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BULLETIN

Article I.

THE NORTH AMERICAN SPECIES OF THE
GENUS TIPHIA (HYMENOPTERA, ACULE-
ATA) IN THE COLLECTION OF THE
ILLINOIS STATE NATURAL
HISTORY SURVEY

BY

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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 133, 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 5a 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 I.—*The North American Species of the Genus Tiphia (Hymenoptera, Aculeata) in the Collection of the Illinois State Natural History Survey.* BY J. R. MALLOCH.

INTRODUCTION

In the course of the work upon white-grubs (*Phyllophaga* spp.) by various members of the staff of the Illinois State Entomologist's office many specimens of the parasitic hymenopterous genus *Tiphia* have been obtained either by rearing from the larvae or pupae or in general collections of imagines. About two years ago I undertook to work up this mass of material with a view to determining how many species there are affecting white-grubs in Illinois, and also to determine, in so far as our material permits, the distribution of the various species. At the outset of my work I encountered great difficulties to progress, chief of which was the extremely unsatisfactory nature of the descriptions of most of the previously described forms. Coupled with this is the fact that the species are remarkably closely related, presenting but few characters that are appreciable except after considerable study. After several months of intermittent study of our material, I was forced to the conclusion that it was necessary for me to obtain specimens from more diverse localities in order to enable me to determine satisfactorily whether certain trivial characters possessed a specific significance; consequently on every possible occasion during my field work in 1917, I collected specimens of *Tiphia*, and I also borrowed a large number of specimens from Mr. Nathan Banks, the latter containing examples from many states in the Union.

I endeavored by dissection of the males to use the structure of the hypopygium as a check upon my separation of specimens by external characters such as punctuation, venation, and the shape of various parts of the body; but the hypopygia of closely related species, or at least of forms that appeared to me to be such, resemble each other so closely that I found very little assistance could be obtained from a study of these.

I also arrived at the decision that the punctuation of the various parts of the body, while fairly constant and very useful for specific separation, is subject to variation, small specimens of such species as *inornata* Say usually being almost devoid of the minute interspersed punctures which are characteristic of normal-sized specimens. These small specimens are probably the result of starving in the larval stage—a condition frequently found in predaceous and parasitic forms.

One of the most important characters that I discovered in the genus is a longitudinal groove on the inner or posterior surface of the basal joint of the hind tarsi of the females in the section to which *punctata*

Robertson belongs. This groove is absent in the females of *inornata* Say and its close allies and also in the males of all species that I have examined, so that it can not be used as a subgeneric character, more especially as the males of the two groups are not separable from the *punctata* group, as far as I can discover, by any character or set of characters that is found in all of these species. What the function of this groove is I can not determine; it may not have any particular function, but the apical spur on the posterior side of the hind tibia is so placed that it can fit into the groove and may form, or have formed at one time in the evolution of the group, a stridulatory organ. Stridulatory organs in the Hymenoptera are normally found on the thorax and abdomen, and in other groups on the wings, abdomen, thorax, and legs. That the tarsal groove above mentioned may have some function altogether different from the one suggested here is quite possible.

The peculiar curved horn-like process at the apex of the abdomen in the males of Tiphinae is the eighth ventral abdominal segment and not part of the hypopygium.

The females of at least the larger species can sting a person's hands, as I know from experience, but I have handled dozens of females of the smaller species without being stung by them.

In collecting specimens during 1917 particular attention was paid to localities in which no previous effort had been made to obtain a representative series of this group, with the result that considerable numbers of species were found that were not previously represented in our collection. At Dubois, in the southern part of the state, many examples of several small species were taken by sweeping black-jack oak; and later in the year some of the same species were found under the same conditions at Havana and at Meredosia.

It is not to be assumed that the Tiphia species discussed in this paper constitute an exhaustive list of those occurring in Illinois, and it is certain that a very large number of those occurring in the United States are unknown to me; but the present paper contains the most comprehensive survey of the North American species yet attempted, contains many new characters for the differentiation of the species, and should prove useful to students of the group.

HABITS OF SPECIES

So far as is known the larvae of Tiphiae are ectoparasitic upon coleopterous larvae. The habits of several species described in this article are discussed in another article in this volume, by Mr. J. J. Davis.

The species particularly affecting white-grubs in cultivated lands are absent from the sand regions near Havana and Meredosia, Illinois, the common species in these localities being much smaller than those that attack white-grubs. They probably feed upon larvae of Scarabacidae occurring in the groves of black-jack oak, which are characteristic of these regions. It is noteworthy that at Dubois I found some of the small

Tiphiae that occur so commonly at Havana, and that many species of Hemiptera, Orthoptera, and Coleoptera which are peculiar to sand regions occur also at Dubois though the soil is much heavier than at Havana and at similar localities.

Very few imagines were taken on flowers in the sand regions, though I swept *Chrysopsis*, *Monarda*, and several less common plants. The flowers of wild parsnip and *Angelica* yielded many examples of the species affecting white-grubs at Galena and other northern points in 1917, and there are many records of similar habits in our office files relating to these species.

GENERIC CHARACTERS

The genus *Tiphia* has been separated by authors from *Paratiphia* by the absence of the first cubital cross-vein of the wing, and the slightly convergent sides of the metathoracic enclosure. These characters, while fairly constant, are not altogether reliable, as many specimens of *Tiphia* have the first cubital present and the metathoracic enclosure is always narrowed posteriorly, though not subtriangular in shape. There are a number of species in *Tiphia* that have the first dorsal abdominal segment similar to that of *Paratiphia*—with a deep transverse linear groove at middle—so that in so far as the absence or presence of the groove is concerned it is impossible to separate the genera by the structure of this segment. There is, however, on each side of the first segment in *Paratiphia* a conspicuous oval depression which is but slightly indicated in *Tiphia*. The principal distinctions between *Tiphia*, *Paratiphia*, and the new genus *Neotiphia* may be summarized as follows:—

- Male with clypeus usually entirely or in large part white; first cubital transverse nervure always present; mouth-opening much longer than broad, extending almost to back of head, the portion between the latter and posterior margin of mouth vertical; metathoracic enclosure subtriangular; first dorsal abdominal segment abruptly declivitous anteriorly, with a deep transverse incision at middle, and a very distinct oval depression on each side; male hypopygium as in Figures 1, 2, and 3.....*Paratiphia*.
- Male with clypeus black; first cubital transverse nervure normally absent; mouth-opening much longer than broad, extending almost to back of head, the portion between it and back of head horizontal; metathoracic enclosure narrowed posteriorly but not subtriangular; first dorsal abdominal segment not abruptly declivitous anteriorly, without an oval depression on each side; male hypopygium as in Figures 4 and 6.....*Neotiphia*.
- Male with clypeus black; first cubital transverse nervure normally absent; mouth-opening broader than long, separated from back of head by a rather broad flat area; metathoracic enclosure slightly narrowed posteriorly; first abdominal segment not abruptly declivitous anteriorly, without well-defined oval depression on each side; male hypopygium as in Figures 5, 7, and 8....*Tiphia*.

KEY TO SPECIES KNOWN TO AUTHOR

MALES

1. Sixth ventral abdominal segment with a broad shallow longitudinal groove in center2
- Sixth ventral abdominal segment without a central groove.....3
2. Lower central portion of clypeus broadly rounded at apex; oral opening extending caudad little more than half-way to posterior margin of head from base of mandible.....*canaliculatus*, sp. n.
- Lower central portion of clypeus acutely pointed; oral opening extending almost to back of head; mandibular triangle absent.....
.....(*Neotiphia acuta*, sp. n.)
3. Ventral abdominal segments 3 to 5 each with a sharp tooth on middle of disc on each side.....*odontogaster* Viereck.
- At most the fifth ventral segment with such tooth, or with an elongate transverse ridge on each side of disc.....4
- No tooth or ridge on fifth ventral segment.....7
4. Mesopleurae doubly punctate on the entire surface; clypeus with lower central portion transverse at apex, punctate almost to margin; fore tibiae in front and flagellum below ferruginous.....5
- Mesopleurae either with large punctures on entire surface or the minute punctures confined to margins; fore tibiae and flagellum black.....6
5. Small species, 5-6 mm. in length; second ventral abdominal segment with microscopic shagreening on disc.....*tuberculata*, sp. n.
- Larger species, 7-8 mm. in length; second ventral abdominal segment without shagreening on disc.....*subcarinata*, sp. n.
6. Lower half of sides of metathorax with large shallow punctures in addition to the striations.....*occidentata*, sp. n.
- Lower half of sides of metathorax without punctures, only striate.....
.....*odontogaster* Viereck.
7. Basal dorsal abdominal segment without a transverse incision at middle...8
- Basal dorsal abdominal segment with a transverse incision at middle....24
8. Tegulae much longer than broad.....*transversa* Say.
- Tegulae as broad as long.....9
9. Central portion of clypeus flat and broad, its apical margin truncate, the width of the central produced portion greater than one-third the width between lower angles of eyes (Fig. 11).....*clypeata* Robertson.
- Clypeus generally more or less convex, the apical margin usually emarginate and always less than one-third the width between lower angles of eyes (Fig. 10)10
10. Mesopleurae with large deep punctures, the disc free from small interspersed punctures except on margins.....11
- Mesopleurae with large and small interspersed punctures on the entire surface14

11. Angulation of radius less than one-fifth the distance from stigma to transverse vein; lateral dorsal areas of metathorax coarsely rugose-reticulate*rugulosa*, sp. n.
 — Angulation of radius at least one-third the distance from stigma to transverse vein; lateral dorsal areas of metathorax not rugose-reticulate except posteriorly12
12. Apex of third cubital cell much distad of apex of marginal; occiput densely punctate, so that there are behind eyes no glossy spaces between the punctures; basal dorsal abdominal segment with a broad shallow post-marginal depression.....*occidentata*, sp. n.
 — Apex of third cubital cell not appreciably beyond apex of marginal; occiput glossy, punctures behind eyes separated; basal dorsal abdominal segment with a deep linear post-marginal depression.....13
13. Third cubital cell ending almost in line with apex of marginal.*similis*, sp. n.
 — Third cubital ending very distinctly proximad of apex of marginal.....21
14. Clypeus slightly convex on disc, center of apical margin slightly emarginate. the edge rounded, without any flat depressed rim, punctate to apex.....*clypeolata*, sp. n.
 — Clypeus not as above, there being usually a distinct impunctate flat margin at apex or the central emargination not being regularly rounded.....15
15. Apex of marginal cell not extending distad of apex of third cubital, or very slightly so (Fig. 13).....16
 — Apex of marginal cell extending very conspicuously beyond apex of third cubital (Fig. 12).....21
16. Dorsum of prothorax with minute punctures interspersed between the large punctures on disc; clypeus flat.....17
 — Dorsum of prothorax without the minute interspersed punctures except on margins; clypeus usually convex.....18
17. Sixth ventral abdominal segment with very long yellowish upright hairs on the greater portion of disc.....*inornata* Say.
 — Sixth ventral abdominal segment with short whitish decumbent hairs on greater portion of disc.....*vulgaris* Robertson.
18. Basal dorsal abdominal segment with shallow poorly defined post-marginal depression19
 — Basal dorsal abdominal segment with deep linear post-marginal depression20
19. Sixth ventral abdominal segment with long yellowish erect hairs on greater portion of disc.....*inornata* Say.
 — Sixth ventral abdominal segment with short whitish decumbent hairs on greater portion of disc.....*vulgaris* Robertson.
20. Mesopleurae with small, widely separated punctures and minute interspersed punctures on a glossy surface; tegulae with an incised line around outer and posterior margins.....*winnemanae*, sp. n.

- Mesopleurae with large and small interspersed punctures on disc, the former on at least the anterior half not separated by more than the width of one of the large punctures; tegulae without complete incised marginal line *punctata* Robertson.
- 21. Abdominal segments 2 to 5 each with a slender incised line along posterior margin; incision between first and second dorsal abdominal segments very deep owing to the front margin of the latter being abruptly declivitous *affinis*, sp. n.
- Abdominal segments 2 to 5 without incised line on posterior margin, or if it is present it is very broadly interrupted at middle; incision between first and second dorsal abdominal segments normal, the front margin of second segment not abruptly declivitous..... 22
- 22. Basal dorsal abdominal segment with a deep narrow post-marginal incision; antennae usually black..... *inaequalis*, sp. n.
- Basal dorsal abdominal segment with a broad, shallow, punctate depression near posterior margin; antennae usually conspicuously ferruginous on under surface of flagellum..... 23
- 23. Basal dorsal abdominal segment with a large part of center of the declivitous anterior portion with minute closely placed punctures.....
..... *conformis*, sp. n.
- Basal dorsal abdominal segment with large irregularly arranged punctures on entire surface of the declivitous anterior portion.... *egregia* Viereck?
- 24. Legs entirely black; first dorsal abdominal segment sometimes with a tubercle near posterior margin..... *floridana* Robertson.
- Legs more or less yellowish, especially the fore tibiae and the tarsi; first dorsal abdominal segment without a tubercle..... *illinoensis* Robertson.

FEMALES

- 1. Pygidium punctate to apex..... 2
- Pygidium with a large portion of surface before apex impunctate..... 3
- 2. Oral opening very narrow, extending almost to back of head, post-mandibular triangle absent (*Neotiphia*) *acuta*, sp. n.*
- Oral opening broad, not extending almost to back of head, post-mandibular triangle distinct *floridana* Robertson.
- 3. Tegulae much longer than broad, very distinctly shagreened.....
..... *transversa* Say.
- Tegulae as broad as long, usually glossy and not shagreened..... 4
- 4. Basal joint of hind tarsi without a distinct groove on the posterior surface 5
- Basal joint of hind tarsi with a distinct longitudinal groove on posterior surface (Fig. 9) 7
- 5. Punctures on pygidium extending to a short distance from apex; ventral surface of pronotum doubly punctate on entire surface.....
..... *vulgaris* Robertson.

* See notes on *Tiphia luteipennis* following description of *acuta*.

- Punctures on pygidium ceasing at, or slightly beyond, middle of exposed surface; ventral surface of pronotum doubly punctate only on margins..6
- 6. Declivitous portion of basal dorsal abdominal segment doubly punctate on its entire surface, the minute punctures very closely placed, the large ones widely placed.....*inornata* Say.
- Declivitous portion of basal dorsal abdominal segment with large irregularly placed punctures, the small closely placed punctures absent.....*clypeata* Robertson.
- 7. Clypeus punctate almost to apical margin, the apex with a round almost abruptly declivitous emargination.....*clypeolata*, sp. n.
- Clypeus usually impunctate on a narrow space along apical margin, the apical emargination when present not abruptly declivitous.....8
- 8. Pygidium with very distinct shagreening almost to apex; basal dorsal abdominal segment with a very shallow post-marginal depression in which are 2-3 series of punctures.....9
- Pygidium without distinct shagreening, or if this is present it does not extend almost to apex, or the basal dorsal abdominal segment has a deep linear post-marginal incision in which there is but one series of punctures10
- 9. Basal angulation of radius about one-sixth of the distance from stigma to first complete transverse nervure; clypeus with 1-2 transverse series of punctures on middle.....*rugulosa*, sp. n.
- Basal angulation of radius about one-third of the distance from stigma to first complete transverse cubital nervure.....*odontogaster* Viereck.
- 10. Mesopleurae with very distinct though microscopic shagreening on surface, which gives it a subopaque appearance; sides of metathorax with very coarse shagreening even on the upper rugose portion; basal dorsal abdominal segment with broad shallow post-marginal depression.....*tuberculata*, sp. n.
- Mesopleurae glossy on disc, without shagreening, or species not as above in other respects11
- 11. Basal dorsal abdominal segment with a deep transverse median incision; clypeus punctate almost to apex.....*incisurata*, sp. n.
- Basal dorsal abdominal segment without transverse incision.....12
- 12. Tegulae with a deep impressed line round their outer and posterior margins; basal dorsal abdominal segment with a shallow broad post-marginal depression13
- Tegulae either without an impressed marginal line or, if this is present, it does not encircle the entire outer and posterior sides.....15
- 13. Face not distinctly buccate in center above antennae; viewed from above its anterior margin is almost transverse, punctures very sparse, those on lower portion not closely placed; space between posterior margin of oral opening and back of head very broad, greater than one-third the length of head*tegulina*, sp. n.

- Face distinctly buccate above antennae; punctures on lower half of face contiguous; space between posterior margin of oral opening and back of head very narrow, about one-fourth as great as length of head.....14
- 14. Large species, 12 mm. in length.....*conformis*, sp. n.
- Smaller species, 8 mm. in length.....*imitatrix*, sp. n.
- 15. A large portion of center of basal dorsal abdominal segment with minute closely placed punctures which extend caudad almost to post-marginal depression.....*arida*, sp. n.
- If there are any small closely placed punctures present on basal dorsal abdominal segment they are confined to declivitous anterior portion and do not extend caudad on dorsum.....16
- 16. Lower half of sides of metathorax conspicuously though finely shagreened or cross-striated, the minute setiferous punctures indistinct.....17
- Lower half of sides of metathorax very faintly and indistinctly shagreened or striated, appearing glossy, the minute setiferous punctures distinct..18
- 17. Large species, averaging 11 mm. in length, post-mandibular triangle smooth and glossy; basal dorsal abdominal segment with broad poorly defined post-marginal depression.....*robertsoni*, sp. n.
- Smaller species, averaging 8-9 mm. in length; post-mandibular triangle distinctly shagreened; basal dorsal abdominal segment with narrow well-defined post-marginal depression which is sometimes interrupted ventrally.....

	{ <i>affinis</i> , sp. n.
	{ <i>inaequalis</i> , sp. n.
- 18. Anterior declivitous portion of basal dorsal abdominal segment with double punctuation on its entire surface.....*aterrima*, sp. n.
- Anterior declivitous portion of basal dorsal abdominal segment with irregular single punctuation or doubly punctate in center.....19
- 19. Ventral surface of prothorax with double punctuation on disc; entire ventral surface of thorax and coxae with very distinct microscopic shagreening which prevents them from having a glossy appearance; greater portion of pygidium indistinctly shagreened.....*reticulata*, sp. n.
- Ventral surface of thorax not as above, at least the flap-like posterior extensions of mesothorax highly glossy.....20
- 20. Pygidium distinctly shagreened on apical half.....21
- Pygidium not distinctly shagreened on apical half.....22
- 21. Pygidium very distinctly shagreened on apical half; dorsal abdominal segments 2 and 3 usually without a trace of an incised line along the posterior margins (cf. *texensis*).....*punctata* var. *intermedia*, var. n.
- Pygidium indistinctly shagreened on apical half; abdominal segments 2 and 3 in *robertsoni* and *affinis* with a distinct incised line along their posterior margins.....22
- 22. Lower half of sides of metathorax with very distinct though microscopic shagreening; apical half of pygidium glossy.....(see 16)
- Lower half of sides of metathorax with very faint shagreening; apical half of pygidium with more or less shagreening at its base.....23

23. Large species, over 15 mm. in length; dorsal abdominal segments 2 and 3 without incised line along posterior margin.....*texensis*, sp. n.
 — Smaller species, not over 14 mm. in length; dorsal abdominal segments 2 and 3 without an incised line along their posterior margins.....
*punctata* Robertson.

DESCRIPTION OF SPECIES

NEOTIPHIA, gen. nov.

This genus is separable from *Tiphia* by the much longer and narrower oral opening which extends to, or almost to, the back of the head; the glossy post-mandibular triangle so conspicuous in *Tiphia* is absent or linear, and the palpi are very much shorter than in that genus. The clypeus is black, and in the genotype male it is pointed below, while in the female it is narrowly produced centrally, with the apical outline of the produced part rounded. The abdomen resembles that of *Paratiphia* at base, though not so abruptly declivitous on anterior portion of first dorsal segment. The hind metatarsi of female have the groove on posterior surface long and deep. The venation is similar to that of *Tiphia*.

Genotype, *Neotiphia acuta*, sp. n.

NEOTIPHIA ACUTA, sp. n.

Male.—Black, glossy; palpi yellowish; tarsi brown; wings yellowish brown except at apices; veins and stigma black-brown; hairs white.

Face doubly punctate above antennae, on other portions with large and rather widely spaced punctures; clypeus subtriangular, terminating in an acute point below, surface with dense, minute punctures, and larger punctures below; antennae submoniliform below; mandibles simple; palpi much shorter than in *Tiphia*, apical joint of maxillary palpus not over four times as long as its greatest diameter; oral opening narrow, its length more than 1.5 its posterior width, nearly parallel-sided, extending nearly to posterior margin of head; post-mandibular triangle absent; cheeks with sparse large punctures. Pronotum with large deep punctures; mesopleura with large, deep subcontiguous punctures. Metathoracic enclosure narrowed posteriorly, posterior face of metathorax slightly rugose below, doubly punctate on greater portion of surface. Basal dorsal abdominal segment with an incised line at middle, which is distinctly angulate centrally; punctures on disc of segment large, no impressed apical line present; remaining segments, except apical, with large shallow punctures which are closer near anterior and posterior margins, forming usually a single transverse line; segments 1-5 each with a broad impunctate apical margin; sixth segment with large, deep, contiguous punctures; ventral segments similar to those of dorsum, the basal segment flattened as usual, and the sixth with much smaller punctures and a very conspicuous broad shallow channel in

center on apical half. Venation resembling that of *Tiphia inornata*, the vein closing marginal cell gradually curving away from costa considerably before apex of cell, so that the apex of cell is far removed from costa; vein closing apical submarginal sloping backward, so that while the anterior portion of apex of the cell is at apex of marginal the posterior portion of apex is very much distad of it. Legs, especially the tarsi, with long soft white hairs, fore and mid tarsi with their joints short and broad; hind tarsi, except the apical joint, slender.

Length, 10–12 mm.

Type, Texas. No other data.

A female, with same data, which is in the collection may belong to this species. I append a summary of its characters:—

Differs in color from the male *acuta* in having the antennae rufous below and the wings more evenly yellow.

Structurally, differs in having the clypeus with a broad impunctate lower margin and its outline rounded; the oral opening extends even farther back, leaving but a narrow line between it and back of head; the first dorsal abdominal segment is shorter and broader, with the transverse median incision straight; the pygidium is covered on the entire surface with large, deep, contiguous punctures; the sixth ventral segment with the lateral margins conspicuously sinuate; the tarsi are less conspicuously hairy and are not so thick, and the basal joint of hind pair has a deep groove on posterior surface; and the venation differs in that the vein does not close the marginal cell.

TIPHIA LUTEIPENNIS CRESSON

Mr. E. T. Cresson kindly furnished me with notes and sketches of the type specimen of this species, which enabled me to determine that *luteipennis* is distinguishable from the foregoing species by the following characters: oral opening broader; clypeus apparently smooth; pygidium punctate to apex, but the corresponding ventral segment much broader, with a broader impunctate margin and an almost regularly rounded apex (in *acuta* it is roundly emarginate); tarsi without long hairs at base, whereas in *acuta* there are long hairs which are most conspicuous on the mid pair.

Described from Colorado.

TIPHIA CANALICULATA, sp. n.

Male.—Differs from *acuta* in having the antennae longer, the joints normal; the face more evenly punctured; clypeus broad at apex, regularly and broadly rounded, with a distinct impunctate margin; post-mandibular triangle distinct though small; the back of head, pronotum, and mesopleura with a few small punctures interspersed between the large ones; lateral margin of sixth ventral abdominal segment with two rounded incisions on each side, the central projecting part sharp; the

central groove on same segment deeper; the fore and mid tarsi normal in structure and not conspicuously hairy.

Length, 9 mm.

Type locality, Chimney Gulch, Col. (coll. N. Banks).

Female unknown.

TIPHIA TRANSVERSA Say

This species differs from all others known to me in having the tegulae much longer than broad in both sexes. In cephalic and thoracic punctuation the male very closely resembles that of *clypeata*, but the clypeus is slightly buccate centrally, its surface covered with large and microscopic punctures almost up to the anterior margin, the central portion narrower than one-third the clypeal width, tapered anteriorly and with a rather deep central emargination. The veins closing marginal and submarginal cells are nearly at right angles to the costa, whereas in *clypeata*, *inornata*, and most other species of this group, these veins are sloped diagonally towards the apex of wing posteriorly.

The female differs from *inornata*, in addition to the tegular distinction, in having the lateral areas of the metathorax distinctly punctate and the posterior face of metathorax smooth and doubly punctate, the large setigerous punctures being widely separated.

Originally described from Indiana. I have seen examples from Dubois, Algonquin, and Urbana, Ill., which are in the collection here, and from Falls Church and Great Falls, Va., Southern Pines, N. C., and Wollaston and East Falmouth, Mass., submitted by Nathan Banks. The dates on the specimens range from July 2 to September 3.

Two examples from Fedor, Lee county, Texas, one from Great Falls, and one from Falls Church differ from the others in having an impressed line above the outer margin of the tegulae which curves backward at two-thirds the length of tegula, whereas in the typical examples the line fades out and is not recurved.

The date of the Texas examples is June 21, 1909.

TIPHIA CLYPEATA Robertson

The male of this species is distinguished from all others known to me by the following combination of characters: Face with deep, large, contiguous punctures on lower half and sides, sparsely punctate in front of ocelli and with a narrow impunctate space centrally on upper portion; clypeus flat, doubly punctate except on a moderately broad border on apical central portion, this portion over one-third the width of clypeus, its outline transversely truncate; disc of pronotum and central portion of mesopleura with large deep punctures, the minute punctures absent; basal abdominal segment without transverse incision at middle, the preapical depression shallow, with 1-2 series of rather large punctures. Abdomen with rather large, deep, widely separated punctures;

apical dorsal segment with a central impunctate line which is faintly shagreened apically; marginal cell rather pointed at its outer posterior extremity, the enclosing vein sloped towards base of wing on its upper portion, second submarginal cell with its apex distad of submarginal.

The female, which has previously been undescribed, differs from that of *inornata* Say in the following characters:—

The clypeus is broader and not so high, with a less distinct central emargination; the mandibles are stouter and shorter, with the grooves extending much farther towards apex, the one on under side ending very close to apex; the basal dorsal abdominal segment has a better defined subapical depression, and has irregular, widely spaced punctures on basal half; and the pygidium has a smaller impunctate space which is more or less distinctly shagreened.

Originally described from Carlinville, Ill., and represented in my material by many specimens from various parts of this state, even to the northern tier of counties. I have also seen examples—from the collection of N. Banks—taken at Chain Bridge, Glencarlyn, and Falls Church, Va., and at Sea Cliff, N. Y. A female in the collections here, from Spokane, Wash., is either this or a closely allied species. The dates on specimens show that the species occurs from the middle of May till the middle of July, with a few scattered examples up to the middle of October.

TIPHIA INORNATA Say

TIPHIA VULGARIS Robertson

The males of the above species very closely resemble each other, but may be separated as follows: *inornata* has the mandibles toothed, the clypeus with a rather large emargination, and the sixth ventral abdominal segment with the greater portion of its surface with long erect yellowish hairs; *vulgaris* has the mandibles almost invariably simple, the clypeus with a weak emargination, and the sixth ventral abdominal segment with shorter subdepressed white hairs.

The females are easily separated by the punctuation of the pygidium, which in *inornata* ceases about middle of disc, while in *vulgaris* it is carried to within a short distance of the margin. The last-named species is readily separated from its allies by the subopaque appearance of the ventral surface of the pronotum, due to the presence of many minute punctures between the larger ones. Both species have the basal half of first dorsal abdominal segment doubly punctate.

Both species occur throughout Illinois and in the Eastern States, *vulgaris* being the commonest species affecting white-grubs in the vicinity of Urbana. I have seen *inornata*, or a species which I can not separate from it, from Florida.

Both species appear to be largely confined to fields, especially pastures, and very few examples of either were taken in or near woodlands in 1917. At Galena, Ill., a series of both sexes of *vulgaris* was taken on

flowers of wild parsnip early in July. The greatest number of specimens of both species occurs in May, June, and the first half of July, but a few specimens occur much later every year.

I have before me several male specimens that do not exceed 6 mm. in length. These I thought at first represented a distinct species, but I consider it more probable that they are specimens which have been dwarfed through lack of food—a not uncommon occurrence among predaceous and parasitic species. To the food-habits of the species is also due no doubt some measure of the variability of punctuation and striation of the various parts of the body, just as in some Tachinidae the number of macrochaetae may vary considerably in large and small individuals of the same species, the difference in size being governed largely by the conditions under which the larval stages were passed.

TIPHIA ODONTOGASTER Viereck

The male of this species differs from that of any other described species in having a sharp tooth-like tubercle on each side near posterior margin of ventral abdominal segments 3, 4, and 5. From *tuberculata* it differs in having the mesopleura with very large deep punctures and no interspersed minute punctures, the clypeus with a broad impunctate margin on central portion and the lateral angles of this portion reflexed, and the fore tibiae are black and much more slender, the apical dorsal abdominal segment is very coarsely punctured throughout, and the apical ventral segment has its postero-lateral outline deeply emarginate near apex so that the central protruded portion is nearly parallel-sided.

The female, hitherto unknown, may be described as follows:—

Glossy black, antennae brownish below, wings faintly yellowish.

Clypeus flat, central portion at apex hardly wider than socket of one antenna, punctures rather large and deep, impunctate margin moderately broad; apical antennal joint twice as long as subapical; facial punctures subcontiguous below, becoming more widely separated above; cheek glossy, punctures large and subequal, minute interspersed punctures present only near posterior margin. Disc of pronotum with large punctures; metathoracic enclosure with slender boundary and central ridges, surface of enclosure and of lateral areas of metathorax with very shallow pits or punctures; posterior surface of metathorax with very minute and larger, setigerous, punctures; mesopleura glossy, with large deep punctures. Basal abdominal segment short and broad; subapical depression poorly defined, centrally with 2-3 series of small punctures; pygidium punctate on basal half, rather coarsely shagreened and opaque on apical half; hairs on apical half of abdomen long and rather coarse.

Originally described by Viereck from a male collected at Beulah, N. M. The specimens before me, 1 male and 3 females, are from the collection of Nathan Banks and were taken at Palmerlee, Ariz., in September and October.

A male in the collection of the Illinois State Natural History Survey, collected at Las Vegas, N. M., and one from the collection of N. Banks, collected by A. Agassiz in the Gulf of Georgia, B. C., differ from the typical form in having only the tubercles on segment 5 tooth-like, the others being poorly developed—otherwise I can detect no specific distinctions, and I refer the specimens to this species tentatively.

TIPHIA TUBERCULATA, sp. n.

Male.—Glossy black. Antennal flagellum opaque black, usually paler below, occasionally yellowish brown towards apex on that side; palpi yellowish; mandibles pale from middle to tip. Legs black, anterior or inner side of fore tibiae, apices of mid tibiae, and the whole or a great part of all tarsi ferruginous or yellowish, tibial spurs pale. Wings clear at base, becoming brownish beyond middle and especially in the marginal cell; stigma and veins brownish black.

Punctures on lower portion of face of moderate size, contiguous, becoming more widely spaced above, ocellar region in small individuals sparsely punctate, no impunctate precellar line present; scape of antennae closely punctate, the punctures small; clypeus flat, generally rounded or slightly transverse anteriorly in center, never emarginate, doubly punctate at base, the punctures large at apex and usually extending to extreme margin; mandibles without a well-developed preapical inner tooth; cheek minutely and closely doubly punctate. Pronotum with sparse, regular, moderately large punctures on disc; metathoracic enclosure well defined, never with a complete central ridge, the enclosed surface usually shagreened or faintly rugose; mesopleura with small punctures which are well separated, and between them many very minute punctures. Basal abdominal segment without median transverse incision; preapical depression broad and shallow, usually with 1–2, rarely 3, series of small punctures; second segment with very small widely separated punctures, remaining segments with closer and larger punctures, especially basally and apically; apical segment with a very narrow, faintly shagreened, impunctate central longitudinal line on apical half; fifth ventral abdominal segment with a distinct tooth-like projection, or a slightly elevated ridge, on each side near apex. Marginal cell very distinctly surpassing apex of second submarginal, its apex usually rounded; base of first cubital in nearly all cases distinct but short.

Female.—Differs from the male in having the fore tibiae entirely black, and the tarsi usually less noticeably yellowish.

The clypeus is regularly broadly rounded or subtruncate centrally at apex and punctured except on a narrow apical margin; the face is closely and minutely doubly punctate below, becoming more coarsely and gradually more widely punctate above; cheeks doubly punctate on posterior half; mandibles simple. Mesopleura with rather small, widely separated punctures, the spaces between microscopically shagreened and

with very minute pits, giving the whole a subopaque appearance very different from the glossy surface of allied forms; sides of metathorax rather coarsely shagreened even where rugose. Abdomen punctured as in the male but the punctures larger and closer; pygidium impunctate on apical half, the punctures rather abruptly ceasing in a transverse line, apical half very faintly shagreened, distinctly glossy; second ventral segment quite as distinctly shagreened as the others, which is not the case in allied species.

Length: male, 5.5-7 mm.; female, 6-8.5 mm.

Type locality, Meredosia, Ill., August 19-22, 1917, collected by sweeping the foliage of black-jack oak along margin of a sand-pit.

Paratypes and allotypes: Dubois, Ill., August 8, 1917, collected by sweeping foliage of black-jack oak; Havana, Ill., August 30, 31, 1917, collected by sweeping foliage of various trees in the sand region near Havana; Bluffs, Ill., Aug. 19, 1917. Collectors, T. H. Frison, C. A. Hart, and the writer. Over 100 specimens.

TIPHIA SUBCARINATA, sp. n.

Male.—This species agrees very closely with *tuberculata*, but is larger, averaging 8 mm. in length, and has the second ventral segment glossy, showing none of the fine shagreening which is present in *tuberculata*, even under a strong magnification.

The color of the legs and antennae is the same in both species, and both have an impressed line on margins of the tegulae. The post-mandibular triangle is shagreened in both species. In *tuberculata* the protuberances on sides of fifth ventral segment are usually tooth-like, while in *subcarinata* they are in the form of short transverse ridges.

Type locality, Glencarlyn, Va., July 25, on *Ceanothus*. Paratypes: same locality as type, June 23 and 30 and July 25; Great Falls, Va., June 28 and July 8; Falls Church, Va., August 13 (N. Banks); Grand Junction, Mich., July 15, 1914.

TIPHIA RUGULOSA, sp. n.

Male.—Entirely black, glossy. Wings slightly grayish, veins black.

Face on almost its entire surface with large, deep, contiguous punctures, with none which are very minute, a distinct raised central ridge on lower half of face extending to, or almost to, an impunctate line which reaches the anterior ocellus; ocellar region sparsely punctate except on vertex; scape of antennae glossy, the elongate joint coarsely punctate, flagellum opaque; clypeus glossy, slightly buccate centrally, and with large punctures, broadly depressed and impunctate apically, the margin with slightly reflexed angles; cheeks doubly punctate. Pronotum with large, distinctly separated punctures on disc except along posterior margin; scutellum and postscutellum with large punctures; lateral margins of metanotum rugose; enclosure usually with a distinct raised central line and weak transverse rugose reticulations; mesopleura

with large punctures on entire surface, minute punctures either absent or present on margins only. Basal dorsal abdominal segment without median transverse incision, preapical depression broad and shallow, usually with 3 rows of rather large punctures, the punctures sparse proximad of the depression, becoming much more numerous towards middle; next 4 segments with large shallow punctures; apical segment rounded, without sharp ridge, rather coarsely punctate except on apical half of center of dorsum, the impunctate area microscopically shagreened, giving it a subopaque appearance; hairs on abdomen of moderate length, those on apical ventral segment not more dense than on subapical; marginal cell truncate or subtruncate apically; second submarginal elongate, its apex distinctly proximad of apex of marginal.

Female.—Differs from the male in having the facial punctures widely separated, the clypeus flat on disc, with the impunctate margin broader and its apex less reflexed, and the punctures on thorax and abdomen more widely separated, and on the latter much smaller.

Differs from other Eastern species known to me in having the pygidium impunctate and minutely shagreened on apical half.

Length: male, 7.5–9 mm.; female, 8–9.5 mm.

Type locality, Urbana, Ill., November 10, 1915, male taken in forestry of the University of Illinois (J. R. Malloch). Allotypes: Urbana, university grounds, June, 1885 and 1888 (J. Marten); Homer, Ill., July 20, 1907 (C. A. Hart). Paratypes and allotypes: Falls Church, Va., September 17 to October 11; Glencarlyn, Va., October 7; Great Falls, Va., October 3 (N. Banks); Wollaston, Mass., June 1, 1895 (F. Sprague).

TIPHIA CLYPEOLATA, sp. n.

Female.—Resembles *punctata* Robertson, but differs strikingly in the form of the clypeus, which is flat and has the central portion with a rounded excavation, the edge of which is almost declivitous. The upper portion of head except immediately above the antennae is very sparsely punctate, the punctures being small; the mandibles are large, and broad almost to apex. Pronotum with small sparse punctures on dorsum; tegulae simple; lower portion of sides of metathorax weakly striate and with faint setigerous punctures, posterior surface doubly punctate. Basal dorsal abdominal segment with a broader, but still deep, post-marginal incision; no marginal incised line on any of the segments; pygidium glossy on apical half. Groove on basal joint of hind tarsi short, poorly defined. Stigma small, truncate, radius leaving at its apex or close to it.

Length, 12–14 mm.

Type locality, Fedor, Lee Co., Texas, April 28, 1909 (coll. Banks). Paratype, Pennington Gap, Va. (coll. Banks).

I have before me six specimens of what I take to be the male of this species. They are very similar to the male of *punctata*, but differ in having the clypeus flat, punctate to apex, and with a rounded central emargination. The upper portion of head and the dorsum of pronotum

are more densely punctate than in *punctata*, but in other respects they agree very closely in the two species.

Length, ♀-9 mm.

Localities, Falls Church, Va., September 28 and 29, and Dubois, Ill., August 10, 1917.

TIPHIA INCISURATA, sp. n.

Female.—Black; under side of flagellum, mandibles except bases and apices, and palpi brown.

Facial punctures subcontiguous above antennae, elsewhere widely separate; clypeus with the punctures becoming larger towards apex and extending to margin, the latter transverse; space between oral opening and back of head broad; post-mandibular triangle sparsely punctate. Pronotum with large punctures on greater portion of sides; mesopleura coarsely, doubly punctate; posterior face of metanotum minutely punctate, with a few shallow, large punctures near upper lateral angles. Basal dorsal abdominal segment with an almost straight transverse median incision, anterior declivitous portion very minutely punctate in center, with large punctures laterally, posterior dorsal portion of segment with sparse punctures and no clearly defined post-marginal depression; incised line on posterior margin of segments 2 to 5 distinct; pygidium impunctate on apical half, its surface smooth. Incision on posterior surface of basal joint of hind tarsi small, almost punctiform, the surface irregularly punctate. Stigma rather large, radius leaving before its apex.

Length, 11.5 mm.

Type locality, Southern Pines, N. C., June 23, 1910 (A. H. Manee):•

TIPHIA OCCIDENTATA, sp. n.

Male.—Glossy black. Apices of mandibles and the palpi yellowish brown. Antennae entirely black, flagellum opaque. Wings slightly grayish, veins black. Hairs white.

Face with deep, large, contiguous punctures which become more widely spaced as they near vertex; a narrow impunctate space below anterior ocellus connects with a sharp elevated central ridge which does not reach entirely to antennal insertions; clypeus convex in center, doubly punctate on disc, the minute punctures sparse, apex with a narrow impunctate flat rim which is deeply emarginate centrally; mandibles with poorly developed subapical tooth; back of head coarsely and very closely doubly punctate. Dorsum of pronotum with very large contiguous punctures; mesopleura with large, deep subcontiguous punctures, metathoracic enclosures with sharp boundary and central ridges; declivitous lateral portions of metathorax coarsely rugose above, faintly longitudinally striate below and with a number of rather large shallow punctures near lower margin; posterior face of metathorax coarsely rugoso-reticulate. Basal dorsal abdominal segment without median

transverse incised line, the punctures large, becoming sparse near apex, subapical depression broad and shallow, with two series of punctures centrally; punctures on segments 2 to 6 large and deep, becoming progressively larger and closer to sixth, on which they are subcontiguous; seventh segment with large, deep contiguous punctures and narrow longitudinal impunctate line on apical half; fourth and fifth ventral segments each with a poorly developed tubercle on each side near posterior lateral angle. Wing venation similar to that of *inornata*, the apex of marginal cell at upper anterior angle of submarginal, and very distinctly proximad of lower anterior angle; angulation of radius less than one-third of the distance from stigma to first transverse cubital.

Length, 9.5 mm.

Type locality, Colorado. One specimen labeled "Mts. of Colo., Aug.-Sept., Carpenter." (Coll. N. Banks.)

TIPHIA SIMILIS, sp. n.

Male.—Differs in color from *occidentata* in having the mandibles and palpi darker and the wings whitish.

Face with less closely contiguous punctures on lower portion than *occidentata*, the preocellar impunctate space indistinct and the central ridge usually absent; clypeus doubly punctate, disc slightly convex, apical impunctate margin of moderate width, central emargination much less pronounced than in *occidentata*; mandibles simple; back of head glossy, the large punctures well separated, the minute punctures not very numerous. Pronotum with punctures separated and equal in size to those of mesopleura, the latter doubly punctate on margins and rather broadly so posteriorly; posterior face of metathorax with rather small close punctures; lower half of sides of metathorax with longitudinal striae, but without the punctures present in foregoing species. Abdomen similar to that of *occidentata*, but with less conspicuous hairs, no tubercles on ventral segments, and the seventh dorsal segment with larger punctures and an impunctate central line; first dorsal segment much more rounded above, with a very deep post-marginal incised line, and the depression between the first and second segments very much deeper. Apex of marginal cell in line with apex of submarginal, the lower angle of latter proximad of median portion of posterior margin of cell; angulation of radius about two-fifths of the distance from stigma to transverse cubital.

Length, 8 mm.

Type locality, Waukegan, Ill., August 25, 1917 (J. R. Malloch).

A specimen in our collection differs from the type in having the legs paler, the wings almost milky, the stigma largely yellowish, the impunctate line below anterior ocellus present, and the clypeus narrow and with a less distinct margin. In other respects it agrees with the type, and I consider it as the same species.

Locality, Cherry Valley, Ill., Aug. 17, 1883.

TIPHIA AFFINIS, sp. n.

Male.—Very similar to *similis*, differing only in having the disc of mesopleura usually with a few scattered small punctures interspersed between the large ones, the face with a very distinct central ridge, the clypeus broader, lower portion of sides of metathorax shagreened, second dorsal abdominal segment precipitous anteriorly so that there is a very pronounced incision between the first two segments.

Female.—Differs from the male in having the antennae ferruginous apically, and the under side of antennal flagellum of same color.

Face narrowly doubly punctate above antennae, remainder of surface with sparse large punctures: clypeus doubly punctate basally, impunctate on a broad apical margin, centrally narrowly emarginate; mandibles simple, broad, grooves ceasing some distance before apex; cheeks, posteriorly, narrowly doubly punctate above. Mesopleura glossy, doubly punctate posteriorly; enclosure parallel-sided, well defined, central ridge distinct; posterior face of metathorax doubly punctate laterally. Basal abdominal segment with very small sparse punctures, preapical depression consisting of a single transverse series of deep contiguous punctures; anterior margin of second segment not so noticeably declivitous as in male, but more so than in females of other species; remaining segments sparsely covered with small punctures, which are closer near anterior and posterior margins; pygidium with the apical half glossy and impunctate. Stigma small, truncate, outer transverse cubital oblique. Basal joint with groove on posterior surface weak—in the form of two small subcontiguous pits.

Length: male, 6–7 mm.; female, 7 mm.

Type locality, Galena, Ill., July 8, 1917 (Hart and Malloch). Paratypes: Falls Church, Va., July 1–4 (N. Banks); Dubois, Ill., Aug. 10, 1917 (J. R. Malloch).

TIPHIA ATERRIMA, sp. n.

Female.—Glossy black; flagellum below, and mandibles except apices ferruginous; front side of fore tibiae and the tarsi brownish.

Head rounded above; the front slightly buccate above antennae and not steeply declivitous above, sparsely punctate above, punctures below not contiguous; clypeus with a broad impunctate margin, apex slightly, narrowly emarginate; mandibles simple, long; space between oral opening and back of head broad. Metathorax twice as long as scutellum, shagreened and sparsely punctate on dorsum; enclosure 3 times as long as broad, parallel-sided or slightly narrowed centrally; lower portion of sides of metathorax distinctly shagreened, posterior face doubly punctate. Anterior declivitous portion of dorsal abdominal segment doubly punctate on entire surface, the small punctures very minute; post-marginal depression broad, with 2–3 series of large punctures except in center; punctures on remaining segments as in *punctata*, the post-marginal incised line distinct except sometimes on median portion of second seg-

ment; pygidium glossy on apical half. Legs normal, hind tarsal groove long.

Length, 8 mm.

Type locality, Urbana, Ill., Sept. 6, 1891 (C. A. Hart). Six specimens.

TIPHIA ARIDA, sp. n.

Female.—This species closely resembles *punctata*, but differs in having the tegulae with an incised line on a large part of outer margin, the basal dorsal abdominal segment with a rather shallow, broad post-marginal depression in which there are 2 rows of punctures centrally, and a large median patch of small punctures on the declivitous anterior half of segment, which extends caudad almost to the post-marginal depression. The incised line on posterior margin of abdominal segments is present only on lateral portions of segments 2 and 3 but complete on 4 and 5. The pygidium is irregularly wrinkled and indistinctly shagreened on basal portion of apical half. The hind tarsal groove is long and deep. Radius leaves stigma at apex of lower side, the apex of stigma oblique. Otherwise as *punctata*.

Length, 11.5 mm.

Type locality, Havana, Ill., Aug. 13, 1903 (C. A. Hart). Taken at a place called Devil's Hole.

TIPHIA TEXENSIS, sp. n.

Female.—Agrees in most respects with *punctata*, but is larger, generally exceeding 15 mm. in length. The metathoracic enclosure is somewhat lyre-shaped, the lateral ridges being bent inward at middle, cephalad of which they are curved outward and then, just at anterior margin, they curve inward again. The lower part of sides of metathorax have 2-3 large punctures close to lower margin, but are otherwise as in *punctata*. The basal dorsal abdominal segment is similar to that of *punctata*, but the second is more regularly covered with larger punctures. The shagreening on pygidium is very minute and becomes obsolete before reaching apex.

Type locality, Dallas, Texas. Four females. (Coll. N. Banks.)

TIPHIA PUNCTATA Robertson

I have examined the type specimen of this species. In my material here I have a very large number of males and a smaller, though still large, number of females which I consider belong to the species. There are some slight differences between the male examples from the various localities but, while I think that there are several species in the lot, I do not consider it advisable to attempt to differentiate them with the specimens I have as criteria. So closely related are the forms that it is not impossible that what I regard as probably distinct species are merely local variants of one and the same species. For the present, then, I leave

all the males as *punctata*, though I may have males of some of the closely related species confused with them.

The characters used in the keys and the differences cited in the descriptions of other species should serve to identify this species.

The female has not been described. It differs from *robertsoni* in having the basal dorsal abdominal segment with a very slender linear post-marginal incision, and the lower half of sides of metathorax with very faint shagreening.

Common throughout Illinois, and represented in my material by specimens from Virginia and New York.

Occurs from July to September inclusive.

TIPHIA PUNCTATA var. *INTERMEDIA*, var. n.

Female.—This variety differs from the typical form in having the pygidium with distinct shagreening on a large portion of the apical half. In other respects it is very similar though averaging smaller, being 9–11 mm. in length.

Type locality, Carlinville, Ill. (Robertson). Paratypes: Falls Church, Va., July 10–Sept. 17; Washington, D. C.; Taunton, Mass.; Great Falls, Va., August 24.

TIPHIA TEGULINA, sp. n.

Female.—Black, shining; under side of flagellum, middle of mandibles, and palpi ferruginous.

Head broad, flattened above, face almost transverse when viewed from above. lower portion sparsely punctate, upper portion with widely separated punctures; clypeus with a broad impunctate apical margin, the outline transverse. Sides of pronotum coarsely striated except above; mesopleura glossy, with sparse irregular punctures; posterior face of metanotum doubly punctate; tegulae large, with a distinct marginal incised line. Declivitous portion of first dorsal abdominal segment doubly punctate, the posterior portion sparsely punctate and with a very broad poorly defined post-marginal depression; incised line on posterior margins of segments 2 to 5 distinct except in center of 2; pygidium minutely and indistinctly shagreened on apical half. Groove on posterior surface of basal joint of hind tarsi long and deep. Stigma large, radius leaving before its apex.

Length, 13.5 mm.

Type locality, Goose Lake, Siskiyou Co., Calif. (coll. Banks).

A specimen from Wenass Valley, Washington, July 7, 1882, may represent a distinct species. It is smaller, 9 mm. in length, and is less distinctly punctured, especially on dorsum of pronotum and anterior portion of basal dorsal abdominal segment. It differs from the following species in the greater separation of the oral opening from the back of the head.

TIPHIA CONFORMIS, sp. n.

Female.—Very similar to *tegulina*, differing in being smaller, and in having the face less distinctly transverse, with contiguous large punctures on the lower half and more closely placed punctures above. The space between oral opening and back of head is much narrower than in *tegulina*. The upper half of sides of pronotum is less conspicuously striated, and the posterior face of the metanotum is densely covered with minute punctures and the larger punctures are irregularly arranged on surface. The basal dorsal abdominal segment is less densely covered with minute punctures. In other respects similar to *tegulina*.

Length, 11 mm.

Type locality, Quincy, Ill., August 13, 1889, taken on thistles, etc. (C. A. Hart). Paratype, Falls Church, Va., August 2 (N. Banks).

A female in the collection from Brownsville, Texas, November 24, 1911, differs from the type in having the basal dorsal abdominal segment almost without minute punctures in center, but agrees in other respects very well with the type.

A male taken at the same time as the type resembles *punctata* Robertson, but differs as indicated in the key.

TIPHIA IMITATRIX, sp. n.

Female.—Very closely resembles *conformis*, but differs in being much smaller, as indicated in key. In addition to the difference in size there are distinctions in the head structure, the space between the oral opening and the back of head being greater in *imitatrix* than in *conformis*.

Type locality, Falls Church, Va., Aug. 24, 31, and Sept. 13 (N. Banks).

TIPHIA EGREGIA Viereck?

I identify doubtfully as this species a large number of male specimens taken in the following localities: Falls Church, Va., Aug. 7, 30, 31 (Banks); Bluffs, Ill., Aug. 19, 1917; Meredosia, Ill., Aug. 19-22, 1917; Havana, Ill., Aug. 30, 1917 (Malloch).

TIPHIA INAEQUALIS, sp. n.

Male.—Closely resembles *affinis*, differing only in having the clypeus more elevated centrally, the face less distinctly carinate in center, the basal dorsal abdominal segment less declivitous posteriorly and with a slight but distinct constriction of the deep post-marginal incision, and the anterior margin of second segment not abruptly declivitous anteriorly. From *egregia* it differs as indicated in key.

Female.—I can not separate this sex from the female of *affinis*.

Length, 6.5-7.5 mm.

Type locality, Dubois, Ill., Aug. 9, 10, 1917 (Malloch). Paratypes: Ashley, Ill., Aug. 7, 1917; White Heath, Ill., Aug. 8, 1915 (Malloch); Falls Church, Va., July 8, 9, Aug. 7-9, Sept. 29 (Banks).

This may be *relativa* Viereck, but it is not possible to decide without comparison of the types.

TIPHIA ROBERTSONI, sp. n.

Female.—Larger than *affinis*, resembling in most respects *punctata*, from which it differs in having the lower half of sides of metathorax very distinctly shagreened or cross-striated. The basal dorsal abdominal segment has a poorly defined post-marginal depression in which there are 1-3 series of deep punctures; the anterior declivitous portion of this segment is doubly punctate on a large portion of center of disc; and the pygidium is smooth on apical impunctate space, which is smaller than in *punctata*. For other characters see key.

Length, 10.5-11.5 mm.

Type locality, Carlinville, Ill., August (C. Robertson). Paratypes: Urbana, Ill., July 23, 1891, Sept. 9, 1892, and Aug. 30, 1914; Muncie, Ill., Sept. 7, 1912; Alto Pass, Ill., Aug. 12, 1891; and Falls Church, Va., Sept. 6 and 10 (Banks).

TIPHIA WINNEMANAE, sp. n.

Male.—Very closely related to *punctata*, but readily separated from it by the characters mentioned in the accompanying key. The tegulae in *punctata* usually have on the posterior margin a distinct incised line, but very rarely if ever in typical specimens is it carried forward along the outer margin. In those cases where such line occurs the much coarser and closer punctuation of the mesopleura should serve to separate the species.

Length, 7.5 mm.

Type locality, Plummers Island, Md., July 24 (N. Banks).

TIPHIA RETICULATA, sp. n.

Female.—Closely related to *punctata*, separable by the very distinctly shagreened ventral surface of thorax, even the posterior flap-like extension of the mesothorax being so distinctly reticulated as to appear almost subopaque. The clypeus is flat, rather broad and low, with a broad impunctate margin and a rounded central emargination. The pygidium is distinctly but not coarsely shagreened. Tarsal groove long and deep.

Length, 8.5 mm.

Type locality, Falls Church, Va., Sept. 29 (N. Banks).

TIPHIA FLORIDANA Robertson

I have examined the type series of this species. I can not distinguish very striking differences between this species and *waldeni* Viereck, and

consider that they may possibly be the same. The male sometimes has the tubercle absent from basal dorsal abdominal segment.

TIPHIA ILLINOENSIS Robertson

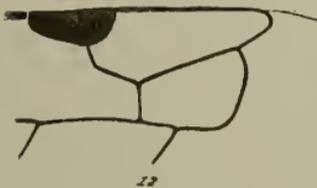
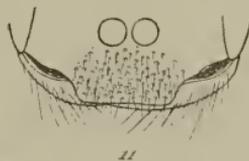
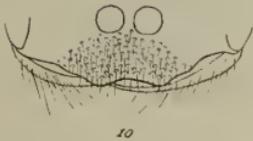
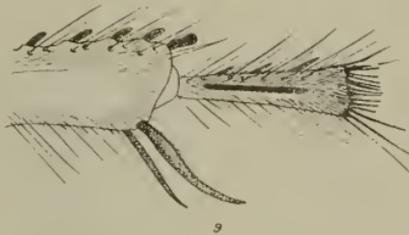
I have seen only the male of this species, which is distributed widely throughout Illinois. Robertson made no mention of the median transverse incision of first abdominal segment in his description, but the type specimen possesses this character, as also do several other specimens in the type series. Mixed with the type series were several specimens of *punctata*, the type of the latter being so much larger that they were not associated with it.

PLATE I

- Fig. 1. *Paratiphia algonquina*, hypopygium of male, dorsal view, with eighth ventral segment removed.
- Fig. 2. The same, ventral view.
- Fig. 3. The same, lateral view.
- Fig. 4. *Neotiphia acuta*, hypopygium of male, ventral view, with eighth ventral segment removed.
- Fig. 5. *Tiphia punctata*, hypopygium of male, ventral view, eighth ventral segment in position.
- Fig. 6. The same as Fig. 4, lateral view.
- Fig. 7. The same as Fig. 5, lateral view.
- Fig. 8. *Tiphia transversa*, hypopygium of male, ventral view, with eighth ventral segment removed.
- Fig. 9. *Tiphia punctata*, apex of tibia and basal joint of tarsus of hind leg, caudal view.
- Fig. 10. *Tiphia inornata*, clypeus of male.
- Fig. 11. *Tiphia clypeata*, same.
- Fig. 12. *Tiphia inaequalis*, marginal and submarginal cells of wing.
- Fig. 13. *Tiphia inornata*, same.

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PLATE I



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