens this border is widely interrupted at middle and nearly obsolete anteriorly, only the posterior fourth remaining evident.

## CORIMELAENA PULICARIA Germ.

*Odontoscelis pulicarius* Germar, Zeit. f. Ent., Vol. 1, p. 39. 1839.

Very common and widely distributed (V. D.). Taken in numerous localities in all parts of Illinois, March 4 to October 6; common from April to August; nymphs in June, July, and August. Our commonest species.

Dr. S. A. Forbes says of this species\*: "The favorite food plants of the species seem to be New Jersey tea (*Ceanothus americanus*), Spanish needles, and a small dooryard weed, *Veronica peregrina*. It is probable that the insect breeds principally on these plants. Wheat, blue-grass, strawberry, and celery have been injured by them, and they often occur on cultivated berries, to which they give a disagreeable taste. The species is single-brooded, and is widely distributed east of the Rocky Mountains. The adults hibernate and appear in early spring, laying eggs in May and June. The young which hatch from these eggs rarely fail to reach maturity by the early part of July, after which the adult insect is common until fall."

## CORIMELAENA INTERRUPTA, sp. n.

*Male*.—Black, highly polished. Wing with a broad pale yellow margin which is widest near base, and broadly interrupted in middle by a blackish brown mark. Antennae yellowish brown. Legs glossy black, knees paler, tarsi yellowish.

Head much broader than long, dorsum with large, deep, subcontiguous punctures except on two small areas on middle of posterior margin; tylus broad apically, not reflexed; lateral margin of head in front of eyes slightly and regularly emarginate. Pronotum with a few faint striations and numerous very indistinct shallow punctures on disc, the large deep punctures confined to a patch on middle of each side, which does not extend to margin, and a few in the transverse depression. Scutellum highly glossy, the punctures large and rather closely placed laterally on basal half, very sparse and smaller on disc, the whole surface with a sub-obsolete secondary microscopic punctuation. Venter with large punctures laterally, almost impunctate on disc; penultimate segment without sharp lateral carina.

Length, 3 mm.

Type and paratype, Brownsville, Tex., November 23, 1911. Swept from pastures in South Texas Garden (C. A. Hart).

## CORIMELAENA MINUTISSIMA, sp. n.

*Male*.—Differs in color from the preceding species in having the antennae paler, the pronotum subopaque, the tibiae as pale as the tarsi, and the pale border of wing complete.

Head less glossy than in preceding species, the margin in front of eye slightly sinuate. Pronotum microscopically shagreened, with closely placed shallow punctures on anterior third, the large punctures as in preceding species, but extending to lateral margin, and the transverse

\* Twenty-third Rep. State Ent. Ill., p. 116. 1905.



depression slightly striated in the punctate portion. Scutellum as in *interrupta*. Venter with a narrower impunctate discal area. Hind tibiae with very weak spinules.

Length, 2.5 mm.

Type, Sarita, Tex., December 1, 1911. Taken on sand hills (C. A. Hart).

*CORIMELAENA NANELLA* McAtee, sp. n.

This species is most easily separable from *pulicaria* by the small extent of pale color on the corium. Only the outer edge laterad of the cubital vein is so colored, while in *pulicaria* the triangular area between the cubitus, brachium, and claval suture, also is pale. I have seen no real intergradation between these types of coloration. *Nanella* averages smaller in size, ranging from 2 to 2.5 mm. The color is more metallic, being bronzy black, and the body is distinctly thicker than in *pulicaria*. This species is not a small form of the new species described below, because it has the broad brachial field characteristic of *lateralis* and *pulicaria*.

Type, a male, Virginia, near Plummers Island, Md., June 17, 1913, (W. L. McAtee). In writer's collection. Paratypes, two males: Beltsville, Md., June 15, 1913 (W. L. McAtee); and Chesapeake Beach, Md., June 18, 1914 (L. O. Jackson). Allotype, Forest Glen, Md., June 13, 1915 (W. L. McAtee).

To the above description, which is by Mr. McAtee, I add the details of structure in key.

*CORIMELAENA HARTI*, sp. n.

*Male and Female*.—Glossy black, apex of tylus, chitinized portion of wing laterad of the outer venational suture, lateral margin of abdominal segment beyond the exposed portion of wing in both sexes, and margin of apical segment of female yellow. Antennae yellowish testaceous. Legs black, tibiae castaneous, tarsi yellowish.

*Male*.—Head much broader than long, with large subcontiguous dorsal punctures, slightly sinuate in front of eye, subtruncate at apex, the tylus with a small round dorsal wart at apex. Pronotum with large and interspersed minute punctures on almost the entire dorsum, the transverse middle depression nearly absent, posterior margin slightly declivitous, so that there is a decided depression between pronotum and base of scutellum, the latter about as long as broad, the apex obtusely rounded, in type with a slight central emargination which may be abnormal, in profile with a slight angle at base of posterior half, the declivitous portion nearly straight, punctures large and deep, especially so laterally, the disc with smaller punctures. Apex of chitinized portion of wing acute, venational suture as in *lateralis*. Hypopygial plate densely punctate, its upper margin doubly emarginate (Pl. XIX, Fig. 58). Hind tibia without postero-dorsal spinules.

*Female*.—Similar to the male, but the apex of scutellum is regularly rounded. The basal genital plates are broad, with punctures on the upper half (Pl. XIX, Fig. 66).

Length, 2.5 mm.

Type and allotype, Makanda, Ill., June 26, 1909. Paratypes, two females, Plummers Island, Md., June 10, 1906 (W. L. McAtee), and June 30, 1907 (A. K. Fisher), and one female, Virginia, near Plummers Island, July 20, 1913 (W. D. Appel).

CORIMELAENA AGRELLA McAtee, sp. n.

Body as broad across posterior part of abdomen as at humeri, very broadly rounded behind; thicker throughout than in *C. lateralis*. Transverse depression across middle of pronotum more conspicuous than in that species, pronotum more tumid, bulging downward more strongly before humeral angle; posterior margin of pronotum rather straight. Costa slightly incurved opposite point where claval suture disappears beneath scutellum, insect therefore appearing somewhat constricted at this level. Triangular area between cubitus, brachium, and claval suture much narrower than in *C. lateralis* and with fewer punctures. Color more greenish with brassy reflections.

Length, 3 to 4 mm.

To put the contrasts with *C. lateralis* in another way it may be said that that species is broadest at humeri, more narrowly rounded behind, not appearing constricted, and by no means as thick. The depression across pronotum and the humeral tumidity are less conspicuous. Brachial field broader and with more numerous punctures. Length, 3.5 to 4 mm.

Type, a male from Plummers Island, Md., May 18, 1913, W. L. McAtee (in writer's collection). Allotype, same locality, June 17, 1913, W. L. McAtee.

Other specimens examined: from Plummers Island, Md., April 26, 1908, May 4, 9, 1913, May 17, 1907, May 24, 1914, June 7, 1914, June 8, 17, 1913, August 19, 1906; from Maryland near Plummers Island, May 9, 18, 1913, May 10, 1916, May 23, 1915, May 24, 1914; from Great Falls, Va., May 19, 1915, W. L. McAtee.

To the above description, which is by Mr. McAtee, I add the structural and color details in the key, and record a male from Kentucky in our collection.

ADDENDA \*

ADDENDUM 1

THYANTA Stål

The species of this genus are remarkably alike in structure and with few exceptions very similar in color. The key presented herein is based upon specimens in our collection and includes all species of the genus described from North America except *pallidovirens* Stål, which may be a variety of *custator* Say. The localities cited in the key are those of the specimens in our collection.

[\* In order to leave Mr. Hart's text as nearly as possible in its original form the editor has written the following addenda, hoping that the matter presented may prove useful to students of this family.]

## KEY TO SPECIES

1. Humeral angles produced in the form of acute spines—Figure 79, Plate XXI (N. M.) ..... *perditor* Fabricius.
- Humeri rounded or angulated, not produced in the form of acute spines... 2
2. Species at least 8 mm. in length; hypopygial orifice usually small, claspers with lateral, or median, process very small, sometimes a mere angle (*custator*)..... 3
- Species much smaller, rarely 7 mm. in length; hypopygial orifice large, claspers with lateral, or median, process elongate, the clasper appearing furcate..... 5
3. Ocelli exceptionally large, the distance between their lateral margin and inner margin of eye not greater than width of ocellus; male hypopygium with a large rounded protuberance just below upper margin of opening, without conspicuous concave area on each side at apex, claspers as in Figure 74, Plate XX; hairs on tibiae in both sexes moderately long, not noticeably irregular as in *custator* (Tex.)..... *casta* Say.
- Ocelli small, the distance between their lateral margin and inner margin of eye distinctly greater than width of an ocellus; male hypopygium flattened for a considerable distance below upper margin of opening, with a conspicuous concave area on each side at apex, clasper as in Figure 73, Plate XX ..... 4
4. Lateral margins of pronotum glossy black, vertically rugose; male hypopygium with a slight but distinct elevation in center of the upper margin (Fig. 70) ..... *calceata* Say
- Lateral margins of pronotum rarely black, not vertically rugose; male hypopygium with upper margin in center transverse or almost so (Fig. 75) ... *custator* Fabricius.
5. Osteolar canal not longer than the distance from its apex to lateral margin of mesosternum (Utah)..... *rugulosa* Say.
- Osteolar canal much longer than the distance from its apex to lateral margin of mesonotum ..... 6
6. Head much longer than its greatest width (Fig. 71); dorsum green, with conspicuous yellowish white longitudinal stripes on head, scutellum, and elytra; pronotum with a broad conspicuous median transverse depression ..... *elegans*, sp. n.
- Head as broad as long, or the dorsum is without yellowish white stripes and the pronotum has no well-defined median transverse depression.... 7
7. Venter of abdomen in both sexes with a transverse row of black dots near the posterior margin of each segment; lateral margins of pronotum subcarinate only on posterior half or less; lower margin of hypopygial opening of male with a deep central V-shaped notch (Fig. 72); head with sides straight for a considerable distance; mesosternum with a large black patch on each side of central ridge (Tex.)..... *punctiventris* V. D.
- Species without the above combination of characters; if the mesosternum has the black patches as above the pronotum is carinate on its lateral margins from posterior to near anterior margin and the head is not straight on sides; male hypopygium without notch..... 8

8. Mesosternum with a large black patch on each side of central ridge; head as in Figure 69, Plate XX; pronotum sharply carinate on lateral margins from posterior to near anterior margin (Tex., Cal.).....*brevis* V. D.
9. Mesosternum without a black patch on each side of central ridge; head with sides straight for a considerable distance; pronotum with lateral margins sharply carinate only on posterior half or less (Tex.)...*antiquensis* West.

#### THYANTA ELEGANS, sp. n.

*Male and Female*.—Pale green, marked with yellowish white. Head with a broad white stripe on each side of dorsum, the two covering the juga almost to apex, and a white stripe below each eye on venter. Pronotum with a narrow white line on each lateral margin, and a reddish transverse band between humeri in male, the transverse band conspicuously white in center in female; prosternum, mesosternum, and metasternum each with a white spot or stripe on each side; scutellum broadly white on each lateral margin and in center, the scutellar stripes margined internally with red; elytra with a rather broad white costal streak. Connexivum uniform green; venter whitish green, the punctures darker. Legs green; tarsal claws blackened on apical half.

Head convex above, very distinctly longer than broad; dorsal vein as in Figure 71; second antennal joint longer than third. Humeral margin angulated but not very sharp; pronotum with a very conspicuous broad transverse depression in center, the dorsum coarsely punctate except on the transverse pale line in female. Scutellum rather narrowly rounded at apex, coarsely punctate except on margins at base and apex. Elytra coarsely punctate, not appreciably rounded off basad at apex on outer side. Genital plates of female as in Figure 76; hypopygium of male as in Figure 77. Hairs on tibia long, many of them longer than diameter of tibia.

Length: male, 6 mm.; female, 7 mm.

Type, male, Loma, Texas, July 7, 1908. Allotype, Lake Lomalta, Tex., November 27, 1910.

This species is distinguished from every other in the genus by its striking green and white markings and much elongated head. The head of *T. brevis*, which is much broader, is shown in Figure 69.

#### ADDENDUM 2

##### *Key to Apateticus and Allies*

1. Tibia without a dorsal canal or groove; pronotum with large sharp spines on posterior lateral angle and a small thorn on posterior margin on each side of base of scutellum; osteole short, not curved; scutellum with a tumid area on each side at base (Tex.).....*Tylospilus* Stål.
- Tibia with a dorsal canal or groove bounded on each side by a slight but distinct ridge; scutellum punctate at base.....2
2. Pronotum with an acute spine on posterior margin at each side of base of scutellum.....*Apateticus* Dall.
- Pronotum without such spine.....3

3. Female with basal genital plates widely separated at base and sometimes for the entire length of their inner margins; male hypopygium with two long slender chitinized processes on each side in orifice....*Apoecilus* Stål.
- Female with basal genital plates contiguous the entire length of their inner margins; male hypopygium with a broad subtriangular or furcate chitinized plate on each side in orifice. ....*Podisus* Stål.

The above groups are as easily distinguished as are most genera in Pentatomidae and ought to rank as genera.

June, 1919.

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Thyanta—*Continued*.  
     *perditor*, 217.  
     *punctiventris*, 217.  
     *rugulosa*, 217.  
 Thyreocoris, 207, 208.  
     *albipennis*, 209.  
 Trichopepla, 177, 179, 186.  
     *atricornis*, 186.  
     *semivittata*, 186.  
 Tylospilus, 218.

Vanduzeeina, 168.  
 Vulsirea, 178.

Weda, 171.

Zicrona, 197, 202.  
     *caerulea*, 202.

PLATE XVI

*Wings of Pentatomoidea*

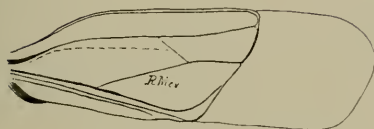
- Fig. 1. *Menecles insertus*, fore wing.
- Fig. 2. *Tessaratomy chinensis*, the same.
- Fig. 3. *Anasa tristis*, the same.
- Fig. 4. *Apateticus maculiventris*, hind wing.
- Fig. 5. *Homaemus proteus*, the same.
- Fig. 6. *Sehirus cinctus*, the same.
- Fig. 7. *Tessaratomy chinensis*, the same.
- Fig. 8. *Pangaeus bilineatus*, the same.
- Fig. 9. *Euschistus variolarius*, the same.
- Fig. 10. *Anasa tristis*, the same.
- Fig. 11. *Corimelaena pulicaria*, the same.

(Figures 1 to 11 drawn by the editor from sketches by the author; figures 12 to 77 original drawings by the editor.)

# PLATE XVI



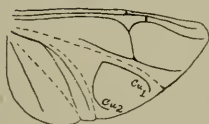
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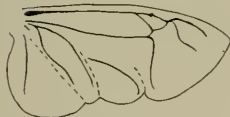
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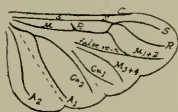
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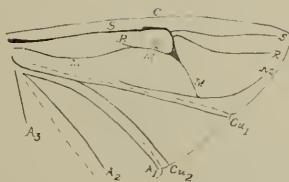
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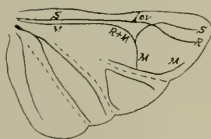
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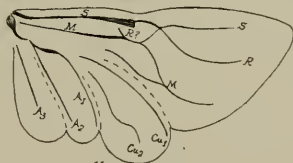
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PLATE XVII

*Details of Scutellerinae*

- Fig. 12. *Homaemus aenifrons*, outline of ventral plate of prothorax, one side: *e*, eye; *c*, coxa.  
Fig. 13. *Homaemus parvulus*, the same.  
Fig. 14. *Homaemus bijugis*, the same.  
Fig. 15. *Homaemus proteus*, the same.  
Fig. 16. *Stethaulax marmoratus*, outline of head, dorsal view.  
Fig. 17. *Symphylus* sp.?, the same.  
Fig. 18. *Sphyrocoris obliquus*, outline of ventral plate of prothorax, one side.  
Fig. 19. *Stethaulax marmoratus*, the same.  
Fig. 20. *Symphylus* sp.?, the same.  
Fig. 21. *Stethaulax marmoratus*, osteole.  
Fig. 22. *Symphylus* sp.?, the same.  
Fig. 23. *Symphylus* sp.?, apex of abdomen, ventral view.  
Fig. 24. *Stethaulax marmoratus*, the same.

PLATE XVII



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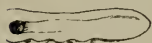
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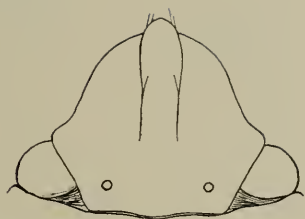
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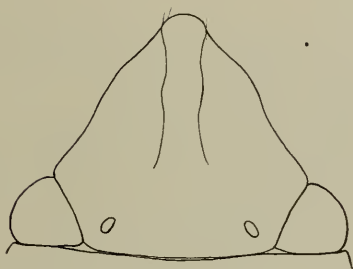
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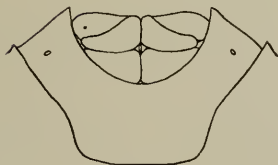
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PLATE XVIII  
*Details of Pentatominae*

- Fig. 25. *Banasa dimidiata*, male hypopygium, one side, viewed from above and to one side.  
Fig. 26. *Banasa calva*, the same.  
Fig. 27. *Banasa imbuta*, the same.  
Fig. 28. *Dendrocoris humeralis*, male hypopygium, caudal view.  
Fig. 29. *Chlorochroa sayi*, left hypopygial clasper of male.  
Fig. 30. *Chlorochroa uhleri*, the same.  
Fig. 31. *Rhytidolomia belfragii*, the same.  
Fig. 32. *Peribatus piceus*, outline of upper margin of hypopygial plate of male, one side.  
Fig. 33. *Peribatus limbolarius*, the same.  
Fig. 34. *Euschistus politus*, the same, and plate of upper side of hypopygial aperture from above.  
Fig. 35. *Euschistus tristigmus*, the same.  
Fig. 36. *Euschistus crenator*, outline of upper margin of hypopygial plate.  
Fig. 37. *Euschistus impictiventris*, outline of upper margin of hypopygial plate of male, one side, and plate of upper side of hypopygial aperture from above.  
Fig. 38. *Euschistus comptus*, outline of upper margin of hypopygial plate.  
Fig. 39. *Euschistus conspersus*, outline of upper margin of hypopygial plate of male, one side, and plate of upper side of hypopygial aperture from above.



# PLATE XVIII



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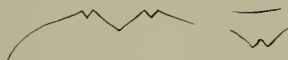
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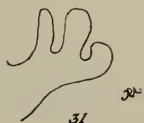
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PLATE XIX

Details of Cydnidae

- Fig. 40. *Galgupha atra*, arrangement of abdominal spiracles.  
Fig. 41. *Corimelaena lateralis*, the same.  
Fig. 42. *Cydnoides ciliatus*, the same.  
Fig. 43. *Galgupha aterrima*, corium of wings.  
Fig. 44. *Galgupha nitiduloides*, the same.  
Fig. 45. *Galgupha nigra*, the same.  
Fig. 46. *G. nitiduloides*, fore femur and tibia, front view.  
Fig. 47. *G. nitiduloides*, male hypopygial plate.  
Fig. 48. *G. atra*, fore femur and tibia, front view.  
Fig. 49. *G. atra*, male hypopygial plate.  
Fig. 50. *G. nigra*, fore femur and tibia, front view.  
Fig. 51. *G. nigra*, male hypopygial plate.  
Fig. 52. *G. aterrima*, fore femur and tibia, front view.  
Fig. 53. *G. aterrima*, male hypopygial plate.  
Fig. 54. *G. aterrima*, scutellum, lateral view.  
Fig. 55. *G. nitiduloides*, the same.  
Fig. 56. *Corimelaena lateralis*, corium of wings.  
Fig. 57. *Galgupha atra*, the same.  
Fig. 58. *Corimelaena harti*, hypopygial plate of male.  
Fig. 59. *Corimelaena lateralis*, the same.  
Fig. 60. *Corimelaena pulicaria*, the same.  
Fig. 61. *Corimelaena montana*, the same.  
Fig. 62. *Galgupha denudata*, apex of scutellum, dorsal view.  
Fig. 63. *Galgupha atra*, the same.  
Fig. 64. *Corimelaena lateralis*, genital plates of female, ventral view.  
Fig. 65. *Corimelaena polita*, the same.  
Fig. 66. *Corimelaena harti*, the same.

# PLATE XIX

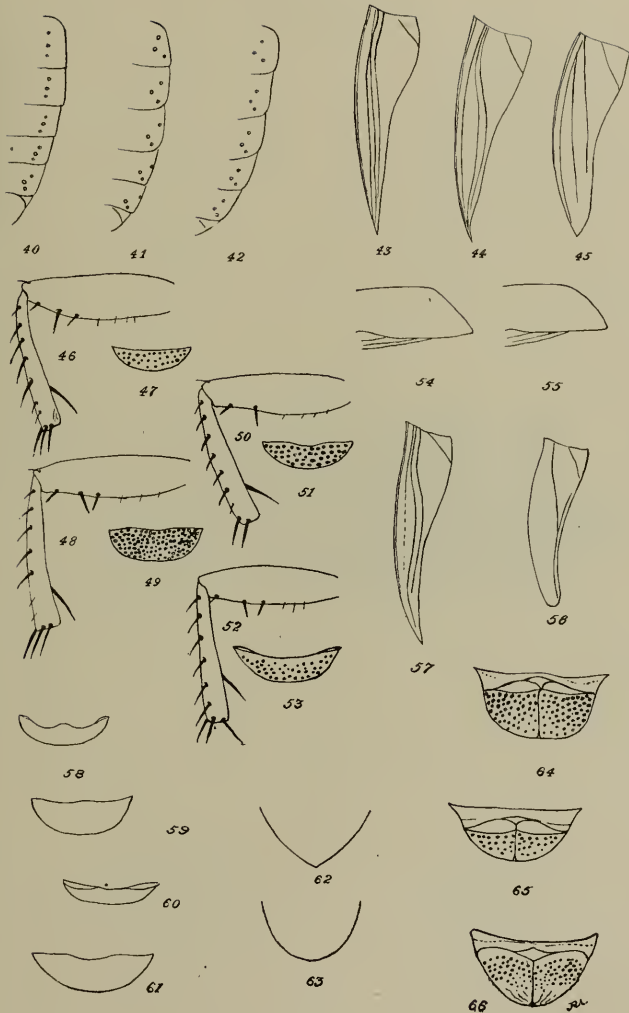


PLATE XX

*Details of Thyreocorinae and Pentatominae*

- Fig. 67. *Corimelaena harti*, head of male, dorsal view.  
Fig. 68. *C. nanella*, same as above.  
Fig. 69. *Thyanta brevis*, same as above.  
Fig. 70. *T. calceata*, hypopygium of male, caudal view.  
Fig. 71. *T. elegans*, head of male, dorsal view.  
Fig. 72. *T. punctiventris*, hypopygium of male, caudal view.  
Fig. 73. *T. custator*, hypopygial clasper of male.  
Fig. 74. *T. casta*, same as above.  
Fig. 75. *T. custator*, hypopygium of male, caudal view.  
Fig. 76. *T. elegans*, genital segment of female, ventral view.  
Fig. 77. *T. elegans*, hypopygium of male, caudal view.

# PLATE XX



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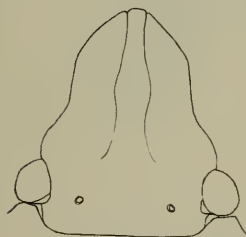
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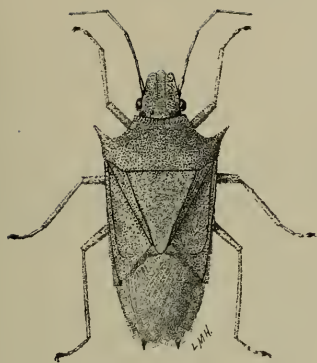
78

PLATE XXI

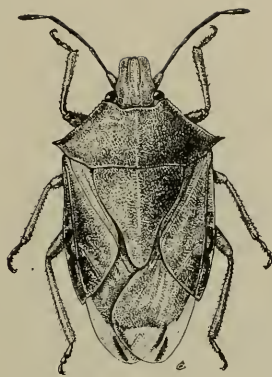
*Typical Pentatomoidea*

- Fig. 78. *Solubea pugnar*.  
Fig. 79. *Thyanta perditor*.  
Fig. 80. *Chlorochroa uhleri*.  
Fig. 81. *Podisus maculiventris*.  
Fig. 82. *Euschistus variolarius*.  
Fig. 83. *Corimelaena pulicaria*.

PLATE XXI



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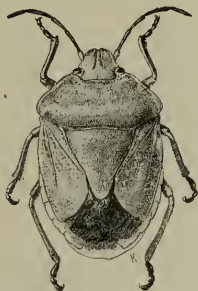
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