

A REVISION OF THE INSECTS OF THE APHID GENUS AMPHOROPHORA

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This paper represents principally a systematic study of the aphid genus *Amphorophora* Buckton. There has also been included what is known of the biology of each species. The meager facts that are available indicate very forceably the need of rearing work in connection with any systematic study in this family of insects.

The genus was erected by Buckton in *British Aphides*¹ for a new species which he described on the same page. Since that time various other species have been added by other writers. Several authors have discussed the species common to their own State or country, but the species of this genus of the entire world have never been brought together in one paper. The present writer has attempted to do this here.

In this work I have had the use of all specimens in the United States National Museum and the Bureau of Entomology; the collection of the Maine Agricultural Experiment Station, loaned by Dr. Edith M. Patch; the Swain collection of Leland Stanford University, loaned by Prof. G. F. Ferris; a part of the Canadian collection loaned by William Ross; and the private collections of W. M. Davidson, Dr. Thomas Guyton, and Harold Morrison. Prof. J. J. Davis has kindly loaned certain slides from his collection and from the Monell collection. Prof. E. O. Essig has loaned specimens from the University of California. Prof. R. Takahashi sent Japanese material. The National collection contains metatype slides of certain of Van der Goot's species. Frederick Laing and Prof. F. V. Theobald have discussed through correspondence the European species and Professor Takahashi the Japanese and Formosan species. Prof. O. W. Oestlund has compared drawings sent to him with species discussed by him in his report of 1887.

Certain aphid workers who have visited Washington recently have examined some of the slides with the writer and expressed their opinions as to the identity of the species. These include Miss Patch and Messrs. Ross, Guyton, Davidson, and Potgieter.

¹ Vol. 1, 1876, p. 187.

Dr. A. C. Baker of this Bureau, under whose immediate direction the work has been done, has given many valuable suggestions and has helped in many ways. The writer also wishes to thank Dr. A. L. Quaintance for making it possible to undertake the work.

Genus AMPHOROPHORA

Amphorophora BUCKTON, British Aphides, vol. 1, 1876, p. 187.

Macrosiphum OESTLUND, Minn. Geol. Survey Rept., no. 14, 1886, p. 27.

Macrosiphum DEL GUERCIO, Nuove Rel. Staz. Firenze, ser. 1, 1900, no. 2, p. 159.

Nectarosiphon SCHOUTEDEN, Ann. Ent. Soc. Belg., ser. 5, vol. 45, 1901, p. 112.

Eunectarosiphon DEL GUERCIO, Redia, vol. 9, 1913, p. 188.

Rhopalosiphum VAN DER GOOT, Tijds. voor Ent., vol. 56, 1913, p. 146.

The above is copied from Baker's Generic Bulletin.² For a discussion of this synonymy see Baker's paper. The species *convolvuli* Kaltenbach, which he refers to *Amphorophora* in his discussion proves to be a *Myzus*, according to letters received by the writer from both Laing and Theobald.

I am of the opinion that Baker's characterization of the genus should be modified so as to exclude certain species in which the antennal tubercles are covered with small scales or imbrications. Tubercles of this type may be either converging or diverging. I am excluding these species from my conception of *Amphorophora* and leaving them for a future study.

The antennae are usually longer than the body, dark colored in the majority of the species, and imbricated. The sensoria are sub-circular and vary greatly in number in the different species, some having only a row on segment III, while other species have segments III, IV, and V thickly covered. The hairs are plainly capitate on some species. In other species they are indistinctly so, if at all. The hairs are sometimes nearly as long as the width of segment III, while in other species they are very minute.

The antennal tubercles are very prominent in most species, but occasionally are almost wanting on the outer side.

The beak usually reaches about to the second coxae, but may be longer.

The wing venation is normal. Some *Amphorophorus*-like species have a brownish tinge to the veins but most of these fall in the group with imbricated antennal tubercles, which I am excluding from the genus. A few species are dusky near the tip of the wing.

The legs are very long, the posterior ones being much longer than the length of the body.

The cornicles are long, much longer, as a rule, than the cauda. I have given considerable latitude to the amount of dilation, some

² U. S. Dept. Agr. Bull. 826, p. 54.

being very prominently swollen, others being very slender, but at the same time, plainly dilated. There is a distinct distal flange in all species. One group of species has the tip of the cornicles very conspicuously reticulated. Another group has no reticulations, but often two or more lines or imbrications. Certain species are intermediate between the reticulated and imbricated ones. Some have small scales or imbrications over most of the length of the cornicle, while in others these organs have an almost smooth surface.

The shape of the cauda varies from those that are strongly constricted to those that are conical. The number of hairs on the cauda differs in the different species, but, as a rule, there are 2 to 4 sets of lateral ones.

Tubercles are not conspicuous in the genus as a whole, but several species show prothoracic, lateral ones. A few species have them on the lateral margins of the abdominal segments. One species has two dorsal ones on the head and two on the dorsum of the prothorax.

Intermediates between the alate and apterous forms appear to be fairly common in the genus as I have seen them in three species, *nabali* Oestlund, *sensoriata* Mason, and *essigwanai*, new name.

The type of the genus is *Amphorophora ampullata* Buckton, which is described in British Aphides.³ It was taken on the fronds of *Cystopteris montana*. The type slide still exists in the British Museum and contains three apterous viviparous females. A very similar species was taken from ferns on the American continent, and drawings of it were sent to Frederick Laing for comparison. He says in private correspondence that in all of the type specimens of *ampullata* "the sensoria reach nearly the length of Segment III and number from 30-34." The species from this continent, he says, seems to be the same as one which he reared in England from a fern and the same as Van der Goot described as *ampullata* Buckton.⁴ I learn from correspondence with Professor Oestlund that his 1887 description of *ampullata* Buckton is of the same species. William's *ampullata* Buckton? (1910) is very probably the same, but I can not tell from his description, and his specimens seem to be lost. There is also in the National Collection the same form from Takahashi. It is probable that all references in literature to *ampullata* Buckton, except those cataloguing the original description, refer to this new form. Laing writes that he had given to this new form a provisional varietal name, but suggests that the writer fix the status as he thinks best. In view of the differences in the number and position of the sensoria on Segment III of the apterous viviparous female, it is my opinion that it is entitled to standing as a distinct species, and it is described in this paper as *A. laingi*, new species. *A. ampullata* Buckton, therefore, at present is known only from the type slide.

³ Vol. 1, p. 187.

⁴ Beit. Z. Kennt. der Holland, Blattläuse (1911).

The genus *Amphorophora* seems to be world-wide in its distribution. From data at hand various species of the genus are found in North America, South America, Europe, Africa, India, and Japan.

Certain groups of plants are favored as hosts. The genus *Rubus* has eight of the species discussed in this paper. *Ribes* has four species. In the family Ericaceae the genus *Vaccinium* has one, *Gaultheria* one, *Epigaea* one, *Azalea* one, and *Rhododendron* two species. The family Compositae is host to five species. This family is known to be the summer host of one of these five and will probably prove to be the same for the others. The Coniferae furnish hosts for one species in this country and one in England.

There are practically no data on the alternation of hosts in this genus. Only one, and probably two species are known to have alternate hosts. Some of the others seem to live on the same plants throughout the year.

Very little can be said on the origin and phylogeny of the group, as the species are too imperfectly known at present. I am not in a position to say where the genus originated or on what plant. In fact, I can not be absolutely certain that I am dealing with a phyllogenetic group. It seems probable that those species on a certain host group originated from a common ancestor, as they seem to be rather closely related.

In the group of forms mentioned as living on Compositae there are several very closely related ones. These include *cosmopolitana* (*lactucae* Kalténbach), *carduellinum* Theobald, *oleraceae* v. d. Goot, *formosana* Takahashi, *sonchifoliae* Takahashi. There are also some other specimens in the National Collection which could be described as new species with about as much difference as is given for most of the species mentioned, but I hesitate to do this until more is known of them. This group is so closely related that it is often difficult to place an individual specimen. There should be extensive rearings to settle definitely the number of species concerned. Until this is done I am retaining as valid species those which have been described, with the exception of *sonchifoliae* Takahashi. He admits that it is very near *oleraceae* v. d. Goot, but his differences do not hold when checked against metatype specimens.

Certain species which have been placed in this genus by various writers are not included here, since they belong to the group mentioned as having imbricated antennal tubercles. These include *rhinanthi* Schouteden, *subterrans* Wilson, *magnoliae* Essig and Kuwana, *lonicericola* Takahashi, and *hydrangeae* Matsumura.

Other species properly belonging to *Megoura* have been placed in *Amphorophora* at times and there is some evidence for considering *Megoura* as a synonym of *Amphorophora*. However, I have decided to retain it as a valid genus, separating the two on the shape of the

cornicles. In *Megoura* they are practically the same thickness from the base to the center, after which they narrow to the flange. This often gives the center the appearance of a slight bulge. In *Amphorophora* the cornicle narrows considerably between the base and the swollen central portion, giving an actual, conspicuous dilation.

In the tables of measurements the first line for each specimen refers to the left side, such as left antenna or left cornicle.

When a species is described from one specimen only, this specimen is designated as the type.

When a species is described from several specimens, all from the same colony, these specimens are designated as cotypes, and there is no type.

When a species is described from several specimens taken from different colonies, either in the same or different localities, the specimens from one colony are designated as cotypes, those from the other colonies as paracotypes.

The following keys will help to separate the species. It has been necessary to omit *betae* from the keys as no specimens were available for study and the published description does not give sufficient details.

KEY TO ALATE VIVIPAROUS FEMALES⁵

- | | |
|---|----------------------------------|
| 1. Cornicles distinctly reticulated..... | 2 |
| Cornicles not reticulated, often imbricated at tip..... | 15 |
| 2. Cornicles shorter than segment III of antennae..... | 3 |
| Cornicles equal to or longer than segment III..... | 11 |
| 3. Segment III of antennae light colored..... | <i>corylina</i> (Davidson). |
| Segment III of antennae dark colored..... | 4 |
| 4. Segment IV longer than V..... | 5 |
| Segment IV shorter than V..... | 10 |
| 5. Cornicles not longer than width of head through eyes..... | 6 |
| Cornicles considerably longer than width of head through eyes..... | 8 |
| 6. Segment IV with sensoria..... | <i>brittenii</i> (Theobald). |
| Segment IV without sensoria..... | 7 |
| 7. Cauda with about six lateral hairs. Cornicles very broad. | |
| Cauda with about two lateral hairs. Cornicles more slender (On <i>Aconitum</i>)..... | <i>essigwanai</i> , new name. |
| Cauda with about two lateral hairs. Cornicles more slender (On <i>Aconitum</i>)..... | <i>aconiti</i> (v. d. Goot). |
| 8. III with a row of about 16 sensoria..... | <i>vaccinii</i> , new species. |
| Antennae with numerous sensoria..... | 9 |
| 9. V with 14-15 sensoria..... | <i>hayhursti</i> , new species. |
| V with 5-10 sensoria..... | <i>mitchelli</i> , new species. |
| 10. Smallest diameter of cornicle one-half of widest diameter (On <i>Spiraea</i>). | |
| Smallest diameter of cornicle one-half of widest diameter (On <i>Spiraea</i>)..... | <i>spiraecola</i> (Patch). |
| Smallest diameter of cornicle two-thirds of widest diameter (On <i>Rubus</i>)..... | <i>reticulata</i> , new species. |
| 11. IV with sensoria..... | <i>brittenii</i> (Theobald). |
| IV without sensoria..... | 12 |

⁵ Roman numerals refer to the number of the segment of the antenna, as segment III.

12. III with 9-11 sensoria in a row (On <i>Cupressus</i>).....	<i>morrisoni</i> (Swain).	13
III with 13-45 sensoria (On <i>Rubus</i>).....		
13. Antennae light colored.....	<i>maxima</i> , new species.	14
Antennae dark colored.....		
14. III with 20-30 sensoria and noticeably shorter than cornicle. Distinct dusky spot on tip of wing.....	<i>rubicola</i> (Oestlund).	
III with 34-42 sensoria and subequal with cornicle, tip of wing with a faint dusky border.....	<i>davidsoni</i> , new species.	
15. Cornicles slightly longer than segment III.....	<i>nervata</i> (Gillette).	16
Cornicles not longer than III.....		
16. Cornicles distinctly shorter than IV.....		17
Cornicles not shorter than IV.....		22
17. IV without sensoria.....		20
IV with sensoria.....		18
18. V with 0-3 sensoria (On <i>Rubus</i>).....	<i>sensoriata</i> Mason.	
V with 5-8 sensoria.....		19
19. Hairs on antennae capitate and about as long as width of segments	<i>pergandei</i> , new species.	
Hairs inconspicuous, shorter than width of segment.....	<i>carduellina</i> (Theobald).	
20. Cornicles considerably swollen (On Ferns).....	<i>laingi</i> , new species.	
Cornicles slender, less swollen.....		21
21. III with 21-31 sensoria.....	<i>vagans</i> (v. d. Goot).	
III with 30-50 sensoria (On <i>Rubus</i>).....	<i>rubi</i> (Kaltenbach).	
22. Cornicles longer than width of head through eyes.....		23
Cornicles equal to or shorter than width of head through eyes.....		27
23. Antennae very tuberculate.....		24
Sensoria in a straight row.....		25
24. Cornicles three times base of VI.....	<i>braggi</i> , new species.	
Cornicles more than four times base of VI.....	<i>nabali</i> (Oestlund).	
25. With sensoria on IV and V.....	<i>minima</i> , new species.	
Without sensoria on IV and V.....		26
26. Cauda with about 4 lateral hairs.....	<i>cicutae</i> Shinji.	
Cauda with 2 lateral hairs.....	<i>nervata</i> (Gillette).	
27. III with 6-8 sensoria.....	<i>solani</i> (Thomas).	
Antennae tuberculate.....		28
28. IV with about 27 sensoria. V with 12 sensoria....	<i>oleraceae</i> (v. d. Goot).	
IV with 9-19 sensoria. V with 1-7 sensoria....	<i>cosmopolitana</i> , new name.	

KEY TO APTEROUS VIVIPAROUS FEMALES

1. Cornicles distinctly reticulated.....	2
Cornicles not reticulated, often imbricated at tip.....	13
2. Cornicles much shorter than segment III.....	3
Cornicles not shorter than III.....	5
3. III with about 25 sensoria over nearly entire length....	<i>aconiti</i> (v. d. Goot).
III with less sensoria.....	4
4. III with 2-3 sensoria near base. Cauda with 2 lateral hairs.	<i>pallida</i> , new species.
III with 6-8 sensoria.....	<i>essigwanai</i> , new name.
5. Cornicles much longer than III.....	6
Cornicles subequal with III.....	8
6. III with 13-15 sensoria.....	<i>rubicola</i> (Oestlund).
III with 1-6 small sensoria.....	7
7. Cauda as broad as antennal tubercles.....	<i>morrisoni</i> (Swain).
Cauda not as broad as antennal tubercles....	<i>rhododendronia</i> , new species.

Alate viviparous female.—The antennal segments are as follows:

III	Sensoria on III	IV	V	VI
1.264 mm. 1.280 mm.	49 50	0.688 mm. 0.688 mm.	0.608 mm. 0.560 mm.	8+(?) mm. -----

The sensoria of segment III are tuberculate and evenly distributed throughout nearly the entire length. Other segments without secondary sensoria. VI with a group of six small sensoria adjacent to the larger one. IV and V faintly imbricated, V more distinctly so toward the tip. I slightly gibbous on inner side. Head 0.608 mm. wide through the eyes. Antennal tubercles fairly prominent. Beak reaching nearly to second coxae. Cornicles 0.624 mm. long, distinctly reticulate for a distance of 0.16 mm.; largest diameter, 0.088 mm.; smallest diameter, 0.064 mm.; flange, 0.08 mm. The cauda is twisted in our specimen, but Van der Goot states that it is of the same length as the cornicles. There appears to be two sets of lateral hairs. Spiracles and hairs of abdomen as shown in figure 172.

Apterous viviparous female.—The only specimen we have is in very poor condition. The single antenna present is slightly longer than the body, the segments being as follows:

III	IV	V	VI
1.184 mm.	0.624 mm.	0.56 mm.	0.128+(0.8+)

The third segment has about 25 sensoria scattered over nearly the entire length. The head is 0.608 mm. wide through the eyes. The antennal tubercles are distinct.

The beak reaches almost to the third coxae. The one cornicle which is present is 0.64 mm. long, being distinctly reticulated for a distance of 0.128 mm.; widest diameter, 0.096 mm.; narrowest diameter, 0.064 mm.; flange, 0.08 mm. Theobald says they are variable in form, some being almost cylindrical. The cauda is twisted; Van der Goot says that it is of the same length as the cornicles. His figure shows it to be broad and not constricted.

Host.—*Aconitum napellus*.

Distribution.—Holland, Bergedorf near Hamburg, Germany (determinations verified by Van der Goot), and Yorkshire, England.

Metatype.—Deposited in the U. S. National Museum.

AMPHOROPHORA ALNI, new species

Figs. 1-3

Apterous viviparous female.—Antennae longer than body, slender; hairs shorter than width of segments, one to three small sensoria near base of III, antennal measurements as follows:

No.	III	Sensoria on III	IV	V	VI
1-----	0. 896 0. 864	3 3	0. 736 0. 752	0. 720 0. 688	0. 192+1. 088 0. 192+1. 088
2-----	0. 768 0. 720	1 2	0. 672 0. 640	0. 656 0. 640	0. 160+0. 992 0. 192+1. 072
3-----	0. 832 0. 832	1 1	0. 720 0. 688	0. 656 0. 656	0. 192+1. 072 0. 176+ (?)

Antennal tubercles large and prominent. Capitulate hairs present on vertex and on basal antennal segments. Beak reaching third coxae. Cauda long, broad, not constricted, with two sets of lateral hairs. Cornicles very long, moderately swollen on distal half, distinctly reticulate at tip.

No.	Head	Cauda	Cornicles				
			Length	Reticulated	Wide X	Small X	Flange
1----	0. 496	0. 368	0. 864 0. 864	0. 064 0. 064	0. 104 0. 096	0. 048 0. 048	0. 064 0. 072
2----	0. 480	0. 352	0. 800 0. 800	0. 080 0. 064	0. 096 0. 088	0. 048 0. 048	0. 064 0. 064
3----	0. 496	0. 368	0. 880 0. 880	0. 096 0. 080	0. 112 0. 112	0. 048 0. 048	0. 064 0. 064

Last Instar Apterous Nymph

Head	III	IV	V	VI	Cornicles	
					Length	Width
0. 384	0. 528	0. 496	0. 512	0. 16+0. 928	0. 640	0. 112
	0. 512	0. 528	0. 512	0. 16+0. 960	0. 640	0. 080
0. 352	0. 544	0. 480	0. 512	0. 16+0. 928	0. 640	0. 064
	0. 560	0. 512	0. 480	0. 16+0. 896	0. 576	0. 112

Described from specimens submitted by Miss Patch, taken at Orono, Me., on *Alnus incana*, August 7, 1916 (Maine No. 127-16). Three apterous viviparous females and several nymphs. No alates.

One apterous viviparous female was also taken at Orono on *Alnus incana* on June 26, 1909 (Maine No. 45-09), and one in 1904 (Maine No. 48-04 Sub. A).

Cotypes.—Deposited in the U. S. National Museum, Cat. No. 26370. Paracotypes in the Maine Agricultural Experiment Station.

AMPHOROPHORA AMPULLATA Buckton

Amphorophora ampullata BUCKTON, Brit. Aph., vol. 1, 1876, p. 187.—LICHTENSTEIN, Les. Puc. Aph., 1885, p. 19.—KIRKALDY, Can. Ent., vol. 37, 1905, p. 415.—WILSON, Ann. Ent. Soc. Amer., vol. 3, 1910, p. 320.—PATCH, Maine Agr. Exp. Sta. Bull. 202, 1912, p. 180.—WILSON and VICKERY, Trans. Wis. Acad. Sci. Arts and Letters, vol. 19, pt. 1, 1918, p. 33.

This is the type species of the genus. The type slide (bearing three apterous viviparous females) exists in the British Museum. Frederick Laing writes that segment III of these specimens have from 30-34 sensoria, reaching nearly the length of the segment. Drawings kindly loaned by him show the hairs of III to be less than half the width of the segment and capitate. The cornicle is shown to be about three-fifths as long as III, moderately slender, conspicuously swollen, and with no reticulations or imbrications.

As explained on page 3, this species is known only from the type slide.

AMPHOROPHORA AMURENSIS Mordvilko

Acyrtosiphon (Amphorophora) rubi amurense MORDVILKO, Fauna de la Russie, vol. 1, liv. 2, 1919, p. 267.

Mordvilko described this form as a subspecies of *rubi* Kalténbach. I have not seen it, but judging from his description it is a good species. It may be separated from its near relatives by the characters given in the key on page 54. I quote herewith a translation of Mordvilko by A. J. Bruman.

Apterous viviparous female.—Body spindle shaped. Depth of frontal furrow is two-sevenths to one-third the distance between the bases of the antennae. Antennal tubercles quite convex. The projection of the vertex is distinct. Antennae only slightly longer than the body (one and one-twenty-fifth to one and one-fourteenth times). The third segment is one and one-fourth to one and one-third times longer than the fourth, and the fourth nearly that many times longer than the fifth. The base of the sixth segment is one-sixth to two-thirteenths the length of the third, and the tip of the sixth is only very slightly less than the length of the third segment (for instance eleventh-twelfths of that length). The capitate hairs on the third segment reach four-fifths to three-fifths the diameter of the proximal part of the segment. Near the base this segment has 6-12 secondary sensoria. The cornicles reach two-ninths to one-fourth the length of the body. At a distance of one-third from the end they are swollen. From here toward the base they first become narrow and then at the very base they widen considerably. In front of the flange there is another slight (hardly noticeable) swelling. No sculpture is seen on the walls of the cornicles. The cauda is two to two and one-half times shorter than the cor-

nicles, elongated—triangular, at times with a weak constriction at some distance from the base. On each side there are usually four bristly hairs, at times on one side only three hairs. Size of body, 3.25–1.23 mm.; 4.21–1.44 mm. Color green or light green (may be inclined toward light brick or light reddish). Antennae dark, brownish with the exception of the base of the third segment which is somewhat lighter. The cornicles are dark tawny, darker toward the end (almost black) and lighter toward the base. The ends of the femora are dark; the ends of the tibiae and tarsi are brown. Eyes reddish brown. The color of the extremities is generally darker than in the other subspecies of *rubi* Kalténbach.

Measurements of two specimens.—4.14–1.44: Frontal furrow, 0.07; between the base of the antennae, 0.26; mouth of furrow, 0.19; width of furrow at the middle of its depth, 0.15, at base, 0.10; central vertex projection, 0.011; hairs on each side, 0.060; antennae, 4.49; with the following lengths of segments: 0.17, 0.10, 1.23, 0.98 (0.96), 0.75 (0.73), 0.19 (0.20)+1.07 (1.09). Hairs on third segment up to 0.040; diameter of the proximal part of the segment, 0.053. Sensoria, 10 (6). Cornicles, 1.02; their thickness 0.12 (base), 0.066 (0.38 from base), 0.11 (0.32 from end), 0.53 (0.05 from end), 0.060 (0.03 from end), 0.056 (in front of flange), 0.066 (flange). Cauda, 0.43; its thickness 0.20 (base), 0.14 (0.24 from end); on each side 3–4 bristly hairs. Posterior femora, 1.53; tibia, 2.74; tarsi, 0.14 (0.04:0.12), claws, 0.046, hairs on tibia, 0.029–0.063; diameter of proximal part of tibia, 0.066.

4.03–1.44: Frontal furrow, 0.08; between basis of antennae, 0.26; mouth of furrow, 0.15; width of furrow at the middle of its length, 0.12, at base, 0.08. Projection of vertex, 0.010; hairs on its side, 0.056. Antennae, 4.39; with the following lengths of segments: 0.17, 0.10, 1.21 (1.16), 0.93 (0.94), 0.73, 0.19+1.06. Hairs on the third segment, 0.027–0.035, diameter of the proximal part of the segment, 0.054. Sensoria near the base of this segment, 9 (12). Cornicles, 0.90; their thickness, 0.12 (base), 0.073 (0.27 from base), 0.11 (0.26 from end), 0.055 (0.04 from end), 0.056 (0.02 from end), 0.053 (in front of flange), 0.073 (flange). Cauda, 0.45; its thickness 0.21 (base), 0.15 (0.32 from end), 0.16 (0.29 from end), 0.15 (0.20 from end); on each side of the cauda are four bristly hairs. Posterior femora, 1.57; tibia, 3.08; tarsus, 0.14 (0.04, 0.11); claws 0.043, hairs on tibia, 0.040–0.060; diameter of proximal part of tibia, 0.073.

This form differs from the European (*rubi* Kalténbach) in the darker coloration of the antennae, legs, and cornicles, frequently by a more constant small, hardly noticeable swelling of the cornicles in front of the flange and by the lesser number of hairs on the sides of the cauda (in the specimens which I examined there were not more than four on each side). Apparently the North American *Microsiphum rubicola* Oestlund, at least by its dark coloration of the antennae and cornicles stands closest of all to *Ac. rubi amurense*.

Distribution.—The subspecies is known so far only from the shores of the lower Amur.

Habits.—These aphids were collected from the ends of shoots and from the under side of the leaves of raspberry. Their life habits are apparently similar to those of *Ac. rubi rubi*.

AMPHOROPHORA AZALEAE, new species

Apterous viviparous female.—Body light colored. Antennae about one and one-half times as long as body, dark; the tips of the segments and all of segment VI darker; hairs very small and inconspicuous; III, with 2–3 sensoria near base. Antennal tubercles

prominent. Spines on head small. Cornicles dark colored, long and slender, slightly swollen, the tips distinctly reticulated. Cauda light colored, broad, and conical, not constricted, with three sets of rather small lateral hairs. Measurements as follows:

III	Sensoria on III	IV	V	VI		
0. 688	3	0. 464	0. 480	0. 144+0. 368+		
0. 672	2	0. 464	0. 512	0. 144+0. 496		
Head	Cauda	Cornicle				
		Length	Reticulated	Wide X	Small X	Flange
0. 415	0. 288	0. 672	0. 048	0. 064	0. 040	0. 048
		0. 672	0. 048	0. 064	0. 040	0. 048

Described from one adult apterous viviparous female and several alate and apterous nymphs taken on *Azalea indica* in a nursery at Glen St. Mary, Fla., February 23, 1924, by W. T. Owrey.

Host.—*Azalea indica*.

Distribution.—Florida.

Cotypes.—Deposited in U. S. National Museum. Cat. No. 26945.

AMPHOROPHORA BETAЕ (Theobald)

Rhopalosiphum betae THEOBALD, Journ. Bd. Agr., vol. 19, no. 11, 1913, p. 918.

Macrosiphum betae (Theobald) WILSON and VICKERY, Trans. Wis. Acad. Sci. Arts and Letters, vol. 19, pt. 1, 1918, p. 42.

I have not seen this species. Judging from Theobald's figures it probably should be included in this genus.

Host plants.—Beets and mangolds.

Distribution.—England.

AMPHOROPHORA BOREALIS, new species

Figs. 109-111

Received from Dr. Edith M. Patch one slide bearing a single adult apterous viviparous female and several very small nymphs (Maine No. 101-18), taken on checkerberry at Orono, Me., June 26, 1918. Doctor Patch had given this species the manuscript name of *borealis*, but gave the writer the privilege of describing it in this paper. Her manuscript name is adopted.

Apterous viviparous female.—Antennae slightly longer than body, basal segments nearly concolorous with body, distal segments darker, III with a single sensorium near base, hairs inconspicuous, shorter than width of segment. Antennal tubercles large and heavy. Beak reaching beyond second coxae. No prothoracic or

abdominal tubercles showing. Cornicles dark colored, long, distinctly swollen, tip plainly reticulated, remainder imbricated. Cauda long and broad, distinctly constricted at base; three sets of lateral hairs. Measurements as follows:

III		IV		V		VI	
0. 576 0. 560		0. 416 0. 416		0. 448 0. 448		0. 144+0. 752 0. 144+0. 792	
Head	Cauda	Cornicles					
		Length	Reticulated	Wide X	Small X	Flange	
0. 400	0. 272	0. 560	0. 064	0. 072	0. 032	0. 048	
		0. 576	0. 064	0. 080	0. 032	0. 048	

Host.—Checkerberry.

Locality.—Orono, Maine.

Cotypes.—Returned to Maine Agricultural Experiment Station.

AMPHOROPHORA BRAGGI, new species

Figs. 4-6

Alate viviparous female.—Antennae slightly longer than body, dark colored, very tuberculate, hairs as long as or longer than width of segment, not plainly capitate. Antennal tubercles rather small. Beak not reaching second coxae. No prothoracic or abdominal tubercles. Abdomen light colored, without lateral dark patches, as in *cosmopolitana*. Cornicles very dark, lighter at base, short, strongly swollen, reticulated but not showing plainly on the black background. Cauda short, strongly constricted, one set of lateral hairs before constriction and three sets beyond constriction. Legs very dark, except bases of femora.

III		IV		V		VI	
Sensoria on III		Sensoria on IV		Sensoria on V			
1. 072		0. 528		0. 480		3	
1. 072		0. 560		0. 496		5	
						0. 112+(0. 784+)	
						0. 112+(0. 768+)	
Head	Cauda	Cornicle					
		Length	Wide X	Small X	Flange		
0. 560	0. 336	0. 592	0. 136	0. 048	0. 064		
		0. 608	0. 136	0. 048	0. 064		

Described from a single alate viviparous female taken by L. C. Bragg on lettuce at Marblehead, Mass., October 4, 1920.

This species can be distinguished from *cosmopolitana* on lettuce, by its larger size, more numerous sensoria, darker legs, and by its lighter colored abdomen without lateral dark patches.

Type.—Deposited in the U. S. National Museum. Cat. No. 26371.

AMPHOROPHORA BRITTENII (Theobald)

Figs. 7-9 and 62-66

Rhopalosiphum brittenii THEOBALD, Journ. Econ. Biol., vol. 7, 1912, p. 107.—PATCH, Maine Agr. Exp. Sta. Bull. 225, 1914, p. 68.—WILSON and VICKERY, Trans. Wis. Acad. Sci. Arts and Letters, vol. 19, pt. 1, 1918, p. 46.—JACKSON, The Scot. Natur., 1917, p. 85; 1919, p. 158.

I have not seen this species. The alate and apterous viviparous females are described by Theobald. Miss Jackson (1919) gives a description of the oviparous female.

Host plants.—Red and black currants and gooseberries.

Distribution.—England, Scotland, Ireland, and Wales.

Cotypes.—Deposited in Theobald's collection.

AMPHOROPHORA CARDUELLINA (Theobald)

Figs. 45-48 and 67-69

Rhopalosiphum carduellinum THEOBALD, Bull. Ent. Res., vol. 6, 1915, p. 113.—WILSON and VICKERY, Trans. Wis. Acad. Sci. Arts and Letters, vol. 19, pt. 1, p. 49.—THEOBALD, Bull. Ent. Res., vol. 11, 1920, p. 67.

In Theobald's first paper he described the alate form of this species and also described an apterous form. In his second paper he gave another description of an apterous form, stating that his first description referred to another species. Dr. J. T. Potgieter has shown the writer specimens from South Africa which he considers to be this species. The apterous form seems to agree more nearly with the second description of Theobald than with the first one. Doctor Potgieter's specimens however have sensoria on segment V of the antennae. These specimens will be fully described in Doctor Potgieter's forthcoming paper on South African Aphididae.

The chief difference between this species and *cosmopolitana* seems to be in the presence of sensoria on segment IV and V of the apterous form. In a large series of *cosmopolitana* which I have examined there are sensoria only on segment III. The range of sensoria on segment III of *corduellina* seems to be somewhat greater while in the alate form the range on segment III seems to be somewhat less than in *cosmopolitana*.

The cotype specimens were taken on *Carduus* species in Transvaal in 1914. Those belonging to Doctor Potgieter were taken on *Sonchus* species.

Theobald says in his 1915 paper that the cotypes are deposited in his collection. In his second description of the apterous form (1920) he writes that the cotypes are in the British Museum.

AMPHOROPHORA CICUTAE Shinji

Figs. 80-84

Amphorophora cicutae SHINJI, Can. Ent., vol. 49, 1917, p. 51.

The type of this species was loaned to Dr. A. C. Baker, of this bureau, who made the following manuscript description:

"III, 0.8 mm.; IV, 0.736 mm.; V, 0.56 mm.; VI (0.144 mm. + 1.04 mm.).

"The sensoria (15) form an even row along the segment. They are moderate in size; cornicles, 0.736 mm.; flange, 0.08 mm., narrowest diameter, 0.048 mm.; widest, 0.096 mm.; cauda, 0.32 mm., the extremity extending about to the tip of the cornicles, which have no reticulations at tip but a few transverse imbrications."

This is somewhat different from Shinji's description.

The present location of the type is not known. Essig says in a letter that it must have been taken by Shinji when he left the University of California. No other records of the species have been made.

Host.—*Cicuta virosa*, var. *californica*.

Locality.—University of California campus, Berkeley, Calif.

Date of collection.—April 20, 1915.

AMPHOROPHORA CORYLINA (Davidson)

Figs. 98-100

Rhopalosiphum corylinum DAVIDSON, Journ. Econ. Ent., vol. 7, 1914, p. 134.—WILSON and VICKERY, Trans. Wis. Acad. Sci. Arts and Letters, vol. 19, pt. 1, 1918, p. 63.—SWAIN, Univ. Cal. Publ. Tech. Bulls., vol. 3, No. 1, 1919, p. 81.

The following description is from specimens on the type slide.

Alate viviparous female.—Antennae longer than body, slender, faintly imbricated, hairs shorter than width of segments. Antennal measurements as follows:

III	Sensoria on III	IV	V	VI
0. 800 mm.	20	0. 448 mm.	0. 496 mm.	0. 144+0. 832 mm.
0. 752 mm.	24	0. 448 mm.	0. 464 mm.	0. 144+0. 864 mm.
0. 688 mm.	22	0. 448 mm.	0. 448 mm.	0. 160+0. 792 mm.
0. 672 mm.	20	0. 432 mm.	0. 448 mm.	0. 144+0. 768 mm.

Antennal tubercles prominent. Width of head through eyes, 0.464 mm. Beak reaching second coxae. Cornicles, 0.56 mm. long; reticulate for 0.08 mm.; imbricated; widest diameter 0.064 mm., smallest diameter 0.048 mm.; flange, 0.064 mm.; cauda 0.208 mm. long, conical not constricted, three sets of lateral hairs.

Pupa, alate viviparous female.—Antennal measurements:

III	IV	V	VI
0. 496 mm.	0. 288 mm.	0. 352 mm.	0. 112+0. 704 mm.
0. 448 mm.	0. 304 mm.	0. 336 mm.	0. 128+0. 688 mm.
0. 512 mm.	0. 320 mm.	0. 368 mm.	0. 112+0. 768 mm.
0. 480 mm.	0. 320 mm.	0. 384 mm.	0. 112+0. 768 mm.

Cornicles 0.496 mm. long, flanged, slightly swollen.

This species was first recorded from *Corylus*. Davidson recently told me that he doubts if *Corylus* is an important food plant, it being much more common on ninebark.

Host plants.—*Corylus rostrata*, *Physocarpus capitatus*.

Distribution.—California.

Cotypes.—Deposited in U. S. National Museum. Cat. No. 26854.

AMPHOROPHORA COSMOPOLITANA *new name*

Figs. 14-26 and 33-44

Aphis lactucae KALTENBACH, Monogr. der Familien der Pflanzenlause, 1843, p. 37.

Aphis lactucae (Linnaeus) WALKER, Ann. Nat. Hist., ser. 2, vol. 2, 1849, p. 49.

Rhopalosiphum ribis (Linnaeus), KOCH, Die Pflanzenlause Aphiden, 1854, p. 39.—BUCKTON, British Aphides, vol. 2, 1879, p. 9.—LOWE, Geneva Agr. Exp. Sta. Bull. 139, 1897, p. 663.—VAN DER GOOT, Beit. zur Kennt. der Hollandischen Blattlause, 1915, p. 146.

Rhopalosiphum lactucae (Kaltenbach) PASSERINI, Aphididae Italiae, 1863, p. 20.—WALKER, The Zoologist, ser. 2, no. 53, 1870, p. 1997.—FERRARI, Ann. del Mus. Civ. di Stor. Natur. di Genova, vol. 2, 1872, p. 60.—BUCKTON, British Aphides, vol. 2, 1879, p. 10.—MACCHIATI, Bull. della Soc. Entom. Ital., vol. 14, 1892, p. 244.—SANDERSON, Canad. Ent., vol. 33, 1901, p. 70.—SCHOUTEDEN, Mem. de la Soc. Entom. de Belg., vol. 12, 1906, p. 236.—DAVIDSON, Journ. Econ. Ent., 1910, p. 377.—ESSIG, Pomona Journ. Ent., vol. 3, 1911, p. 463.—THEOBALD, Journ. Econ. Biol., vol. 7, 1912, p. 105.—PATCH, Maine Agr. Exp. Sta. Bull. 225, 1914, p. 53.—MORDVILKO, Fauna de la Russie, livr. 2, 1914, pp. 51, 58.—GILLETTE and BRAGG, Journ. Econ. Ent., vol. 8, 1915, p. 100.—DOBROV-KIANSKY, A List of Aphids Found on Cultivated Plants in the Government of Kharkov, Bull. on Pests of Agr. Khorkov, 1916.—TULLGREN, Meddelande fran Centrolanstalten for Jorsbrukforsk, Entomologiska andelmingen, no. 27, 1916, p. 104.—THEOBALD, Fruit, Flower and Vegetable Trades Journ. London, Oct. 13, 1917.—ESSIG, Univ. Cal. Pub. Ent., vol. 1, no. 7, 1917, p. 331.—QUAINTANCE and BAKER, U. S. Dept.

- Agr. Farm. Bull. 804, 1918, p. 28.—DAS, Mem. Indian Mus., vol. 6, no. 4, 1918, pp. 165, 273.—HAVILAND, Ent. Month. Mag., 1918, p. 201.—DAVIDSON, Journ. Econ. Ent., vol. 11, no. 3, 1918, p. 289.—ESSIG and KUWANA, Proc. Cal. Acad. Sci., vol. 8, no. 3, 1918, p. 35.—WILSON and VICKERY, Trans. Wis. Acad. Sci. Arts and Letters, vol. 19, pt. 1, 1918, pp. 49, 97.—JACKSON, Scott. Nat., 1918, p. 85; 1919, p. 159.—SWAIN, Univ. Cal. Pub. Tech. Bull., vol. 3, no. 1, 1919, p. 82.—TAKAHASHI, Rev. Formosa Agr. no. 182, 1921, p. 63.—DEL GUERCIO, Redia, vol. 14, 1921, p. 109.
- Siphonophora lactucae* (Linnaeus) THOMAS, 8th Rept., Ill. State Ent., 1879, p. 60.
- Nectarophora lactucae* (Kaltenbach) OESTLUND, Minn. Geol. and Nat. Hist. Surv. Bull. 4, 1887, pp. 85, 91.—HUNTER, Iowa Agr. Exp. Sta. Bull. 60, 1901, p. 115.
- Siphonophora lactucae* (Kaltenbach) WILLIAMS, Univ. Nebr. Spec. Bull. 1, 1891, p. 16.—SCHOUTEDEN, Ann. de la Soc. Entom. Belg., vol. 44, 1900, pp. 115-119.
- Macrosiphum lactucae* (Kaltenbach) SANBORN, Kans. Univ. Sci. Bull., vol. 3, no. 8, 1906, p. 240.
- Macrosiphum lactucae* Schrank? DAVIS, Bull. Ill. St. Lab. Nat. Hist., vol. 10, 1913, p. 109.
- Amphorophora lactucae* (Kaltenbach) QUAINANCE and BAKER, U. S. Dept. Agr. Farm. Bull. 1128, 1920, p. 30.—BLANCHARD, Physis, vol. 5, no. 20, 1922, p. 207.—PATCH, Conn. State Geol. and Nat. Hist. Surv. Bull. no. 34, 1923, p. 301.

The synonymy of this species is somewhat involved but is explained as follows:

Aphis ribis Linnaeus, based on Linnaeus's description in Fauna Sueca refers to Réaumur (vol. 3, pl. 22, figs. 7-10) incorrectly, as the plant there shown is mountain maple and not *Ribis*. It should refer to plate 24, figure 4, which is a gooseberry leaf with characteristic pseudogalls. This, then, is *Myzus ribis* (Linnaeus).

Aphis lactucae Linnaeus cites only Réaumur (pl. 22 figs. 3-5). Réaumur described two forms, a green and a bronze one, which are evidently a *Macrosiphum*, being, as Réaumur says, like the rose species. Müller in his translation of Linnaeus, 1774, also indicates a *Macrosiphum*. Müller also says that Linnaeus considers Réaumur's lettuce as cultivated lettuce, whereas Réaumur had in mind wild lettuce. Kaltenbach refers to this also. This is immaterial, however, since both the *Macrosiphum* and the *Amphorophora* live on both wild and cultivated lettuce.

Aphis lactucae Kaltenbach is based on Kaltenbach's description, but he also cites Réaumur (pl. 22, figs. 3-5), as did Linnaeus. Since Linnaeus' species is different from Kaltenbach's and since Linnaeus based his species entirely on Réaumur, Kaltenbach erred in citing Réaumur. He should also have used another name, since *lactuæ* was preoccupied by Linnaeus.

Most of the older writers cite Réaumur and Linnaeus and give no descriptions of their own. Walker seems to have confused the

Amphorophora and the *Macrosiphum* as Passerini and Sanderson have pointed out. He described two or more species with both swollen and slender cornicles as varieties, calling the species *Aphis lactucae* Linnaeus and cited both Linnaeus and Kaltenbach.

Koch under the name of *Rhopalosiphum ribis* Linnaeus seems to confuse two species on *Ribis*, describing and figuring one with swollen cornicles and also speaking of the pseudogalls of *Myzus ribis* Linnaeus.

Buckton follows Koch in calling the winter form *Rhopalosiphum ribis* Linnaeus but figures the typical pseudogalls of *Myzus ribis* Linnaeus. He calls the summer form *Rhopalosiphum lactucae* Kaltenbach.

Van der Goot refers the species to *Rhopalosiphum ribis* Linnaeus. Both he and Buckton also have *Myzus ribis* Linnaeus.

Three names have then been applied to this species—*ribis* Linnaeus, *lactucae* Linnaeus, and *lactucae* Kaltenbach. *Aphis ribis* Linnaeus is accepted to be *Myzus ribis* Linnaeus. *Aphis lactucae* Linnaeus is a *Macrosiphum*. *Aphis lactucae* Kaltenbach is a homonym of *Aphis lactucae* Linnaeus, and can not be used. A new name is therefore necessary and the name *cosmopolitana* is here proposed.

This species seems to have very close relatives, both on currant and on its summer hosts. On currant I am describing in this paper *pergandei*, new species. On *Sonchus* there are several forms as discussed on page 4.

Apterous spring form on Ribes.—Antennae shorter than body, light colored, not conspicuously imbricated, hairs inconspicuous, much shorter than width of segment, III with 1–3 small sensoria at base. Antennal tubercles of moderate size. Beak reaching between second and third coxae. Cornicles short, thick, plainly swollen, the tips darker and imbricated. The cauda narrow, strongly constricted in some specimens, less so in others, three sets of lateral hairs.

No.	III	Sensoria on III	IV	V	VI
1.....	0. 576	?	0. 280	0. 240	0. 096+0. 320
	0. 560	3	0. 320	0. 256	0. 096+0. 320
2.....	0. 544	1	0. 224	0. 240	?

No.	Head	Cauda	Cornicle			
			Length	Wide X	Small X	Flange
1.....	0. 464	0. 304	0. 592	0. 128	0. 040	0. 048
2.....	0. 448	0. 224	0. 448	0. 096	0. 040	0. 048
			0. 512	0. 088	0. 040	0. 048

Spring Migrant on Ribes.—Antennae dark colored, somewhat longer than body, tuberculate, hairs inconspicuous, shorter than width of segment, I gibbous on inner side. Antennal tubercles very small. Beak short, not reaching second coxae. Prothoracic tubercles showing. Abdominal segments with lateral dark patches. Cornicles rather short, moderately swollen, slightly imbricated at tips. Cauda long, strongly constricted, with three sets of lateral hairs.

Antennal measurements

No.	III	Sensoria on III	IV	Sensoria on IV	V	Sensoria on V	VI
1-----	0. 688	46	0. 392	15	0. 336	6	0. 112+0. 848
	0. 720	50	0. 392	18	0. 320	5	0. 112+0. 832
2-----	0. 640	42	0. 400	17	0. 288	6	0. 128+ ?
	0. 696	40	0. 384	15	0. 344	7	0. 128+0. 784
3-----	0. 736	42	0. 392	17	0. 336	6	0. 112+0. 736
	0. 704	46	0. 400	17	0. 320	5	0. 104+0. 768

Other measurements

No.	Head	Cauda	Cornicle			
			Length	Wide X	Small X	Flange
1-----	0. 464	0. 272	0. 416	0. 088	0. 040	0. 048
			0. 416	0. 088	0. 040	0. 048
2-----	0. 448	0. 240	0. 448	0. 088	0. 040	0. 056
3-----	0. 464	0. 248	0. 416	0. 088	0. 040	0. 056
			0. 416	0. 088	0. 040	0. 056

Alate viviparous female (on Sonchus).—Antennae about one-quarter longer than body, dark colored, imbricated, numerous sensoria, hairs shorter than width of segment, somewhat capitate. Antennal tubercles very small. Prothoracic lateral tubercles present, a hair in front of each. Abdominal segments with lateral dark spots, each spot imbricated and having several hairs and usually a tubercle. The spiracle shows either on or near this dark spot. A large dorsal dark area above and between base of cornicles. Cornicles short, distinctly swollen, the tip with about two imbrications. Cauda long, slender, strongly constricted, the lateral edges above constriction showing as dark colored. An occasional specimen has the cauda much broader and not strongly constricted. Three sets of lateral hairs on cauda.

Antennal measurements

No.	Locality	III	Sensoria on III	IV	Sensoria on IV	V	Sensoria on V	VI
1	D. C.-----	0. 640	37	0. 352	13	0. 304	3	0. 120+0. 720
		0. 608	38	0. 336	9	0. 304	1	?
2	?-----	0. 800	47	0. 480	15	0. 384	5	0. 112+0. 880
		0. 800	42	0. 464	13	0. 384	5	0. 096+0. 848
3	La-----	0. 656	42	0. 368	9	0. 320	3	0. 096+ ?
4	D. C.-----	0. 656	33	0. 432	15	0. 320	3	0. 080+ ?
5	D. C.-----	0. 704	44	0. 448	14	0. 288	1	0. 096+0. 752
		0. 656	43	0. 416	12	0. 352	1	0. 112+0. 576
6	D. C.-----	0. 784	45	0. 448	17	0. 368	4	0. 112+0. 848
		0. 784	49	0. 448	19	0. 336	6	0. 112+0. 848
7	D. C.-----	0. 816	53	0. 480	18	0. 400	1	0. 112+0. 944
		0. 768	54	0. 496	16	0. 368	7	0. 112+0. 928
8	D. C.-----	0. 672	40	0. 368	13	0. 304	3	0. 096+ ?
		0. 672	42	0. 352	12	0. 280	2	0. 096+ ?
9	D. C.-----	0. 672	39	0. 400	10	0. 320	6	0. 112+0. 880
		0. 688	42	0. 392	14	0. 368	7	0. 128+0. 880
10	D. C.-----	0. 640	44	0. 336	13	0. 320	1	0. 112+0. 816
		0. 592	45	0. 352	11	0. 320	3	0. 112+0. 832
11	Ill-----	0. 768	26	0. 528	18	0. 400	3	0. 144+0. 832
		0. 768	47	0. 528	15	0. 416	3	0. 144+0. 912
12	D. C.-----	0. 688	41	0. 400	16	0. 224	1	0. 096+0. 640
		0. 688	46	0. 384	15	0. 288	6	0. 096+ ?
13	D. C.-----	0. 896	57	0. 488	17	0. 432	4	0. 144+1. 024
		0. 880	56	0. 512	18	0. 400	1	0. 128+1. 072
14	D. C.-----	0. 640	44	0. 368	12	0. 320	6	0. 112+0. 752
		0. 624	47	0. 352	10	0. 336	5	0. 128+0. 752
15	D. C.-----	0. 736	48	0. 432	16	0. 352	3	0. 112+0. 992
		0. 752	49	0. 432	15	0. 336	6	0. 112+0. 896
16	?-----	0. 592	34	0. 352	13	0. 288	3	0. 112+0. 768
		0. 640	34	0. 384	13	0. 240	4	0. 104+0. 800
17	P o r t o Rico----	0. 736	46	0. 432	12	0. 352	3	0. 112+0. 864
		0. 704	41	0. 416	11	0. 368	3	0. 112+0. 880
18	La-----	0. 752	42	0. 432	13	0. 336	3	0. 112+0. 832
		0. 784	43	0. 416	11	0. 368	4	0. 112+0. 864
19	Calif-----	0. 672	43	0. 352	10	0. 320	1	0. 112+0. 720
		0. 640	38	0. 384	9	0. 336	1	0. 128+0. 752
20	Calif-----	0. 800	46	0. 448	14	0. 384	2	0. 128+0. 864
		0. 800	47	0. 464	11	0. 368	---	0. 112+0. 832
21	Calif-----	0. 672	40	0. 448	14	0. 304	3	0. 112+0. 592
		0. 704	46	0. 424	16	0. 312	4	0. 112+0. 528

Other measurements

No.	Head	Cauda	Cornicle			
			Length	Wide X	Small X	Flange
1-----	0.432	0.208	0.400	0.064	0.040	0.048
2-----	0.464	0.256	0.448	0.080	0.040	0.048
3-----	0.480	?	?	?	?	?
4-----	0.480	0.224	0.480	0.112	0.040	0.048
5-----	0.480	0.192+	0.480	0.096	0.040	0.056
6-----	0.480	0.240	0.448	0.096	0.040	?
7-----	0.496	0.256	0.496	0.088	0.040	0.056
8-----	0.448	0.224	0.384	0.080	0.040	0.048
9-----	0.464	0.224	0.400	0.080	0.040	0.048
10-----	0.432	0.176	0.368	0.072	0.040	0.056
11-----	0.480	0.272	0.512	0.096	0.048	0.056
12-----	0.448	0.240+	0.416	0.064	0.032	0.048
13-----	0.496	0.224	0.480	0.088	0.056	0.040
14-----	0.448	0.224	0.400	0.080	0.040	0.048
15-----	0.456	0.224	0.480	0.072	0.040	0.048
16-----	0.440	0.224	0.352	0.064	0.032	0.048
17-----	0.464	0.240	0.416	0.080	0.040	0.048
18-----	0.432	0.272	0.448	0.080	0.040	0.048
19-----	0.456	0.240	0.432	0.088	0.040	0.056
20-----	0.464	0.320	0.464	0.080	0.040	0.048
21-----	0.480	0.272	0.448	0.096	0.048	0.056

Color notes (Pergande MSS.).—"October 30, 1899, the winged form is pale yellowish green, with the head, antennae, thoracic lobes, lateral spot in front of anterior wings, sternal plate, lateral spots in front of nectaries, apex of femora and tibiae and tarsi black; a broad dusky band across prothorax; a dusky band about the middle of the abdomen, the more or less confluent bands in front of nectaries, or all three may be joined laterally, forming an angulated edge; the last band is joined posteriorly by two, posteriorly diverging, stout branches between the nectaries; no bands behind them, though there are two dusky lateral spots behind the nectaries, the anterior one much the largest. Legs, nectaries and tail yellow, the apex of the nectaries dusky. Stigma very pale dusky, subcosta yellowish, veins blackish. November 10, 1899, found again a number of apterous and one winged female, the latter being considerably larger than those found October 30, with the spots on the abdomen larger and deep black, though structurally they are all alike. Found also two migrants, larvae and pupa on *Lactuca canadensis*. The migrants are smaller than the one on *Sonchus* though otherwise alike."

Apterous viviparous female (Summer Form on Sonchus).—Antennae about equaling length of body, hairs small, heavy, III with a row of 5 to 20 sensoria, distal segments imbricated, I and II gibbous on inner side. Antennal tubercles fairly large and prominent. Beak reaching slightly beyond second coxae. No dark patches or tubercles showing as in alates. Cornicles short, plainly swollen, with about

two imbrications at tip. Cauda long, strongly constricted, three sets of lateral hairs. Measurements as follows:

Antennal measurements

No.	Locality	III	Sensoria on III	IV	V	VI
1	D. C.	0.592 0.592	11 9	0.336 0.336	0.288 0.304	0.096+0.592 0.096+ ?
2	?	0.736 0.720	13 15	0.432 0.432	0.352 0.352	0.096+0.688 0.112+0.784
3	D. C.	0.656 0.672	8 5	0.368 0.384	0.288 0.304	0.112+0.560 0.112+0.576
4	D. C.	0.624 0.592	8 9	0.384 0.368	0.304 0.320	0.096+0.784 0.096+0.704
5	D. C.	0.720 0.736	11 9	0.480 0.464	0.368 0.320	0.128+0.832 0.112+0.800
6	D. C.	0.640 0.624	11 10	0.368 0.368	0.288 0.304	0.096+0.784 0.112+0.816
7	D. C.	0.640 0.624	6 9	0.352 0.368	0.288 0.336	0.080+0.608 0.112+ ?
8	Ill.	0.656 0.672	13 9	0.416 0.400	0.336 0.336	0.112+0.496 0.128+ ?
9	D. C.*	0.704 0.624	9 7	0.416 0.352	0.368 0.336	0.128+0.800 0.112+0.736
10	D. C.	0.640 0.640	11 9	0.416 0.400	0.304 0.336	0.112+0.816 0.112+0.816
11	D. C.	0.720 0.688	11 15	0.384 0.400	0.240 0.320	0.064+0.592 0.080+0.640
12	La.	0.672 0.672	16 13	0.416 0.432	0.320 0.320	0.096+0.816 0.112+0.848
13	D. C.	0.576 0.576	4 4	0.336 0.336	0.288 0.288	0.096+0.720 0.112+0.704
14	?	0.672 0.672	16 15	0.416 0.416	0.352 0.320	0.112+0.720 0.112+ ?
15	?	?	?	?	?	?
16	Calif.	0.800	16	0.496	0.416	0.144+0.768
17	France	0.848	19	0.528	0.432	0.128+0.832
18	Calif.	0.592	8	0.336	0.272	0.112+ ?
19	Belgium	0.640	21	0.432	0.352	0.112+0.688
20	Belgium	0.672 0.656	14 14	0.368 0.384	0.336 0.336	0.112+ ? 0.102+ ?

Other measurements

No.	Head	Cauda	Cornicle			
			Length	Wide X	Small X	Flange
1	0.448	0.272	0.448	0.080	0.04	0.048
2	0.480	?	0.512	0.096	0.04	0.056
3	0.464	0.304	0.496	0.096	0.04	0.056
4	0.480	?	0.480	0.080	0.04	0.048
5	0.496	0.240	0.512	0.096	0.04	0.048
6	0.448	0.240	0.480	0.080	0.04	0.048
7	0.416	?	0.480	0.088	0.04	0.048
8	0.496	0.288	0.544	0.096	0.04	0.048
9	0.304	0.304	0.560	0.096	0.04	0.048
10	0.432	0.272	0.448	0.080	0.04	0.048
11	0.448	0.288	0.512	0.072	0.04	0.048
12	0.480	0.288	0.496	0.088	0.04	0.048
13	0.464	0.288	0.496	0.080	0.04	0.048
14	0.448	0.224	0.416	0.064	0.04	0.048
15	0.504	0.240	0.560	0.096	0.04	0.048
16	0.480	0.288	0.496	0.088	0.04	0.048
17	0.512	0.320	0.640	0.102	0.048	0.056
18	0.480	0.272	0.416	0.088	0.04	0.048
19	0.488	0.320	0.496	0.088	0.04	0.048
20	0.480	?	0.448	0.088	0.04	0.048

Color notes (Pergande MSS.).—“Apterous females, larvae and pupae very pale yellowish green, pale bluish green or almost white with but a slight yellowish or greenish tinge; the head is generally palest, frequently white; all are covered with a delicate pruinose secretion; antennae and legs white or faintly brownish, tip of tibiae and tarsi darkest, tip of tarsi and claws blackish; apex of antennal joints 3 to 5, the basal section and apical one-third or more of the spur of the sixth black. Eyes brown; nectaries and tail of color of legs. The thorax and wing pads of the pupa are almost white with the external edge of the wing pads blackish.”

Fall migrant (On Ribes).—Antennae longer than body; dark colored, III, IV, and V with sensoria, tuberculate, distal segments imbricated; hairs shorter than width of segment, I gibbous on inner side. Antennal tubercles very small, especially on outer side. Beak short, hardly reaching second coxae. Prothoracic lateral tubercles distinct, a spine showing in front of each. Abdominal segments with large lateral dark areas, each bearing a tubercle and one or more spines. Cornicles comparatively short, conspicuously swollen, slightly imbricated at tip. Cauda long, strongly constricted, three sets of lateral hairs. Measurements as follows:

Antennal measurements

No.	III	Sensoria on III	IV	Sensoria on IV	V	Sensoria on V	VI
1-----	0. 768	45	0. 480	12	0. 400	3	0. 144 + 0. 656
	0. 776	44	0. 472	11	0. 400	3	0. 128 + ?
2-----	0. 768	42	0. 464	15	0. 384	2	0. 144 + 0. 848
	0. 800	44	0. 432	12	0. 356	0	0. 112 + 0. 816
3-----	0. 752	51	0. 464	15	0. 352	3	0. 128 + 0. 704
	0. 800	51	0. 464	13	0. 352	4	0. 112 + 0. 800
4-----	0. 800	45	0. 512	19	0. 432	6	0. 128 + 1. 216
	0. 800	47	0. 512	16	0. 416	6	0. 112 + 1. 152
5-----	0. 736	46	0. 448	19	0. 384	8	0. 128 + 0. 864
	0. 736	43	0. 432	16	0. 368	7	0. 128 + 0. 848

Other measurements

No.	Head	Cauda	Cornicles			
			Length	Wide X	Narrow X	Flange
1-----	0. 480	0. 272	0. 464	0. 088	0. 048	0. 056
			0. 464	0. 096	0. 040	0. 048
2-----	0. 480	0. 208	0. 432	0. 088	0. 040	0. 056
			0. 448	0. 088	0. 040	0. 056
3-----	0. 488	?	0. 416	0. 080	0. 040	0. 048
			0. 400	0. 088	0. 040	0. 048
4-----	0. 520	0. 208	0. 400	0. 072	0. 040	0. 056
			0. 400	0. 088	0. 040	0. 056
5-----	0. 480	0. 208	?	?	?	?

Pergande left the following color notes: "The winged form is either yellowish or yellowish green. Head, antennae, band across prothorax, thoracic lobes and sternal plate, apex of femora, tibiae and tarsi, lateral spot in front of wings, 3 lateral spots in front of nectaries black; the lateral edge of this spot is more or less sharply 3-dentate; the anterior angle is formed of two very fine black and curved lines, uniting at the ends in a large black spot; the other two angles are formed of 3 broad, and shorter black bands, with the last band sometimes very fine and barely visible except at the angle; the space between these lines and bands is of the color of the abdomen, though sometimes they may be confluent so as to form a complete black spot; nectaries pale dusky, tail yellow; subcosta yellowish, the stigma pale dusky."

I have received a single alate specimen from Dr. J. T. Potgieter taken on sycamore at Columbus, Ohio, October 6, 1922. I can see no specific difference between it and the form described above from currant. It is probable that it was simply resting on the sycamore.

Alate male.—Antennae longer than body, dark colored, imbricated, III, IV, and V with numerous tuberculate sensoria; hairs shorter than width of segments. Antennal tubercles very small. Beak short, about reaching second coxae. A small lateral prothoracic tubercle with spine in front of it. Abdominal segments with a dark area and several smaller ones on dorsum of abdomen. Cornicles short, strongly swollen, slightly imbricated at tip. Cauda short, broad, conical, not constricted, with 3 sets of lateral hairs. Measurements as follows:

Antennal measurements

No.	III	Sensoria on III	IV	Sensoria on IV	V	Sensoria on V	VI
9155	0. 736	44	0. 480	18	0. 392	S	0. 128+1. 104
	0. 816	39	?	?	?	?	0. 128+1. 248
5591	0. 800	57	0. 504	19	0. 448	?	?
3/2	0. 912	55	0. 432	11	0. 464	S	0. 144+ ?

Other measurements

No.	Head	Cauda	Cornicle			
			Length	Wide X	Small X	Flange
9155	0. 472	0. 144	0. 384	0. 08	0. 04	0. 048
			0. 384	0. 08	0. 04	0. 048
5591	0. 512	0. 144	0. 416	0. 08	0. 04	0. 048
3/2			0. 416	0. 08	0. 04	0. 048

No. 9155, described above, was taken on *Sonchus asper* January 24, 1900, District of Columbia. No. 5591, 3/2, was taken at Fairbury, Ill., on *Sonchus oleracea* on October 15, 1894, along with alate viviparous females.

Apterous oviparous female.—Antennae about the same length as the body; on some specimens a little longer than body, light colored, faintly imbricated, III with a row of 2–9 sensoria. Antennal tubercles prominent. Beak reaching beyond second coxae. No thoracic or abdominal tubercles showing. Hind tibiae with numerous sensoria, especially on basal three-fourths. Cornicles plainly swollen; about two imbrications at tip. Cauda short, plainly constricted, three sets of lateral hairs. Measurements as follows:

Antennal measurements

No.	III	Sensoria on III	IV	V	VI
1-----	0. 384	6	0. 304	0. 256	0. 112+0. 640
	0. 432	5	0. 288	0. 272	0. 112+0. 656
2-----	0. 384	4	0. 256	0. 192	?
	0. 432	9	0. 288	0. 232	0. 104+0. 496
3-----	0. 440	8	0. 272	0. 240	0. 112+0. 624
	0. 440	6	0. 272	0. 232	0. 112+ ?
4-----	0. 464	?	0. 272	0. 224	0. 112+0. 480
	0. 464	6	0. 272	0. 240	0. 112+0. 464
5-----	0. 432	4	0. 288	0. 240	0. 112+0. 608
	0. 448	2	0. 296	0. 272	0. 112+0. 640
6-----	0. 400	4	0. 262	0. 240	0. 112+ ?
	0. 416	4	0. 240	0. 208	0. 112+0. 560
7-----	0. 408	3	0. 256	0. 224	0. 096+0. 552
	0. 432	4	0. 272	0. 240	0. 096+0. 544

Other measurements

No.	Head	Cauda	Cornicle			
			Length	Wide X	Small X	Flange
1-----	0. 400	0. 160	?	?	?	?
2-----	0. 408	0. 176	0. 416	0. 064	0. 032	0. 040
			0. 400	0. 064	0. 032	0. 040
3-----	0. 376	0. 144	0. 352	0. 056	0. 040	0. 048
			0. 368	0. 064	0. 040	0. 048
4-----	0. 400	0. 208	0. 400	?	?	?
			0. 400	?	?	?
5-----	0. 400	?	0. 352	0. 064	0. 032	0. 040
			0. 384	0. 064	0. 032	0. 040
6-----	0. 360	0. 144	0. 352	0. 064	0. 040	0. 040
			0. 368	0. 064	0. 040	0. 040
7-----	0. 400	0. 192	0. 352	0. 064	0. 040	0. 040
			0. 352	0. 072	0. 032	0. 040

Pergande left the following notes: "Pale yellow and slightly pruinous. Apex of antennal joints 3-6 and terminal one-half of the spur blackish; apex of tibiae and tarsi dusky, eyes brown. The nectaries are sometimes very pale brownish, also the legs, with extreme tip of nectaries dusky."

Biology.—This species alternates between various species of *Ribes* and such plants as *Sonchus*, *Lactuca*, etc.

On *Ribes* it occurs on the leaves, usually on the underside, often causing them to curl and cluster. Sometimes it is associated with *Myzus ribis* (Linnaeus). It is probable that a few individuals remain throughout the year, but most of them have left by the latter part of July.

On the summer hosts it is very numerous on the leaves, stem, and flower heads. It produces two or more generations, remaining on these plants until late autumn, we having records as late as November 24, and on a potted plant of *Sonchus* as late as January 24.

In the autumn it returns to *Ribes*, where the eggs are laid. The earliest record we have in this country of the sexual forms is October 21, and females have been found until late in November.

The eggs are laid on the twigs of currant and are shining black in color. Van der Goot found nearly mature oviparous females on *Deutzia crenata*.

Miss Jackson reports it to be attacked by *Empusa* (*Entomophthora*) *aphides* Hoffman and *Empusa* (*Triplosporium*) *fresenii* Nowakowaki. Theobald found it in the crops of young fowls.

Food plants.—*Ribes* species, *Sonchus* species, *Lactuca*, *Lampsana vulgaris*, *Viburnum opulus*, *Cichorium endivum*, *Picris hieracioides*, *Taraxicum*, milkweed (Swain), *Deutzia crenata* (Van der Goot).

Distribution.—United States, Europe, India, Japan, Argentina, Brazil, and Porto Rico.

Type.—Kaltenbach's type of *lactucaè* is undoubtedly lost. Specimens which I am considering as typical and which agree with descriptions of other authors are in the United States National Museum.

AMPHOROPHORA DAVIDSONI, new species

Figs. 27-32, and 139-141

Amphorophora rubi (Kaltenbach) SWAIN (not *rubi* Kaltenbach), Univ. Cal. Pub., vol. 3, No. 1, 1919, p. 54.

This species can be separated from closely related ones on *Rubus* by its shorter cornicles which are subequal with III, by its dark antennae, the distal segments of which become lighter, by its long antennal hairs, and by the larger number of sensoria on III, 34-42.

Alate viviparous female.—Antennae about equal to the length of the body, III dark, the other segments lighter, hairs very conspicuous, usually longer than the width of the segment, distal segments imbricated, III with 34-42 sensoria, not in a row. Antennal

tubercles prominent. No dorsal or lateral tubercles showing on head, thorax, and abdomen. Beak reaching beyond second and nearly to third coxae. Cornicles not very dark, somewhat swollen, distinctly reticulated, the rest of the cornicles imbricated. Cauda light colored, long, conspicuously constricted, three to four sets of lateral hairs. Margin of wing cloudy, but not a distinct dusky spot as in *rubicola* Oestlund. Measurements as follows:

Antennal measurements

No.	III	Sensoria on III	IV	V	VI
1-----	0.824 0.848	34 36	0.464 0.432	0.432 0.456	0.128+(0.336+) 0.128+ 0.880
2-----	0.856 0.832	42 ?	0.464 0.480	0.448 0.464	0.128+ 0.896 0.128+ ?
3-----	0.816 0.896	37 ?	0.480 0.480	0.432 0.480	0.128+(0.528+) 0.096+ 0.880

Other measurements

No.	Head	Cauda	Length	Reticulated	Wide X	Small X	Flange
1---	?	0.352	0.880 0.848	0.080 0.096	0.096 0.096	0.056 0.056	0.072 0.072
2---	0.496	0.304	0.848 0.848	0.080 0.096	0.104 0.096	0.056 0.056	0.072 0.072
3---	0.544	0.336	0.880 0.880	0.096 0.080	0.120 0.120	0.056 0.056	0.072 0.080

Alate nymphs (last instar)

III	IV	V	VI	Head width	Cornicle
0.512	0.288	0.304	0.112+0.624	0.456	0.688
0.496	0.288	0.288	0.112+0.608	-----	0.624
0.528	0.336	0.336	0.112+0.736	0.544	0.768
0.528	0.336	0.352	0.104+0.640	-----	-----
0.560	0.352	0.336	0.112+0.720	0.512	0.720

Apterous nymph (last instar)

III	IV	V	VI	Head width	Cornicle
0.480	0.288	0.288	0.112+0.640	0.448	0.640
0.480	0.288	0.288	0.096+0.640	?	0.640

This species was taken by Davidson at San Jose, Calif., July 4, 1911, on thimbleberry. The collection consists of three alate viviparous females, several alate nymphs, and one apterous nymph.

As explained under *rubi* Kaltenbaeh, I believe the specimens which Swain received from Gillette and which he described as *rubi* Kalten-

bach are in reality this new species. There is an alate male and several oviparous females in this collection. The following descriptions and the drawings are made from these slides.

Alate male.—Antennae longer than body, dark colored, segment III darker than the other segments, hairs nearly or quite as long as the width of the segment, segments III and V with large subcircular sensoria, the number being shown in the table, segment IV without sensoria. Beak reaching third coxae. Abdomen with lateral tubercles. Cornicles long, moderately but conspicuously swollen, dark colored, imbricated over the entire length, the tip plainly reticulated. Cauda short, not constricted, lighter colored than cornicles, with about three sets of hairs.

No.	III	Sensoria on III	IV	Sensoria on IV	V	Sensoria on V	VI
1-----	0. 720 0. 688	41 48	0. 512 0. 544	0 0	0. 432 0. 432	11 12	0. 128+0. 928 0. 128+0. 848

No.	Head	Cauda	Cornicle				
			Length	Reticulated	Wide X	Small X	Flange
1-----	?	0. 128	0. 672 ?	0. 064 0. 064	0. 080 0. 072	0. 048 0. 048	0. 064 0. 064

Oviparous female.—Antennae longer than body, light colored; tips of segments and base of VI darker, hairs about as long as width of segments, segment III with an uneven row of subcircular sensoria. Antennal tubercles of moderate size. Beak reaching third coxae. Prothoracic lateral tubercles distinct. Hind tibiae with numerous sensoria on basal half, becoming less numerous beyond middle with none on distal portion. Cornicles very long, moderately but plainly swollen, lighter colored than in the male but the tips dark, less imbricated than in male, the tips plainly reticulated. Cauda small, short, broad, not constricted; about three lateral hairs. Measurements as follows:

No.	III	Sensoria on III	IV	V	VI
1-----	0. 672 0. 720	9 10	0. 480 0. 464	0. 400 0. 384	0. 144+0. 688 0. 144+0. 656
2-----	0. 656 0. 688	13 12	0. 416 0. 400	0. 336 0. 400	0. 104+0. 640 0. 096+0. 576
3-----	0. 688 0. 704	17 10	0. 448 0. 440	0. 384 0. 400	0. 128+0. 672 0. 128+0. 640
4-----	0. 656 0. 624	8 11	0. 464 0. 480	0. 352 0. 368	0. 096+0. 592 0. 104+0. 640

No.	Head	Cauda	Cornicle				
			Length	Reticulated	Wide X	Small X	Flange
1-----	0. 464	0. 144	0. 992 0. 976	0. 080 0. 080	0. 112 0. 120	0. 056 0. 064	0. 072 0. 080
2-----	0. 456	0. 208	0. 800 0. 848	0. 064 0. 064	0. 112 0. 104	0. 064 0. 064	0. 080 0. 072
3-----	0. 408	?	0. 928	0. 064	0. 160	0. 056	0. 072
4-----	0. 448	0. 224	0. 960 0. 952	0. 064 0. 064	0. 120 0. 120	0. 064 0. 064	0. 088 0. 080

Cotypes.—Alate viviparous female deposited in the U. S. National Museum, Cat. No. 26375, in the Maine Agricultural Experiment Station and in the collection of Harold Morrison. Paracotype slides of the male and oviparous female, which are a part of the Swain collection, are returned to Stanford University.

AMPHOROPHORA ESSIGWANAI, new name

Figs. 101-108

Rhopalosiphum indicum v. d. Goot of Essig and Kuwana, Proc. Cal. Acad. Sci., vol. 8, no. 3, 1918, p. 55.

In 1916 Van der Goot described and figured his *Rhopalosiphum indicum* from the apterous form only, taken on an unknown host plant. In 1917 he described the alate form of what he considered to be the same species, taken apparently on the wing. Both of these collections were made in India. In 1918 Essig and Kuwana, not having received the above description of the alate, described the alate form of what they considered to be this species, taken on *Euscaphis japonica* and *Staphylea bumalda* in Japan. The two descriptions apparently do not refer to the same species. Essig kindly loaned me some of his specimens. I also have specimens sent by Takahashi taken in Formosa on an unknown host and determined by him as *indicum* v. d. Goot. They are most certainly different from Essig and Kuwana's specimens, and they agree very well with Van der Goot's description. Van der Goot's description of the alate must be accepted as *indicum* until proven otherwise, and I am referring Takahashi's specimens to this species. A new name must therefore be given to Essig and Kuwana's species and I here propose *essigwanai*. I am removing *indicum* v. d. Goot from the genus *Amphorophora*, where it was placed by Takahashi, as it is not typical.

In 1918 Matsumura described his *Rhopalosiphum miniatum*, which Takahashi says is synonymous with *indicum* v. d. Goot. I have not seen it, but I am accepting Takahashi and am not considering it in connection with the *Amphorophora*.

The following descriptions and the drawings are made from the specimens furnished by Essig.

Alate viviparous female.—From one specimen, taken on *Euseaphis japonica* in Japan. Antennae slightly longer than body, rather heavy, dark colored, conspicuously imbricated, hairs very prominent, but shorter than the width of segments, III tuberculate, other segments without secondary sensoria, unguis of VI rather short. Antennal tubercles not prominent. Beak reaching beyond second coxae. Cornicles dark colored, short and heavy in appearance, strongly swollen, plainly reticulated. Cauda small, conical, not constricted, with at least six sets of lateral hairs. Measurements as follows:

III		Sensoria on III	IV		V		VI	
0. 992		53	0. 784		0. 512		0. 144+0. 656	
1. 008		54	0. 784		0. 560		0. 144+0. 560	

Head	Cauda	Cornicle				
		Length	Reticulated	Wide X	Small X	Flange
0. 704	0. 240	0. 800	0. 144	0. 256	0. 072	0. 096
		0. 864	0. 144	0. 208	0. 080	0. 104

Apterous viviparous female.—From one specimen taken on *Staphylea bumalda* in Japan. Antennae longer than the body, imbricated, hairs conspicuous, shorter than width of segments, III with 6-8 small sensoria near base.

III	IV	V	VI
1. 216	0. 688	0. 544	0. 192+0. 736
1. 216	0. 672	0. 544	0. 192+0. 816

Head 0.576 mm. across eyes. Antennal tubercles small. Beak reaching nearly to third coxae. Left cornicle not showing. Right cornicle black, 0.768 mm. long, reticulate for 0.08 mm.; widest diameter, 0.144 mm.; smallest diameter, 0.08 mm.; flange, 0.096 mm. Cauda not showing.

Intermediate.—One specimen furnished by Essig, taken on *Staphylea bumalda* in Japan. Antennae shorter than body, dark colored (Balsam mount), imbricated, hairs fairly numerous, shorter than width of segment. Segment III with about seven small, round inconspicuous sensoria. Antennal measurements as follows:

III	IV	V	VI
1. 248	0. 704	0. 560	0. 176+0. 8
1. 280	0. 720	0. 528	0. 176+0. 8

Head 0.72 mm. across eyes. Antennal tubercles not prominent. Ocelli present but very small. Wings represented only by lobes. Cornicles dark colored, short and not conspicuously swollen, —0.736 mm. long, reticulated for 0.08 mm.; widest diameter, 0.16 mm.: smallest diameter, 0.08 mm.; flange, 0.112 mm.

Host plants.—*Euscaphis japonica* and *Staphylea bumalda*.

Distribution.—Japan.

Cotypes.—Deposited in the University of California.

AMPHOROPHORA EVANSI Theobald

Figs. 85–88

Amphorophora evansi THEOBALD, The Entomologists' Monthly Magazine, ser. 3, No. 97, 1923, p. 24.

I have not seen this species. The cornicles seem to be very slender for an *Amphorophora* and the host plant, Austrian pine, is very unusual. When the alate is known, it may prove to belong to another genus.

AMPHOROPHORA FORMOSANA Takahashi

Figs. 70–71

Amphorophora formosana TAKAHASHI, Aphididae of Formosa, pt. 2, Report No. 4, Dept. of Agri., Government Research Institute, Formosa, Japan, 1923, p. 30.

I have not seen this species.

AMPHOROPHORA HAYHURSTI, new species

Figs. 89–91

Alate viviparous female.—Body light colored, head and thorax somewhat darker than abdomen. Antennae somewhat longer than the body, dark colored, very tuberculate, hairs nearly as long as width of segment, heavy but not distinctly capitate. Antennal tubercles prominent. Beak about reaching second coxae. Legs dark, light at base of femora. No thoracic or abdominal tubercles showing. Cornicles short, heavily swollen, dark colored, lighter at base, indistinctly reticulated at tip. Cauda long, narrow, strongly constricted, four sets of lateral hairs. Measurements as follows:

III	Sensoria on III	IV	Sensoria on IV	V	Sensoria on V	VI
1. 136 1. 088	125 122	0. 608 0. 592	53 45	0. 512 0. 544	14 15	0. 112 + ? 0. 112 + ?
Head	Cauda	Cornicle				
		Length	Reticulated	Wide X	Small X	Flange
0. 552	0. 4	0. 624 0. 624	0. 032 0. 032	0. 144 0. 144	0. 056 0. 056	0. 064 0. 064

Described from a single alate viviparous female received by Pergande from Paul Hayhurst (Hayhurst No. 121), collected at Columbia, Missouri, on *Ribis gracile*, with the following note: "On leaves of *Ribis gracile*, very rare; general color green." These were received December 12, 1906. The date of collection is not given.

Type.—(Pergande No. 9987). Deposited in U. S. National Museum. Cat. No. 26372.

AMPHOROPHORA LAINGI, new species

Figs. 112-117, 189

Rhopalosiphum ampullata (Buckton) OESTLUND, Minn. Geol. and Nat. Hist. Surv. Bull. 4, 1887, p. 77.—WILLIAMS, Univ. Nebr. Spec. Bull. 1, 1891, p. 19.—HUNTER, Iowa Agr. Exp. Sta. Bull. 60, 1901, p. 106.—SANBORN, Kans. Univ. Sci. Bull., vol. 3, no. 8, 1906, p. 242.—VAN DER GOOT, Beit. zur Kennt. der Holland. Blattläuse, 1915, p. 142.

Amphorophora ampullata (Buckton) WILLIAMS, Univ. Neb. Studies, vol. 10, no. 2, 1910, p. 72.—DAVIS, Univ. Neb. Contr. from Dept. Ent. no. 5, 1912, p. 25.—PATCH, Maine Agr. Expt. Sta. Bull. 202, 1912, p. 180.—ROBERTS, Lancashire and Cheshire Naturalist, vol. 10, no. 3, 1917, p. 78.—JACKSON, Scottish Naturalist, 1919, p. 158.

Acyrtosiphon (*Amphorophora*) *ampullatum* BUCKTON, Fauna de la Russie, 1919, p. 247.

As explained on page 3, this is considered to be a distinct species from *ampullata* Buckton. I take pleasure in naming it after Laing, who first called my attention to the differences. I learn from correspondence with Professor Oestlund that his 1887 description of *ampullata* Buckton is in reality of this new species. Van der Goot's 1915 description is plainly so. I can not tell from William's 1910 description of "*ampullata* Buckt?" what he had, and his specimens seem to be lost, but it was very probably not *ampullata* Buckton, since this is not known from this continent. In view of the rather common and widespread distribution of this species it is very probable that all the references in literature to *ampullata* Buckton, except those which simply catalogue the original description, refer to this species and they are so treated here. I have selected as cotypes certain specimens from Dr. E. M. Patch, of Orono, Me., as this is the only collection I have which has both alate and apterous forms in the same collection.

Alate viviparous female.—Antennae one and one-half to two times as long as the body, dark colored, hairs shorter than width of segment, capitate, segment III with 38-51 sensoria, not in a row; other segments with no secondary sensoria. Antennal tubercles very large and prominent. Head with capitate hairs. Beak reaching beyond second coxae. Legs light colored, tips of segments dark. Cornicles long, rather slender, distinctly swollen, basal part light, remainder dark, indistinctly imbricated at tip. Cauda conical, scarcely constricted, concolorous with body, with 7-8 groups of lateral hairs.

Antennal measurements

COTYPE SPECIMENS					
No.	III	Sensoria on III	IV	V	VI
1-----	1. 280	38	1. 136	0. 944	0. 312+ ?
	1. 280	40	1. 152	0. 912	0. 288+1. 520
2-----	1. 232	44	?	?	?
	1. 264	42	1. 168	0. 960	0. 288+1. 504
3-----	1. 312	54	1. 184	0. 960	0. 304+1. 568
	1. 328	51	1. 152	1. 008	0. 336+1. 488
PARACOTYPE SPECIMEN					
1. 328	?		1. 056	0. 896	0. 304+1. 520
1. 280	?		1. 120	0. 928	0. 288+1. 504

Other measurements

COTYPE SPECIMENS						
No.	Head	Cauda	Cornicles			
			Length	Wide X	Small X	Flange
1-----	0. 664	0. 368	0. 768	0. 112	0. 056	0. 080
			0. 768	0. 112	0. 056	0. 080
2-----	0. 656	0. 400	0. 688	0. 112	0. 056	0. 088
			0. 720	0. 120	0. 056	0. 080
3-----	0. 720	0. 432	0. 832	0. 120	0. 064	0. 088
			0. 768	0. 120	0. 064	0. 088
PARACOTYPE SPECIMEN						
1-----	0. 672	0. 336	0. 720	0. 120	0. 056	0. 08
			0. 720	0. 112	0. 056	?

Apterous viviparous female.—Antennae about one and one-half times as long as body, light colored, distal segments imbricated, III with 7–20 sensoria, all on basal half, not in a straight row. Antennal hairs shorter than width of segment; heavy, not pointed. Antennal tubercles unusually large. Hairs on front of head capitate. Beak reaching second coxae, often nearly to third. Cornicles light colored, rather slender, conspicuously swollen, somewhat imbricated at tip. Cauda long, broad, conical, not constricted, with 5–6 groups of lateral hairs.

Antennal measurements

COTYPE SPECIMENS

No.	III	Sensoria on III	IV	V	VI
1-----	1. 296	10	1. 088	0. 960	0. 320+1. 648
	1. 280	11	1. 120	0. 864	0. 300+1. 616
2-----	1. 312	7	1. 008	?	?
	1. 280	10	1. 040	0. 880	?
3-----	1. 344	18	1. 104	0. 800	0. 272+1. 520
	1. 328	11	1. 072	0. 848	0. 256+1. 552
4-----	1. 088	10	0. 976	0. 752	0. 256+1. 568
	1. 152	12	0. 960	0. 768	0. 272+1. 504

PARACOTYPE SPECIMENS

5-----	1. 280	14	1. 072	0. 912	0. 320+ ?
	1. 280	16	1. 104	0. 880	0. 320+ ?
6-----	1. 200	14	0. 880	?	?
	1. 216	20	0. 880	?	?
	1. 488	12	1. 104	0. 864	0. 240+1. 264
	1. 424	14	1. 152	0. 928	0. 228+(1. 28+)
	1. 296	10	?	?	?
	1. 504	14	?	?	?
	1. 408	15	0. 976	0. 912	0. 312+1. 600
	1. 440	15	1. 056	0. 832	?

Other measurements

COTYPE SPECIMENS

No.	Head	Cauda	Cornicles			
			Length	Wide X	Small X	Flange
1-----	0. 704	0. 400	0. 816	0. 128	0. 056	0. 080
			0. 816	0. 128	0. 056	0. 080
2-----	0. 728	0. 392	0. 800	0. 128	0. 056	0. 080
			0. 800	1. 128	0. 056	0. 080
3-----	0. 736	0. 432	0. 880	1. 128	0. 056	0. 088
			0. 864	1. 128	0. 064	0. 096
4-----	0. 688	0. 352	0. 800	0. 120	0. 056	0. 080
			0. 800	0. 112	0. 056	0. 080

PARACOTYPE SPECIMENS

5-----	?	0. 320	0. 752	0. 112	0. 056	0. 072
			0. 752	0. 104	0. 072	0. 088
6-----	0. 736	0. 304	0. 720	0. 112	0. 064	0. 088
	0. 736	0. 400	0. 856	0. 128	0. 064	0. 088
			0. 832	0. 128	0. 064	0. 088
	0. 736	?	0. 848	0. 152	0. 064	0. 088
			0. 848	0. 160	0. 072	0. 096
	0. 736	0. 352	0. 800	0. 152	0. 072	0. 096
			0. 800	0. 144	0. 064	0. 096
	0. 704	0. 416	0. 768	0. 136	0. 064	0. 088
			0. 800	0. 136	0. 064	0. 088
	0. 712	0. 432	0. 800	0. 136	0. 064	0. 088
			0. 800	0. 128	0. 056	0. 088
	0. 656	0. 400	0. 736	0. 120	0. 064	0. 088
			0. 752	0. 112	0. 056	0. 080

Van der Goot describes the oviparous female and the male.

Described from three alate viviparous females and four apterous viviparous females taken by Dr. Edith M. Patch on *Onclea sensibilis* at Orono, Me., July 21, 1922 (Maine No. 172-22). Paracotype specimens were taken by T. L. Guyton at Inglenook, Pa., July 1, 1920 (Guyton number 20-58), by Hayhurst at Sheridan, N. Y. (Hayhurst No. 209, Pergande No. 9986), and were received from Takahashi (Q No. 22018).

Host plants.—*Onclea sensibilis*, *O. struthiopteris*, *Polystichum* species, *Asplenium* species.

Distribution.—United States (Maine, New York, Pennsylvania, Minnesota), England, Holland, Russia, Japan.

Cotypes.—Returned to Maine Agricultural Experiment Station. Paracotypes deposited in U. S. National Museum. Cat. No. 26373.

AMPHOROPHORA MAXIMA, new species

Figs. 174-176

This is one of the largest species of *Amphorophora* I have seen. We have only a single alate specimen and several nymphs. Like *rubicola* Oestlund the cornicle is conspicuously longer than segment III, but it can be distinguished from *rubicola* by its light-colored antennae and by the smaller number of sensoria on III, about 13-17. The wings are torn, so that I am unable to determine whether or not it has a dusky spot.

Alate viviparous female.—Antennae longer than the body, light colored, ends of segments and VI darker, hairs about as long as width of segment, III with 13-17 sensoria on outer side; other segments imbricated; length of segments as follows:

III	IV	V	VI
0.848 0.868	0.656 0.656	0.560 0.448+	0.160+0.824 ?

Antennal tubercles prominent. Head 0.608 mm. across eyes. Beak reaching third coxae. No dorsal tubercles showing on head or prothorax. Lateral tubercles present on prothorax and abdomen. Cornicles dark colored, 1.056-1.072 mm. long, distinctly reticulated for 0.08-0.144 mm., the remainder conspicuously imbricated; widest diameter, 0.112-0.064 mm.; flange, 0.08 mm. Cauda light colored, 0.32 mm. long, rather broad, distinctly constricted, tip somewhat upturned.

Described from one specimen taken on salmon-berry in California in 1911. The slide, which bears a number of very young nymphs has the Pergande number 124121. Pergande's notes under this number give no additional data, except that they were received in August.

Cotypes.—Deposited in U. S. National Museum. Cat. No. 26378.

AMPHOROPHORA MINIMA, new species

Figs. 177, 178

A single specimen (Maine No. 67-05) was received from Dr. Edith M. Patch, taken on the wing. It is included in this genus with hesitation.

Alate viviparous female.—Very small. Antennae about one and one-half times as long as body; numerous sensoria, but not tuberculate; plainly imbricated; hairs very short and inconspicuous. The head is twisted, but the antennal tubercles appear to be large and distinct. Beak short. No prothoracic or abdominal tubercles showing. Small dark-colored areas at lateral margins of abdominal segments. Cornicle very light colored, long, slender for two-thirds of its length, then suddenly and strongly swollen; no reticulation or imbrications present. The cauda is twisted, but it is light colored and appears to be long and broad with three pairs of lateral hairs.

III	Sensoria on III	IV	Sensoria on IV	V	Sensoria on V	VI
0. 416	27	0. 272	13	0. 272	6	0. 096 + 0. 896
0. 416	29	0. 272	12	0. 272	4	0. 096 + 0. 880

Cornicle

Length	Wide X	Small X	Flange
0. 384	0. 064	0. 032	0. 040

Type.—Returned to Maine Agricultural Experiment Station.

AMPHOROPHORA MITCHELLI, new species

Figs. 127-129

A single alate viviparous female was taken on a wild Rhododendron on the top of Mount Mitchell, N. C., altitude 2,100 meters, by Carlo Zeimet on August 29, 1922. Mr. Zeimet says that two other specimens were observed at the same time but were not captured. This is evidently a native species of the wild forest, as no cultivated areas were close at hand. The following description and the drawings are from the one specimen. No other records have been received.

Alate viviparous female.—Antennae longer than the body, black, heavily tuberculate; hairs conspicuous, not capitate, about 0.32 mm. long. Antennal measurements as follows:

III	Sensoria on III	IV	Sensoria on IV	V	Sensoria on V	VI
1. 072 mm.	124	0. 544	45	0. 416	5	0. 104 + 1. 088
1. 088	112	0. 512	44	0. 464	10	0. 096 + 1. 056

Antennal tubercles small. Head 0.496 mm. across eyes. Head and thorax dark and abdomen light, in balsam mount. No thoracic or abdominal tubercles showing. Cornicles light at base, remainder black. Measurements as follows:

Length	Reticulated	Wide X	Small X	Flange
0. 576	0. 032	0. 120	0. 048	0. 056
0. 592	0. 032	0. 112	0. 048	0. 056

Cauda lighter in color than cornicles, 0.336 mm. long, slender, 4 sets of lateral hairs.

Type.—(Q No. 20138). Deposited in U. S. National Museum. Cat. No. 26374.

AMPHOROPHORA MORRISONI (Swain)

Figs. 92-97

Nectarosiphon morrisoni SWAIN, Trans. Amer. Ent. Soc., vol. 44, no. 772, 1918, p. 8; Univ. Cal. Pub. Tech. Bull. Ent., vol. 3, no. 1, 1919, p. 78.

Descriptions and measurements from 11 slides furnished by Harold Morrison, after whom the species was named.

Alate viviparous female.—This is a comparatively small species with antennae about one and one-half times as long as the body. Segments slender, not conspicuously imbricated; hairs few and small, III with 7 to 11 small circular sensoria in a row on the outer edge. Antennal tubercles of moderate size. Beak reaching beyond third coxae. Cornicles long, conspicuously swollen, distinctly reticulated at tip. The cauda is long, conical, not constricted, with 3-4 sets of lateral hairs. Measurements as follows:

No.	III	Sensoria on III	IV	V	VI
1-----	0. 624	9	0. 544	0. 560	0. 176+0. 752
	0. 608	9	0. 560	0. 608	0. 192+ ?
2-----	0. 608	10	0. 496	0. 592	0. 208+0. 800
	0. 592	7	0. 480	0. 544	0. 176+0. 688
3-----	0. 496	11	0. 448	0. 464	0. 176+0. 736
	0. 464	8	0. 400	0. 464	0. 160+ ?
4-----	0. 608	9	0. 512	?	? ?
	0. 608	9	0. 480	0. 496	0. 176+0. 176
5-----	0. 624	9	0. 480	0. 496	0. 192+0. 720
	0. 624	6+	0. 496	?	? ?

No.	Head	Cauda	Cornicle				
			Length	Reticulated	Wide X	Small X	Flange
1-----	0. 512	0. 272	0. 688	0. 08	0. 128	0. 048	0. 064
			0. 656	0. 08	?	?	0. 064
2-----	?	0. 304	0. 640	0. 08	?	0. 040	0. 064
			0. 640	0. 08	?	?	0. 064
3-----	0. 496	0. 224	0. 560	0. 08	0. 112	0. 048	0. 064
			0. 608	0. 08	0. 112	0. 048	0. 064
4-----	?	0. 240	0. 592	0. 08	0. 104	0. 048	0. 064
			0. 592	0. 08	0. 096	0. 048	0. 064
5-----	0. 480	0. 304	0. 656	?	0. 112	0. 048	0. 064
			?	?	?	?	?

Mr. Morrison furnishes from his notes the following color descriptions:

"General color green (pale and dark apple). Head pale green, slightly yellowish. Eyes dark brown, appearing almost black. Ocelli pale, spots black. Antennal segments I and II like head, yellowish pale green, rest black or blackish. Base of III like I and II. Prothorax dark pale green, front edge Prussian green, hinder edge darker. Thorax, ground color apple green, the median cephalic lobe light Van Dyke brown, and the two dorsal lateral, each with a large outer brown spot and a smaller inner one. A lateral lobe on each side below wings light Van Dyke brown. Wing inserts and base of subcosta very pale green. Subcosta and stigma grayish. Veins brown, dark. Beak, III black, II dusky, tip of I dusky, I pale green. Femora pale green, tips dusky, tibia and tarsi blackish or black. Abdomen uniform dark apple green. Ventral anal plate with indistinct dusky band. Cauda like the abdomen, or very slightly paler. Cornicles pale apple green at base, rest dusky to blackish, tips a little lighter."

Specimens collected about a month later show the following differences:

"Head quite yellowish (greenish yellow). The prothorax is brownish pale green, with a darker line along the front edge, and with the hind margin no darker, the membrane between it and thorax being light Hooker's green. The ground color of the thorax appears in these specimens to be brown (pale) with the lobes mentioned in the first description only a little darker. It requires a careful examination to separate the inner and outer lobes of the thorax, as there is only a narrow line of color between them. The median caudal lobe projecting into the abdomen is somewhat blackish and the darkest of all. The abdomen shows a very faint darker stripe down the center. Cauda distinctly but only slightly lighter than abdomen. Cornicles no lighter at tip."

Apterous viviparous female.—Size small, body oval, antennae one and one-fourth to one and one-half times as long as body, slender, faintly imbricated, hairs small, III with one to six, usually one, small circular sensoria near base. Antennal tubercles of moderate size. Beak reaching beyond third coxae. Cornicles distinctly but moderately swollen, distinctly reticulated at tip. Cauda broad, not constricted, three sets of lateral hairs. Measurements as follows:

Antennal segments

No.	III	IV	V	VI
1-----	0. 592	0. 496	0. 480	0. 176+0. 576
	0. 592	0. 480	0. 480	0. 160+0. 592
2-----	0. 624	0. 480	0. 480	0. 176+0. 720
	0. 608	0. 400	0. 448	0. 176+0. 656
3-----	0. 640	0. 496	?	?
	0. 624	0. 496	0. 512	0. 176+0. 704
4-----	0. 624	0. 464	0. 480	0. 192+0. 752
	0. 624	0. 464	0. 480	0. 176+0. 720
5-----	0. 496	?	?	?
	0. 448	0. 352	0. 384	0. 144+0. 512
6-----	0. 528	0. 400	0. 400	0. 144+0. 592
	0. 544	0. 384	0. 384	0. 144+0. 592
7-----	0. 528	0. 384	0. 464	0. 160+0. 672
	0. 528	0. 400	0. 464	0. 160+0. 608

No.	Width of head	Cauda	Cornicles				
			Length	Reticu- lated	Wide X	Small X	Flange
1-----	0. 496	0. 224	0. 752	0. 080	0. 112	0. 048	0. 064
			0. 704	0. 080	0. 112	0. 056	0. 072
2-----	0. 480	0. 320	0. 736	0. 080	0. 112	0. 056	0. 072
			0. 752	0. 080	0. 112	0. 056	0. 072
3-----	0. 480	0. 336	0. 720	0. 080	0. 096	0. 048	0. 064
			0. 704	0. 080	0. 096	0. 048	0. 064
4-----			0. 672	0. 080	0. 128	0. 056	0. 064
5-----	0. 432	?	0. 448	0. 064	0. 112	0. 048	0. 056
			0. 480	0. 064	0. 096	0. 048	0. 064
6-----	0. 416	?	0. 592	0. 080	0. 128	0. 048	0. 064
			0. 592	0. 080	0. 104	0. 048	0. 064
7-----	0. 480	0. 240	0. 624	0. 096	0. 112	0. 048	0. 064
			0. 608	0. 080	0. 112	0. 058	0. 072

Morrison furnishes the following color description from his note files:

“General color green (dark apple to Hooker’s green). Head pale green. Eyes very dark brown, almost black. Antennal segments I and II pale green, slightly yellowish green. Base of III similar, remainder black. Thorax dark apple green, shading imperceptibly into Hooker’s green on the abdomen. Abdomen Hooker’s green, edges paler. Last segment dark apple green. Cauda apple green. Cornicles, base apple green shading into dusky, tips black. Femora

dusky pale green. Tibia dusky yellow, tips and tarsi black. Last abdominal segment and cauda in some specimens distinctly pale green."

This species was first found on *Cupressus* in the Stanford University nursery by Childs and Crawford on February 21, 1912, and the above color notes were written by Morrison on this date. Both alate and apterous forms were present. It was taken again at the same place on March 17, 1912, and April 14, 1912. It was again taken by Morrison on May 21, 1915, in Golden Gate Park, San Francisco, alate and apterous adults and apterous nymphs, and by Harold Compere at the same place during the same month. In August, 1916, Swain found the apterous form on terminal leaves in Exposition Park, San Diego.

Host plants.—*Cupressus macrocarpa* and *C. guadalupensis*.

Distribution.—California (San Francisco, Palo Alto, and San Diego).

Cotypes.—Deposited in the U. S. National Museum. Cat. No. 26856.

Paratypes.—Deposited in the University of California collection, No. EOE 88, and in the Swain collection of Leland Stanford University. Specimens from Harold Morrison are in his collection and in that of the U. S. National Museum.

AMPHOROPHORA NABALI (Oestlund)

Figs. 118–126, 194

Rhopalosiphum nabali OESTLUND, 14th Report, Minn. State Geol., 1886, p. 34; Minn. Geol. and Nat. Hist. Surv. Bull. 4, 1887, p. 77.—WILLIAMS, Univ. Neb. Spec. Bull. 1, 1891, p. 26.—HUNTER, Iowa Agr. Exp. Sta. Bull. 60, 1901, p. 106.—KIRKALDY, Can. Ent., vol. 38, 1906, p. 12.—SANBORN, Kans. Univ. Sci. Bull., vol. 3, no. 8, 1906, p. 241.—WILSON and VICKERY, Trans. Wis. Acad. Sci. Arts and Letters, vol. 19, pt. 1, 1918, p. 113.

Amphorophora nabali (Oestlund) PATCH, Conn. St. Geol. and Nat. Hist. Surv. Bull., no. 34, 1923, p. 302.

There is in the national collection a metatype slide, containing two adult alate viviparous females, two alate nymphs, one apterous viviparous female, and one intermediate. This collection was made in Minnesota from *Nabalus albus* on July 11, 1903, by Pergande and determined by Oestlund. All drawings were made from this slide, and the following descriptions are chiefly from this slide, supplemented by comparisons with certain other specimens.

Alate viviparous female.—Antennae longer than body, dark colored, segments III, IV, and V very tuberculate for their entire lengths; one specimen with only a few on V; hairs conspicuous and heavy with a tendency to be knobbed. Antennal tubercles rather short. Beak reaching second coxae. Radial sector going somewhat closer

to medius than is usual for the genus. Cornicles medium in length, considerably swollen, imbricated, very indistinctly reticulated, if at all. Cauda long, slender, conspicuously constricted, with 4 sets of lateral hairs. Most of the hairs of the body more or less capitate.

Antennal measurements

No.	III	IV	V	VI
1-----	1. 136 mm.	0. 528	0. 464	0. 096 + 0. 768
	1. 072	0. 528	0. 496	0. 096 + (0. 432 +)
2-----	1. 056	0. 528	0. 432	0. 096 + (0. 416 +)

Other measurements

No.	Width of head	Cauda	Cornicles			
			Length	Wide X	Small X	Flange
1-----	0. 528	0. 400	0. 640	0. 120	0. 048	0. 064
2-----	0. 544	0. 448	0. 688	0. 136	0. 048	0. 064

Pergande left, in his notes, the following color description, made from the metatype specimens:

“Head yellowish, eyes brown, ocelli clear, bordered at inner side with purplish brown. Antennae black. Prothorax greenish, thoracic lobes brownish yellow. Abdomen green, variegated with yellowish green. Nectaries dusky, greenish toward base. Legs black, the femora yellowish green at base, growing darker toward or beyond the middle. Stigma dusky, blackish along inner edge. Subcosta yellowish.”

Last instar alate nymph

III	IV	V	VI	Head width	Cornicle length
0. 560	0. 352	0. 336	0. 080 + 0. 832	0. 496	0. 560
0. 576	0. 336	0. 336	0. 080 + 0. 816	-----	0. 560
0. 576	0. 368	0. 336	0. 096 + 0. 928	0. 528	0. 544
0. 624	0. 384	0. 352	0. 080 + 0. 848	-----	0. 544
0. 672	0. 384	0. 320	0. 096 + 0. 928	0. 528	0. 512
0. 656	0. 352	0. 336	0. 096 + 0. 976	-----	0. 528

Third instar alate nymph

III	IV	V	VI	Head width	Cornicle length
0. 480	0. 288	0. 288	0. 08 + (0. 56 +)	0. 496	0. 480
0. 560	0. 288	0. 288	0. 08 + 0. 832	-----	0. 480

Pergande says of the metatypes: "Pupae green; wing pads yellowish; antennae yellowish or greenish with apex of joints 3-5 and the 6th black."

Apterous viviparous female.—Antennae longer than body, with conspicuous knobbed hairs, III with from 3 to 15 sensoria. Antennal tubercles prominent. Beak reaching second coxae. Cornicles of medium length, conspicuously swollen, tips imbricated, sometimes with indications of reticulations. Cauda long, slender, constricted, three sets of lateral hairs.

Antennal measurements

No.	III	IV	V	VI
1-----	0. 912 0. 896	0. 544 0. 528	0. 480 0. 464	0. 096+0. 960 0. 112+1. 088
2-----	0. 880 0. 880	0. 464 0. 432	0. 368 0. 384	0. 080+1. 008 0. 096+0. 992
3-----	0. 896 0. 912	0. 400 0. 432	0. 416 0. 432	0. 096+(0. 656+) 0. 096+0. 960
4-----	0. 880 0. 928	0. 496 0. 480	0. 464 0. 432	0. 112+1. 104 0. 112+1. 120

Other measurements

No.	Head width	Cauda	Cornicles			
			Length	Wide X	Small X	Flange
1-----	0. 480	0. 432	0. 688	0. 128	0. 048	0. 064
			0. 704	0. 128	0. 048	0. 064
2-----	0. 448	0. 368	0. 592	0. 112	0. 048	0. 056
			0. 608	0. 120	0. 048	0. 064
3-----	0. 464	0. 416	0. 592	0. 112	0. 048	0. 064
			0. 656	0. 112	0. 048	0. 064
4-----	0. 480	0. 400	0. 688	0. 112	0. 048	0. 064
			0. 704	0. 112	0. 048	0. 064

Last instar apterous nymph

III	IV	V	VI	Head width	Cornicle length
0. 400	0. 224	0. 224	0. 08+0. 736	0. 448	0. 480
0. 400	0. 224	0. 224	0. 08+0. 752	-----	0. 480
0. 496	0. 288	0. 304	0. 08+0. 912	0. 464	0. 496
0. 512	0. 288	0. 304	0. 08+0. 864	-----	0. 496

Pergande's notes furnish the following color description of the metatype apterous female: "Green, polished; eyes brown; nectaries pale greenish yellow at basal half, the other half brown; tail greenish or dusky. Antennae dusky to black; if pale, the apex of jts. 3-5 and the 6th with spur black; femora pale bluish green; tibiae brownish yellow, greenish at base; apex and tarsi black."

It is probable that Pergande referred to the intermediate when he said "antennae dusky to black" as the second part of his description, "pale, the apex of jts. 3-5 and the 6th with spur black," seems to apply better to the apterous forms.

Intermediate.—The one specimen available (metatype specimen) has antennae which are intermediate in color between the black ones of the alates and the lighter ones of the apterous forms. Both antennae are abortive, one having only a very short fifth segment and no sixth, while the other has the fifth, base of sixth and a very short unguis. III and IV are thickly covered with rather small sensoria. V of the one antenna has six small inconspicuous sensoria. No ocelli showing. Wings very small and abortive, about equally developed on each side, hooks showing on both hind wings. Cornicles and cauda appearing about as in the alate and apterous forms. Measurements as follows:

III	IV	V	VI	Head width	Cauda	Cornicle			
						Length	Wide X	Small X	Flange
1.008	0.528	0.384	0.096+0.08	0.56	0.464	0.800	0.128	0.048	0.064
0.944	0.480	0.144	-----	-----	-----	0.784	0.136	0.056	0.072

Oestlund reported this species as "very numerous on the upper stalk and flower heads of *Nabulus albus*." Pergande took them on the stem and under side of leaves. Miss Patch says it is not uncommon in the east.

The only dates recorded are September 28, 1897, at Zoological Park, D. C., and July 11, 1903, at Minneapolis, Minn., both by Pergande.

Host.—*Nabulus albus*.

Distribution.—Minnesota, District of Columbia, Connecticut.

Metatype.—Deposited in U. S. National Museum.

AMPHOROPHORA NERVATA (Gillette)

Figs. 130-138

Rhopalosiphum nervatum GILLETTE, Canad. Ent., vol. 40, 1908, p. 63.—DAVIDSON, Journ. Ec. Ent., vol. 7, 1914, p. 134.—ESSIG, Univ. Cal. Pub. Tech. Bull. Agr. Exp. Sta. Ent., vol. 1, no. 7, 1917, p. 331.—SWAIN, Univ. Cal. Pub. Tech. Bulls. Agr. Exp. Sta. Ent., vol. 3, no. 1, 1919, p. 84.—PATCH, Maine Agr. Exp. Sta. Bull. 282, 1919, p. 220.

Rhopalosiphum arbuti DAVIDSON, Journ. Econ. Ent., vol. 3, 1910, p. 378.—ESSIG, Univ. Cal. Pub. Tech. Bulls. Agr. Exp. Sta. Ent., vol. 1, no. 7, 1917, p. 331.

The writer has had the privilege of examining the cotype specimens of *nervatum* Gill. from rose and of *arbuti* Davidson from *Arbutus* and considers them to be the same as has already been pointed out by

others. The amount of dilation of the cornicle varies somewhat, some specimens being only very slightly swollen, but the species undoubtedly should be placed in *Amphorophora*.

Alate viviparous Female.—Rather small. Antennae slender, dark colored, about one and one-half times as long as body, imbricated, hairs small and inconspicuous, III with a row of sensoria along outer, basal edge. Antennal tubercles moderate in size. Beak reaching second coxae. Cornicles long, slender, not strongly swollen, conspicuously imbricated, not reticulated. Cauda long, conical, only slightly constricted, two sets of lateral hairs.

Antennal measurements

No.	III	Sensoria	IV	V	VI
1-----	0. 592	13	0. 448	0. 392	0. 128+0. 800
2-----	0. 640	16	0. 432	0. 424	0. 144+0. 848
	0. 624	14	0. 464	?	?
3-----	0. 576	14	0. 416	0. 432	0. 152+0. 800
4-----	0. 560	14	0. 448	0. 448	0. 144+(0. 496+)
	0. 544	13	0. 416	0. 368	0. 128+0. 752
5-----	0. 608	15	0. 480	0. 432	0. 144+0. 848
	0. 624	15	0. 480	0. 448	0. 144+0. 848
6-----	0. 624	15	0. 560	?	?
	0. 640	12	0. 544	0. 544	0. 176+0. 992
7-----	0. 432	13	0. 368	0. 336	0. 112+0. 800
	0. 432	?	0. 368	0. 336	0. 112+?
8-----	0. 592	14	0. 432	0. 432	0. 128+0. 752
	0. 624	?	0. 400	0. 400	0. 128+0. 752
9-----	0. 672	17	0. 592	0. 480	0. 144+0. 976
	0. 704	?	0. 560	0. 480	0. 144+0. 992
10-----	0. 448	12	0. 352	0. 360	0. 128+0. 848
	0. 448	11	0. 352	0. 368	0. 128+0. 848

Other measurements

No.	Head width	Cauda	Length	Wide X	Small X	Flange
1----	0. 408	0. 240	0. 608	0. 056	0. 040	0. 048
			0. 608	0. 064	0. 040	0. 048
2----	?	0. 240	0. 624	0. 064	0. 040	0. 048
			0. 560	0. 064	0. 040	0. 056
3----	?	0. 240	0. 624	0. 056	0. 040	0. 048
			0. 608	0. 056	0. 040	0. 048
4----	0. 384	0. 176	0. 528	0. 056	0. 040	0. 048
			0. 528	0. 048	0. 032	0. 048
5----	?	0. 256	0. 640	0. 056	0. 040	0. 048
			?	0. 048	0. 032	0. 040
6----	0. 440	0. 272	0. 688	0. 072	0. 040	0. 056
			0. 688	0. 072	0. 040	0. 056
7----	0. 352	0. 128	0. 464	0. 056	0. 032	0. 040
			0. 480	0. 056	0. 032	0. 040
8----	0. 384	0. 224	0. 592	0. 056	0. 040	0. 048
			0. 560	0. 064	0. 040	0. 048
9----	0. 416	0. 256	0. 768	0. 064	0. 032	0. 048
			0. 768	0. 072	0. 040	0. 056
10----	0. 368	?	0. 512	0. 048	0. 032	0. 040

Davidson in his description of *arbuti* says, "Joint III has about 20 small sensoria, joint IV about 8 smaller ones." I have been unable to see any sensoria on IV in the specimens which he furnished me.

Apterous viviparous female.—Small. Antennae nearly twice as long as body, light colored, the tips of segments and all of VI darker, faintly imbricated, hairs inconspicuous, no secondary sensoria. Antennal sensoria prominent. Beak reaching third coxae. Cornicles long, slender, slightly but distinctly swollen, imbricated, not reticulated. Cauda very broad, scarcely constricted, with two sets of lateral hairs.

Antennal measurements

No.	III	IV	V	VI
1-----	0. 608	0. 448	0. 400	0. 128+(0. 576+)
	0. 608	0. 416	0. 368	0. 128+(0. 256+)
2-----	0. 528	0. 320	0. 336	0. 112+0. 736
	0. 528	0. 320	0. 320	0. 112+0. 704
3-----	0. 576	0. 384	0. 336	0. 120+0. 816
	0. 560	0. 384	0. 352	0. 112+0. 800
4-----	0. 480	0. 352	0. 320	0. 112+(0. 656+)
	0. 464	0. 352	0. 320	0. 112+0. 752
5-----	0. 640	0. 496	0. 416	0. 136+0. 864
	0. 672	0. 512	0. 416	0. 128+0. 848
6-----	0. 720	0. 624	0. 504	0. 152+(0. 784+)
	0. 752	0. 640	0. 496	0. 160+0. 928
7-----	0. 576	0. 464	0. 400	0. 144+0. 800
	0. 560	0. 448	0. 384	0. 144+0. 784
8-----	0. 592	0. 432	0. 416	0. 136+0. 816
	0. 592	0. 448	0. 384	0. 128+0. 720
9-----	0. 544	0. 432	0. 368	0. 128+0. 688
	0. 528	0. 416	0. 384	0. 144+0. 784
10-----	0. 560	0. 448	0. 384	0. 128+0. 720
	0. 544	?	?	?

Other measurements

No.	Head width	Cauda	Cornicle			
			Length	Wide X	Small X	Flange
1-----	0. 400	0. 304	0. 656	0. 064	0. 040	0. 056
			0. 656	0. 064	0. 040	0. 048
2-----	0. 368	0. 352	0. 528	0. 064	0. 040	0. 048
			0. 528	0. 064	0. 040	?
3-----	?	0. 256	0. 576	0. 064	0. 032	0. 048
			?	0. 064	0. 032	0. 048
4-----	0. 352	0. 208	0. 560	0. 072	0. 032	0. 048
			0. 560	0. 072	0. 032	0. 048
5-----	0. 400	0. 240	0. 720	0. 080	0. 040	0. 048
			0. 704	0. 080	0. 040	0. 048
6-----	0. 424	0. 320	0. 864	0. 096	0. 040	0. 048
			0. 864	0. 088	0. 040	0. 048
7-----	0. 392	0. 256	0. 752	0. 072	0. 040	0. 048
			0. 720	0. 064	0. 040	0. 048
8-----	0. 368	0. 256	0. 640	0. 064	0. 040	0. 048
9-----	0. 392	0. 240	0. 640	0. 064	0. 040	0. 048
10-----	0. 400	?	0. 736	0. 080	0. 040	0. 048

The last instar nymph of the apterous viviparous female measures as follows:

III	IV	V	VI	Head width	Cornicle length
0. 448 0. 432	0. 384 0. 416	0. 336 0. 352	0. 096+0. 768 0. 096+0. 752	0. 400 -----	0. 448 0. 480

Alate male.—Antennae slightly more than one and one-half times as long as body, imbricated especially beyond III, inner side of I gibbous, III 0.608 mm. long with 30 sensoria, IV 0.512 mm. long with 16–17 sensoria, V 0.464 mm. long with 12–14 sensoria, base of VI 0.144 mm. long, unguis 0.792 mm. long. Antennal tubercles moderate in size. Head 0.416 mm. across eyes. Cornicles 0.624 mm. long, widest diameter 0.064 mm., smallest diameter 0.040 mm., flange 0.048 mm. wide, conspicuously imbricated, not reticulated. From one metatype specimen on rose at Fort Collins, Colo., November 3, 1914.

Biology.—In California this species seems to migrate between rose and *Arbutus*. The only transfer was made by Swain. I agree with him and with Essig that *arbuti* Davidson from *Arbutus* seems to be structurally the same as *nervata* Gillette on rose. The writings of Davidson and Gillette would indicate that the species may be found throughout the year on either plant.

Host plants.—Rose, *Arbutus menzeisii*, *Arbutus unedo* Linnaeus, *Photinia arbutifolia* and *Arctostaphylos manzanita* Parry.

Distribution.—Colorado and California.

Cotypes.—Specimens of *nervata* Gillette are in the collection of the U. S. National Museum, Cat. No. 26855, in the Colorado Agricultural Experiment Station, and in the Maine Agricultural Experiment Station. Those of *arbuti* Davidson are in the U. S. National Museum and in the collection of Davidson.

AMPHOROPHORA OLERACEAE (Van der Goot)

Figs. 49–54

Rhopalosiphum lactucae (Kaltenbach) MAKI, Bull. Agr. Exp. Sta. Formosa No. 103, 1913, p. 22.

Rhopalosiphum oleraceae VAN DER GOOT, Zur Kenntniss der Blattläuse Java's 1917, p. 40.

Amphorophora oleraceae (Van der Goot) TAKAHASHI, Aphididae of Formosa, pt. 1, Form. Agr. Exp. Sta. 1921, p. 28; Rev. Form. Agr., no. 182, 1921, p. 63.

Amphorophora sonchifoliae TAKAHASHI, Aphididae of Formosa, pt. 2, Rept. Agr. Gov. Res. Inst. Formosa, no. 4, 1923, pp. 31 and 84.

This species is very close to *cosmopolitana* and is found on the same summer hosts. It can be distinguished by the larger number of sensoria, especially in the apterous form. The sensoria are not quite

as protruding, the hairs are less conspicuous, and the antennal tubercles are slightly larger.

Takahashi has described *Amphorophora sonchifoliae* as a new species on *Sonchus arvensis*. He says, "closely related to *A. oleraceae* (v. d. Goot), from which it differs in the more slender cornicles." He says the cornicles of the alate form are eight times as long as wide, while those of the apterous form are seven times as long as wide. I have compared apterous specimens sent by Takahashi with metatype specimens of *oleraceae* v. d. Goot. While there are some slight differences, I can not at present consider the two as distinct. (See discussion on p. 4.) In the tables of measurements given below I have separated those of *sonchifoliae* from *oleraceae* for the benefit of those who have not seen specimens.

Alate viviparous female (oleraceae v. d. Goot).—Antennae about the same length as the body, dark, hairs very inconspicuous (more so than in *cosmopolitana*), numerous rather large, but not strongly protruding sensoria on III, IV, and V. Antennal tubercles small, but somewhat larger than in *cosmopolitana*. Beak reaching about to second coxae. Small prothoracic tubercles. Abdomen bearing a middorsal dark area and lateral dark patches, these having a tubercle and spines as in *cosmopolitana*. Cornicles of moderate length, somewhat swollen, the tips imbricated, not reticulated. Cauda constricted, three to four sets of hairs.

No.	III	Sensoria on III	IV	Sensoria on IV	V	Sensoria on V	VI
1-----	0. 720	46	0. 448	27	0. 400	12	0. 128+0. 800
2-----	0. 736	51	0. 448	27	?	?	?

No.	Head	Cauda	Cornicle			
			Length	Wide X	Small X	Flange
1-----	0. 448	0. 272	0. 480	0. 064	0. 032	0. 040
			0. 480	0. 064	0. 032	0. 040
2-----	0. 472	0. 256	0. 464	0. 072	0. 032	0. 040

Apterous viviparous female (oleraceae v. d. Goot).—Antennae slightly longer than body, light colored, tips of segments darker, hairs very inconspicuous, III, IV, and V with large, nonprotruding sensoria. Antennal tubercles of moderate size. Beak reaching beyond second coxae, nearly to third. Cornicles short, moderately swollen, the tip imbricated, not reticulated. Cauda strongly constricted, three sets of lateral hairs.

No.	III	Sensoria on III	IV	Sensoria on IV	V	Sensoria on V	VI
1-----	0. 640	28	0. 368	10	0. 360	4	0. 128+?
2-----	0. 640	26	0. 416	10	0. 344	6	0. 128+0. 688
	0. 688	27	0. 424	10	0. 352	5	0. 136+0. 704
3-----	0. 640	22	?	?	?	?	?

No.	Head	Cauda	Cornicle			
			Length	Wide X	Small X	Flange
1-----	?	0. 272	0. 464	0. 080	0. 040	0. 048
2-----	?	0. 256	0. 520	0. 064	0. 040	0. 040
			0. 512	0. 064	0. 040	0. 040
3-----	0. 456	0. 304	0. 448	0. 072	0. 040	0. 040

Measurements of *A. sonchifoliae* Takahashi

No.	III	Sen. on III	IV	Sen. on IV	V	Sen. on V	VI
1-----	0. 656	31	0. 408	8	0. 376	2	0. 136+0. 768
	0. 672	24	0. 400	10	0. 384	2	0. 144+0. 752
2-----	0. 624	26	0. 384	7	0. 336	1	0. 112+0. 672
	0. 608	22	0. 368	5	0. 352	0	0. 120+?

No.	Head	Cauda	Cornicle			
			Length	Wide X	Small X	Flange
1-----	?	0. 208	0. 480	0. 060	0. 040	0. 048
			0. 480	0. 060	0. 040	0. 048
2-----	?	0. 288	0. 464	0. 064	0. 040	0. 048

Host.—*Sonchus* species, *Lactuca debilis*.

Distribution.—Java, Formosa.

Metatype.—Specimens in collection of U. S. National Museum.

AMPHOROPHORA PALLIDA, new species

Figs. 55-58

This species was received from Dr. Edith M. Patch under the manuscript name of *pallida*. At her suggestion it is described in this paper, and I take pleasure in adopting her manuscript name. It was taken on *Clintonia* at Orono, Me., on August 8, 1918 (Maine No. 288-18 and 289-18). Three adult and several nymphal apterous viviparous females were received. No alates.

Apterous viviparous female.—Antennae about one and one-half times as long as body, slightly darker in color, indistinctly imbricated, hairs inconspicuous, shorter than width of segment, III with 2-3

sensoria near base. Antennal tubercles very large and long. Beak reaching beyond second coxae, nearly to third. No prothoracic or abdominal tubercles. Cornicles very light colored, long, strongly dilated on distal half, but not much reduced at flange, reticulated for a short distance, not imbricated. Cauda concolorous with body, long, broad, strongly constricted at base; two sets of lateral hairs. Measurements as follows:

No.	III	Sensoria on III	IV	V	VI
1-----	0. 656	3	0. 560	0. 528	0. 144+0. 960
	0. 656	2	0. 560	0. 536	0. 160+0. 992
2-----	0. 568	3	0. 512	0. 544	0. 152+1. 024
	0. 592	3	0. 488	0. 544	0. 144+1. 040
3-----	0. 688	2	0. 560	0. 536	0. 168+ ?
	0. 672	2	0. 560	0. 544	?

No.	Head	Cauda	Cornicle				
			Length	Reticulated	Wide X	Small X	Flange
1-----	0. 432	0. 320	0. 560	0. 040	?	?	0. 056
			0. 560	0. 040	?	?	0. 056
2-----	0. 384	0. 224	0. 496	0. 040	0. 080	?	0. 048
3-----	0. 368	0. 320	0. 560	0. 040	0. 096	0. 048	0. 056
			0. 584	0. 040	0. 096	0. 056	0. 048

Host.—*Clintonia*.

Distribution.—Orono, Maine.

Cotypes.—Returned to Maine Agricultural Experiment Station.

AMPHOROPHORA PERGANDEI, new species

Figs. 72-77

Pergande took the apterous forms of this species on the under side of currant leaves at Washington, D. C., on May 6, 1897. On May 12 he reared from them a single alate specimen. These cotype specimens furnish the only records we have of the species.

This species can be distinguished from *cosmopolitana* on the same host by the larger number of sensoria and by the very long, capitate hairs of the antennae.

Alate viviparous female.—Antennae about twice as long as body, dark colored, very tuberculate, III with 125-130 sensoria, IV with 40-45 sensoria, V with 5-8 sensoria, hairs capitate and as long as or longer than width of segment. Antennal tubercles of moderate size. Beak reaching about to second coxae. Prothoracic tubercles not showing. Abdomen without the lateral dark patches as in *cosmopolitana*. Cornicles of moderate length, strongly swollen, dark colored, lighter at base, tips very faintly imbricated. Cauda very long, narrow, constricted, four sets of large lateral hairs.

III		IV		V		VI	
1. 056 1. 072		0. 576 0. 552		0. 496 0. 496		0. 112+1. 120 0. 104+1. 104	
Head	Cauda	Cornicle					
		Length	Wide X	Small X	Flange		
0. 528	0. 336	0. 560 0. 544	0. 112 0. 120	0. 048 0. 048	0. 064 0. 072		

Notes by Pergande.—"Color green, thoracic lobes pale brownish; medio dorsal line darker green; nectaries grayish green, their basal one-third pale green. Antennae and legs black; basal half or three-fourths of femora greenish; two basal jts. of antennae dusky, base of first jt. yellowish, eyes brown. Stigma pale dusky; subcosta yellow, veins black."

Apterous viviparous female.—Antennae slightly longer than body, light colored, not plainly imbricated, hairs very conspicuous, capitate, as long as or longer than width of Segment III with 12-27 small sensoria at base, not in a row. Antennal tubercles fairly large. Beak reaching about to third coxae. Cornicles short and thick, plainly swollen, tips imbricated or slightly reticulated. Cauda very long, narrow, constricted, with 4-5 sets of lateral hairs.

No.	III	Sensoria on III	IV	V	VI	
1	0. 832 0. 848	18 13	0. 496 0. 464	0. 400 0. 432	0. 096+1. 152 0. 104+ ?	
2	0. 848 0. 832	17 27	0. 480 0. 496	0. 432 0. 448	0. 112+1. 152 0. 104+1. 152	
3	0. 792 0. 800	19 18	0. 512 0. 496	0. 416 0. 416	0. 112+0. 960 0. 096+0. 880	
4	0. 720	12	0. 384	0. 336	0. 088+0. 760	
5	0. 736 0. 736	19 18	0. 432 0. 432	0. 368 0. 376	0. 104+0. 848 0. 104+0. 808	
6	0. 848 0. 848	26 22	0. 528 0. 512	0. 488 0. 464	0. 128+1. 136 0. 120+1. 136	

No.	Head	Cauda	Cornicle			
			Length	Wide X	Small X	Flange
1	0. 520	0. 416	0. 704	0. 120 0. 120	0. 056 0. 056	0. 072 0. 072
2	0. 504	?	0. 720 0. 720	0. 120 0. 120	0. 048 0. 056	0. 072 0. 072
3	0. 520	0. 416	0. 704 0. 672	0. 128 0. 128	0. 048 0. 048	0. 064 0. 064
4	0. 480	0. 400	0. 656	0. 120	0. 048	0. 064
5	0. 480	0. 448	0. 672 0. 664	0. 128 0. 128	0. 048 0. 048	0. 056 0. 064
6	0. 512	0. 432	0. 704 0. 688	0. 136 0. 128	0. 056 0. 056	0. 064 0. 072

Notes by Pergande.—"Color of all uniformly yellowish green; antennae, legs and nectaries paler; tips of antennal jts. 3 and 4 dusky; tip of the fifth and sixth and terminal half of the last black; tibiae brownish toward the end, the tarsi black."

Described from one alate and six apterous specimens taken by Pergande on currant at Washington, D. C.

Cotypes.—Deposited in U. S. National Museum. Cat. No. 26376.

AMPHOROPHORA RETICULATA, new species

Figs. 142-143

Alate viviparous female.—Small species. Antennae more than twice as long as body, slender, dark colored, hairs inconspicuous, much shorter than width of segment, III with 20 sensoria in a row, I, II, and base of III lighter, concolorous with head. Antennal tubercles of moderate size. Beak reaching slightly beyond second coxae. No prothoracic or abdominal tubercles present. Cornicles uniformly dark colored, very long, slender, plainly swollen, very distinctly reticulate at tip. Cauda light colored, conical, not constricted, three sets of hairs. Measurements as follows:

III	Sensoria on III	IV	V	VI
0. 672	20	0. 544	0. 592	0. 176 + 0. 880
0. 672	20	0. 568	0. 624	0. 192 + 0. 880

Head	Cauda	Cornicle				
		Length	Reticulated	Wide X	Small X	Flange
0. 440	0. 176	0. 584	0. 064	0. 056	0. 040	0. 048
		0. 584	0. 064	0. 056	0. 040	0. 048

Described from one specimen taken by Pergande on raspberry in Washington, D. C., July 27, 1907.

Type.—Deposited in the U. S. National Museum. Cat. No. 26377

AMPHOROPHORA RHODODENDRONIA, new species

Figs. 59-61

A slide bearing four apterous viviparous females was received from Dr. Edith M. Patch (Maine No. 168-22). These were taken on *Rhododendron rhodora* at Orono, Maine, July 21, 1922. They are not typical *Amporophora* but no doubt should be placed here, at least until the alate is known. The host plant belongs to a family on which are several members of this genus of aphids.

Apterous viviparous female.—Antennae about one-third longer than body, imbricated, basal segments light colored, distal part of V and all of VI dark with 1-7 sensoria, hairs capitate and very conspicuous, especially on III. Antennal tubercles very prominent. Beak reaching beyond second coxae. A small prothoracic tubercle showing on some specimens. Cornicles long, slender, slightly swollen, imbricated, tip dark and reticulated. Cauda long, conical, scarcely constricted, three sets of lateral hairs. Measurements as follows:

No.	III	Sensoria on III	IV	V	VI
1-----	0. 784	8	0. 544	0. 624	0. 160+0. 800
	0. 784	6	0. 608	0. 576	0. 176+ ?
2-----	0. 576	1	0. 464	0. 464	0. 128+0. 800
3-----	0. 832	5	0. 528	0. 576	0. 144+0. 832
	0. 816	4	0. 560	0. 560	0. 144+0. 848
4-----	0. 656	3	0. 528	0. 544	0. 168+0. 800
	0. 672	2	0. 528	0. 528	0. 160+0. 832

No.	Head	Cauda	Cornicle				
			Length	Reticulated	Wide X	Small X	Flange
1-----	0. 464	0. 352	0. 800	0. 064	0. 072	0. 040	0. 056
			0. 832	0. 080	0. 088	0. 040	0. 056
2-----	0. 384	0. 224	0. 504	0. 048	0. 072	0. 040	0. 056
			0. 528	0. 048	0. 072	0. 040	0. 056
3-----	0. 448	0. 336	0. 736	0. 080	0. 072	0. 040	0. 056
			0. 712	0. 064	0. 072	0. 040	0. 056
4-----	0. 464	0. 312	0. 704	0. 080	0. 072	0. 040	0. 056
			0. 744	0. 064	0. 064	0. 040	0. 056

Specimen No. 2 is smaller, has four hairs on cauda instead of three, and is somewhat different in other ways. Since it was taken from the same host, I hesitate to describe it as new until more is known of it.

Host.—*Rhododendron rhodora*.

Distribution.—Orono, Maine.

Cotypes.—Returned to Maine Agricultural Experiment Station.

AMPHOROPHORA RUBI (Kaltenbach)

Figs. 150-157, and 190

Aphis rubi KALTENBACH, Monographie der Pflanzenlaus, 1843, p. 24.

Siphonophora rubi (Kaltenbach) KOCH, Die Pflanzenlaus Aphiden, 1854, p. 191.—BUCKTON, British Aphides, vol. 1, 1876, p. 140.—THOMAS, 8th Rept. Ill. St. Ent., 1880, p. 64.—LICHTENSTEIN, Les Pucerons, Monographie des Aphidiens, 1885, p. 40.—WILLIAMS, Univ. Nebr. Spec. Bull. 1, 1891, p. 7.—SCHOUTEDEN, Ann. de la Soc. Ent. Belg., vol. 44, 1900, p. 116.—WILLIAMS, Kans. Univ. Studies, vol. 10, no. 2, 1910, p. 84.

Nectarophora rubi (Kaltenbach) OESTLUND, Minn. Geol. and Nat. Hist. Surv. Bull. 4, 1887, p. 87.—HUNTER, Iowa Agr. Exp. Sta. Bull. 60, pp. 116, 130.

- Macrosiphum rubi* (Kaltenbach) DEL GUERCIO, Nuove Rel. Staz. Firenze, ser. 1, no. 2, 1900, p. 159.—SCHOUTEDEN, Ann. de la Soc. Ent. Belg., vol. 45, 1901, p. 271.—SANBORN, Kans. Univ. Sci. Bull., vol. 3, no. 8, 1906, pp. 248, 268.—DAVIS, Journ. Econ. Ent., vol. 4, 1911, p. 329; Nebr. Univ. Studies, Ent., no. 5, 1911, p. 34; Bull. Ill. St. Lab. Nat. Hist., vol. 10, 1913, p. 104.—WILSON and VICKERY, Trans. Wis. Acad. Sci. Arts and Letters, vol. 19, pt. 1, 1918, p. 148.
- Amphorophora rubi* (Kaltenbach) SCHOUTEDEN, Mem. de la Soc. Ent. de Belg., vol. 12, 1906, p. 242.—GILLETTE, Journ. Econ. Ent., vol. 4, 1911, p. 381.—THEOBALD, Ent., vol. 50, 1917, p. 79; Fruit, Flower and Vegetable Trades Journal, London, Oct. 13, 1917.—SHINJI, Can. Ent., vol. 49, 1917, p. 52.—ESSIG, Univ. Cal. Pub. vol. 1, no. 7, 1917, p. 329.—SWAIN, Univ. Cal. Pub., vol. 3, no. 1, 1919, p. 54.
- Rhopalosiphum rubi* (Kaltenbach) VAN DER GOOT, Beit. kennt. der Holland. Blattläuse, 1915, p. 153.—MULLER-THURGAU, OSTERWALDER, SCHNEIDER-ORELLI, Rept. Dept. Plant Phys. and Plant Path. Swiss Exp. Inst. for Fruit, Vine and Garden Cult. at Wadenswil for the year 1915-16, 1917; Sept. from Landwist schaftl. Jahrbuch der Schweiz, p. 416.
- Eunectarosiphon rubi* (Kaltenbach) DEL GUERCIO, Redia, vol. 9, 1913, p. 188.
- Acrythosiphon (Amphorophora) rubi rubi* (Kaltenbach) MORDVILKO, Fauna de la Russie, 1919, p. 251.
- Nectarosiphon rubi* (Kaltenbach) PATCH, Conn. St. Geol. and Nat. Hist. Surv. Bull. 34, 1923, p. 310.
- Siphonophora fragariella* THEOBALD, Rept. Econ. Zool. year ending Apr. 1, 1905, p. 35.
- Macrosiphum fragariellum* THEOBALD, Journ. Econ. Biol., vol. 8, no. 3, 1913, p. 124.
- Acyrtosiphon (Amphorophora) rubi fragariellum* (Theobald) MORDVILKO, Fauna de la Russie, 1919, p. 263.

This species seems to be widely distributed in Europe and on the North American continent. In America, however, there is another similar species (see *sensoriata* Mason) which, no doubt, has often been confused with *rubi*. In many of the references in literature it is impossible to tell to which one the writer referred. Gillette had this new species when he wrote: "A very similar species taken by Mr. Bragg at Lawrence, Kans., differs by having cornicles decidedly shorter and having joint 4 of the antenna in the alate viviparae well set with sensoria." Dr. C. P. Gillette kindly lent me this slide for examination. Still another species which might be confused with *rubi* Kaltenbach is described in this paper as *reticulata*, new species.

The typical *rubi* Kaltenbach, as fixed by Gillette, Van der Goot, and Mordvilko and which is accepted here, has sensoria only on segment III, while *sensoriata* Mason has them also on IV and V. Gillette says that specimens from England examined by him are a little smaller but agree in other respects with American specimens.

The species described by Swain in 1919 is not *rubi* Kaltenbach. He described specimens received from Gillette. I have had the privilege of examining these same slides, kindly lent by Ferris, and they

prove to be the same as other specimens which I had already described in manuscript as *davidsoni* , new species. Swain did have specimens of *rubi* Kaltenbach from other sources, but did not describe them.

Mordvilko under *rubi* Kaltenbach considers four subspecies. One of these is the typical *rubi* Kaltenbach. Another is *fragariellum* Theobald which I believe to be the same as *rubi* Kaltenbach. The other two subspecies are apparently distinct and I have elevated them to the rank of species. These are discussed under the individual species. I give herewith a translation of Mordvilko's key for the separation of his four subspecies.

1. (6) The third segment of the antennae exceeds the fourth only slightly, for instance, one and one-third to one-seventh times; the unguis of the sixth segment almost equals the third segment (in wingless females somewhat shorter and in winged, somewhat though very little longer).

2. (5) The base of the sixth segment of the antennae consists of one-seventh to one-sixth the length of the third segment, reaching 0.17-0.19 and almost 0.20 mm., but at times (in the case of long antennae) 0.22.

3. (4) The cornicles even in the wingless females are dark, in front of the flange they are usually very slightly but nevertheless noticeably swollen; they reach one-fourth to two-ninths the length of the body (in wingless females); cauda with 3-4 bristly lateral hairs----- *Ac. rubi amurense* , new subspecies.

4. (3) Cornicles in wingless females light colored; in front of the flange there is hardly any swelling noticeable; the cornicles reach two-sevenths to one-third the length of the body; on the sides of the cauda are 5-6 bristly hairs ----- *Ac. rubi rubi* (Kaltenbach).

5 (2) The base of the sixth segment of the antennae consists of one-fifth the length of the third, reaching 0.22 mm----- *Ac. rubi fragariellum* (Theobald).

6. (1) The third segment of the antenna exceeds the fourth distinctly, for instance, one and two-fifths to one and one-half times and the unguis of the sixth segment, even in the wingless females exceeds the third segment distinctly, for instance, one and two-fifths to one and one-half times and the unguis, even in wingless females exceeds the third segment distinctly, for instance, one and two-ninths times; the base of the sixth segment consists of about one-fifth the length of the third reaching 0.17-0.18 mm----- *Ac. rubi zhuravlevi* , new subspecies.

Alate viviparous female. —Large species. General color green. Antennae longer than the body, rather slender, dark colored, hairs nearly as long as width of segment, capitate, more conspicuously so in some specimens, III with 30-50 sensoria over the entire length, not strongly tuberculate. Antennal tubercles very large. Beak reaching second coxae. Prothoracic tubercles large. Cornicles very long, moderately swollen, the tips imbricated but not reticulated. Cauda long, broad, conical, not constricted, with 4-6 sets of lateral hairs. Measurements as follows:

No.	III	Sensoria on III	IV	V	VI
1.....	1. 104	44	0. 944	0. 816	0. 208+1. 200
	1. 104	48	0. 960	0. 832	0. 192+1. 248
2.....	1. 152	40	1. 008	0. 832	0. 200+1. 200
	1. 136	45	0. 928	0. 832	0. 208+1. 232
3.....	1. 056	38	0. 960	0. 800	0. 192+1. 216
	1. 088	33	0. 944	0. 912	0. 192+ ?
4.....	1. 168	42	0. 848	0. 640	0. 160+ ?
5.....	1. 168	36	0. 896	0. 688	0. 160+1. 136
	1. 200	41	?	?	? ?
6.....	1. 088	32	0. 816	0. 576	0. 144+ ?
	1. 104	34	0. 800	0. 624	?
7.....	1. 200	31	0. 864	0. 752	0. 176+ ?
	1. 120	29	0. 704	0. 720	0. 160+1. 232
8.....	1. 136	30	0. 864	0. 608	0. 160+1. 008
	1. 072	33	0. 864	0. 624	0. 160+ ?
9.....	1. 152	42	0. 912	0. 640	0. 160+ ?
	1. 152	37	0. 880	0. 656	0. 160+0. 928
10.....	1. 088	37	1. 040	0. 880	0. 208+1. 296
	1. 056	?	1. 040	0. 848	0. 192+1. 264
11.....	1. 088	30	0. 928	0. 768	0. 192+1. 280
	1. 040	31	0. 880	0. 768	0. 208+1. 312

No.	Head	Cauda	Cornicle			
			Length	Wide X	Small X	Flange
1.....	0. 560	0. 448	0. 896	0. 088	0. 056	0. 072
			0. 912	0. 088	0. 056	0. 072
2.....	0. 528	0. 432	0. 864	0. 088	0. 056	0. 080
			0. 912	0. 096	0. 048	0. 072
3.....	0. 528	0. 448	0. 816	0. 088	0. 056	0. 080
			0. 864	0. 096	0. 056	0. 080
4.....	0. 560	?	0. 848	0. 096	0. 056	0. 072
			0. 816	0. 096	0. 056	0. 072
5.....	0. 560	?	0. 880	0. 096	0. 056	0. 072
			0. 864	0. 104	3. 056	0. 072
6.....	0. 512	0. 384	0. 768	0. 096	0. 056	0. 072
7.....	0. 544	0. 384	0. 800	0. 096	0. 056	0. 072
8.....	0. 528	0. 416	0. 800	3. 096	0. 048	0. 064
9.....	?	0. 496	0. 896	0. 104	0. 056	0. 064
10.....	0. 544	0. 368	0. 864	0. 088	0. 064	0. 080
11.....	0. 544	0. 320	0. 800	0. 088	0. 056	0. 080
			0. 800	0. 080	0. 056	0. 072

Color Notes by Pergande.—"The abdomen is greenish, with a darker green median stripe, with a row of 3 to 4 dusky or blackish spots on each side in front of nectaries. Nectaries whitish, their apex black. Tail of color of body. Antennae black, the two basal jts. head, and prothorax yellowish, terminal $\frac{1}{2}$ or more of femora, and apex of tibiae and the tarsi black, rest of legs yellowish. Eyes and thoracic lobes brown."

Apterous viviparous female.—Large, green. Antennae somewhat longer than body, light colored, becoming darker towards the distal end, imbricated, hairs very conspicuous, nearly as long as width of segment, capitate on some specimens, III with 4-19 sensoria on outer

side of basal half. Antennal tubercles very large. Beak reaching beyond second coxae. Prothoracic tubercles present, a hair near each one. No abdominal tubercles showing. Cornicles long, slender, but plainly swollen, tips imbricated, not reticulated. Cauda large, long, conical, not constricted, with about five sets of lateral hairs. Measurements as follows:

No.	III	Sensoria on III	IV	V	VI
1-----	1. 216 1. 264	10 13	0. 968 0. 960	0. 720 0. 760	0. 168+1. 088 0. 160+ ?
2-----	1. 312 1. 280	19 15	0. 896 0. 944	0. 752 0. 768	0. 192+ ? 0. 208+1. 216
3-----	1. 232 1. 240	9 10	0. 976 1. 000	0. 800 0. 784	0. 176+1. 240 3. 176+1. 216
4-----	1. 104 1. 152	9 10	0. 976 0. 960	0. 720 0. 720	0. 192+1. 152 0. 176+ ?
5-----	1. 264 1. 232	9 9	1. 040 1. 024	0. 816 0. 768	0. 208+ ? 0. 192+1. 200
6-----	1. 216 1. 184	8 9	0. 896 0. 960	0. 768 0. 752	0. 192+1. 168 0. 200+1. 200
7-----	1. 232 1. 248	13 14	1. 024 1. 024	0. 856 0. 816	0. 224+1. 328 0. 192+1. 264
8-----	1. 248 1. 184	12 7	0. 992 1. 056	0. 848 0. 896	0. 192+1. 280 0. 216+1. 200
9-----	1. 184 1. 120	7 9	1. 056 0. 768	0. 896 0. 560	0. 216+1. 200 0. 168+1. 008
10-----	1. 136 1. 056	7 5	0. 848 0. 608	0. 584 0. 480	0. 144+0. 992 0. 144+ ?
11-----	1. 024 1. 136	4 11	0. 608 ?	0. 456 ?	0. 144+ ? ?
12-----	1. 152	8	0. 864	0. 648	0. 160+ ?

No	Head	Cauda	Cornicle			
			Length	Wide X	Small X	Flange
1-----	0. 584	0. 512	0. 992 0. 992	0. 096 0. 096	0. 064 0. 064	0. 080 0. 072
2-----	0. 600	0. 544	0. 992 1. 008	0. 096 0. 096	0. 056 0. 064	0. 080 0. 080
3-----	0. 544	0. 512	1. 056 1. 072	0. 096 0. 096	0. 064 0. 064	0. 088 0. 088
4-----	0. 584	0. 464	0. 960 0. 992	0. 096 0. 088	0. 064 0. 064	0. 080 0. 080
5-----	0. 608	0. 520	0. 976 1. 024	0. 104 0. 104	0. 064 0. 064	0. 080 0. 080
6-----	0. 544	0. 464	0. 960 ?	0. 088 0. 096	0. 056 0. 064	0. 080 0. 080
7-----	0. 608	0. 496	1. 024 1. 008	0. 088 0. 088	0. 056 0. 056	0. 080 0. 072
8-----	0. 600	0. 528	1. 008 1. 008	0. 096 0. 104	0. 064 0. 064	0. 080 0. 080
9-----	0. 576	0. 496	0. 976 0. 960	0. 080 0. 080	0. 048 0. 056	0. 064 0. 072
10-----	0. 576	0. 480	0. 928 0. 912	0. 112 0. 112	0. 064 0. 056	0. 080 0. 072
11-----	0. 496	0. 464	0. 832 0. 960	0. 088 0. 120	0. 056 0. 064	0. 072 0. 072
12-----	0. 568	0. 480	0. 960 0. 896	0. 120 0. 112	0. 064 0. 064	0. 072 0. 080

Alate male.—Antennae much longer than body, dark colored, especially III, hairs nearly as long as width of segment, III and V with sensoria, IV without. Beak about reaching second coxae. Cornicles dark colored, long, moderately swollen, tips imbricated. Cauda as seen from the side, is of moderate length, not constricted and with 3 or 4 lateral hairs. Measurements as follows:

III	Sensoria on III	IV	Sensoria on IV	V	Sensoria on V	VI
0. 944	67	0. 720	0	0. 736	18	0. 192 + 1. 312
0. 976	64	0. 768	0	0. 712	19	0. 176 + ?

Head	Cauda	Cornicle			
		Length	Wide X	Small X	Flange
?	0. 144	0. 576 0. 576	0. 064 0. 064	0. 040 0. 040	0. 056 0. 056

Apterous Oviparous Female.—This is described by Van der Goot.

Biology.—This species is found on probably a large number of the members of the genus *Rubus*, both wild and cultivated. Exact specific records of the host plants are, however, often wanting. So far as known it has no alternate host, and it has been found throughout the summer on *Rubus*.

Pergande found them singly on the under side of leaves. He called attention in his notes to the difference between this and the habits of *sensoriata* Mason, which are found on the canes.

In his account of *fragariellum*, Theobald gives additional biological data.

It is probable that this species is responsible for the spread of mosaic, but there are no definite published data as yet.

Theobald reports it from the dissected crops of young fowls.

Food Plants.—*Rubus*, strawberries.

Distribution.—Europe, North America (Massachusetts; Maine; Ottawa, Canada; New York; District of Columbia; Virginia; Ohio; Minnesota; Colorado; New Mexico; and California).

Type.—Kaltenbach's type is undoubtedly lost. Specimens which I consider to be this species and which agree with descriptions of other authors are in the National Collection.

AMPHOROPHORA RUBICOLA (Oestlund)

Figs. 144-149, 193

- Macrosiphum rubicola* OESTLUND, Minn. St. Geol. Rept. no. 14, 1886, p. 27; Minn. Geol. and Nat. Hist. Surv. Bull. 4, 1887, p. 78.—WILLIAMS, Univ. Nebr. Spec. Bull. 1, 1891, p. 22.—HUNTER, Iowa Agr. Exp. Sta. Bull. 60, 1901, p. 110.—PATCH, Maine Agr. Exp. Sta. Bull. 233, 1914, p. 270.
- Nectarosiphon rubicola* (Oestlund) KIRKALDY, Canad. Ent., 1906, p. 12.—SANBORN, Kans. Univ. Sci. Bull., vol. 3, no. 8, 1906, p. 269.—WILSON, Ann. Ent. Soc. Amer., vol. 3, 1910, p. 318; Proc. Brit. Colum. Ent. Soc., vol. 5, 1915, p. 83.—WILSON and VICKERY, Trans. Wis. Acad. Sci. Arts and Letters, vol. 19, pt. 1, 1918, p. 149.—SWAIN, Univ. Cal. Pub. Tech. Bull. Agr. Exp. Sta. Ent., vol. 3, no. 1, 1919, p. 77.—PATCH, Conn. St. Geol. and Nat. Hist. Surv. Bull., no. 34, 1923, p. 310.
- Nectarosiphum rubicola* (Oestlund) ESSIG, Univ. Cal. Pub. Tech. Bull. Agr. Exp. Sta. Ent., vol. 1, no. 7, 1917, p. 327.—SHINJI, Psyche, vol. 24, no. 3, 1917, p. 84.
- Amphorophora rubicola* (Oestlund) DAVIDSON, Journ. Econ. Ent., 1914, p. 136.

This large species on *Rubus* is rather close in appearance to two other species on *Rubus* which are described in this paper as *davidsoni* and *maxima*. It may be distinguished from them by the large dusky spot on the tips of the wings and by the dark colored antennae, segment III of which is conspicuously shorter than the cornicle and has 20-30 sensoria.

Alate viviparous female.—Antennae about as long as body, dark colored, except base of III, hairs conspicuous, about as long as width of segment, III with 20-30 sensoria scattered over nearly the entire length and not in a straight row. Antennal tubercles fairly large. Beak extending usually to third coxae. In some specimens there are two tubercles showing on the posterior, dorsal portion of the head. The prothorax has two dorsal tubercles, and a lateral tubercle on each side. The front wings have a dusky spot at the tips. This is darker in some specimens than in others. The abdomen has several lateral tubercles, one specimen showing five in front of the cornicle and one caudad of the cornicle. Hairs are present around each tubercle. The cornicles are long, curved, conspicuously swollen and distinctly reticulated. The cauda is long, slender and constricted, with 5-6 lateral hairs.

Antennal measurements

No.	III	Sensoria on III		V	VI
1-----	0. 896	26	0. 592	0. 560	0. 112 + (0. 592 +)
	0. 864	25	0. 608	0. 528	0. 112 + (0. 496 +)
2-----	0. 928	23	?	?	?
	0. 960	22	0. 832	0. 784	0. 160 + 1. 008
3-----	0. 848	27	0. 576	0. 512	0. 152 + 0. 928
	0. 848	28	?	?	?
4-----	0. 992	30	0. 656	0. 576	0. 152 + 0. 880
	0. 976	22	0. 688	0. 576	0. 144 + 0. 880
5-----	0. 848	21	0. 576	0. 480	0. 128 + 0. 816
	0. 832	?	0. 592	0. 480	0. 128 + 0. 864

Other measurements

No.	Head	Cauda	Cornicle				
			Length	Reticulated	Wide X	Small X	Flange
1-----	0. 560	0. 304+	1. 024	0. 080	0. 192	0. 072	0. 088
			1. 040	0. 080	0. 192	0. 072	0. 088
2-----	0. 544	0. 320+	1. 312	0. 080	0. 156	0. 064	0. 088
			1. 280	0. 096	0. 144	0. 064	0. 080
3-----	0. 544	0. 336	1. 184	0. 080	0. 160	0. 064	0. 080
			1. 184	0. 080	0. 176	0. 064	0. 080
4-----	0. 512	0. 448	1. 136	0. 096	0. 120	0. 064	0. 080
			1. 120	0. 080	0. 120	0. 064	0. 080
5-----	0. 512	0. 368	1. 152	0. 080	0. 152	0. 064	0. 080
			1. 200	0. 048	0. 192	0. 064	0. 080

Patch gives the most compact color description, although it is taken from a rather dark specimen.

Apterous viviparous female.—Antennae about as long as body, light colored except distal ends of segments and VI, hairs numerous, about as long as width of segment, III with 13–15 sensoria on basal half. Beak reaching nearly to third coxae. The only tubercles showing are the lateral prothoracic ones. Cornicles very long, not as conspicuously reticulated as in the alates, somewhat imbricated. Cauda small, somewhat constricted. Measurements as follows:

No.	III	Sensoria on III	IV	V	VI
1-----	0. 944	14	0. 544	0. 480	0. 112+0. 848
	0. 944	15	0. 560	0. 432	0. 112+ ?
2-----	0. 768	13	0. 560	0. 512	0. 128+0. 944
	0. 864	13	?	?	?

No.	Head	Cornicle				
		Length	Reticulated	Wide X	Small X	Flange
1-----	0. 528	1. 424	0. 032	0. 144	0. 064	0. 080
		1. 392	0. 048	0. 152	0. 064	0. 072
2-----	0. 528	1. 120	0. 032	0. 128	0. 064	0. 072
		1. 200	?	0. 128	0. 064	0. 072

Pergande left the following color description of metatype apterous specimens, taken on *Rubus strigosus* at Minneapolis, Minn., July 14, 1903: "Color greenish yellow, marked with a broad dark green median and lateral stripe. Eyes dark brown; nectaries stout and dusky. Antennae whitish; apex of jts. 3–5 and the last black femora pale bluish green; tibiae pale yellowish, darkest toward the end, tarsi black. Head yellowish, tail greenish, body not or but faintly pruinous."

Alate male.—Only one specimen is available for study, and this specimen has lost one antenna and all but a part of segment III of the other. This portion is 0.704 mm. long, dark colored, lighter at the base, thickly covered with 57 circular sensoria, hairs almost as long as width of segment. Antennal tubercles not large. Head 0.496 mm. across eyes. No tubercles showing on thorax or abdomen. Tips of wings with dusky spot. Abdomen light colored. Cornicles light colored, reticulated at the tips, imbricated over the entire length, measurements as follows:

Length	Reticulated	Wide X	Small X	Flange
0. 768 mm.	0. 064	0. 104	0. 048	0. 064
0. 752	0. 064	0. 104	0. 056	0. 064

Oviparous females.—Light colored. Antennae light colored, about equal to the body in length, hairs conspicuous, nearly as long as width of segment, with a group of sensoria near base of III. Antennal tubercles of moderate length. Beak reaching to third coxae. Cornicles light colored, darker at the tips, reticulated. Cauda conical, not constricted, with three sets of lateral hairs. Posterior tibiae with numerous sensoria on basal half, becoming less numerous on distal half. Measurements as follows:

No.	III	Sensoria on III	IV	V	VI
1-----	0. 672	5	0. 432	0. 400	0. 120+0. 672
	0. 672	5	0. 424	0. 408	0. 136+ ?
2-----	0. 704	6	0. 496	0. 432	0. 120+0. 688
	0. 752	10	0. 480	0. 400	0. 112+0. 688
3-----	0. 688	7	0. 448	0. 400	0. 120+0. 672
	0. 720	9	0. 480	0. 368	?
4-----	0. 736	11	0. 496	0. 416	0. 112+0. 720
	?	?	?	0. 416	0. 120+0. 720

No.	Width of head	Cauda	Cornicle				
			Length	Reticulated	Wide X	Small X	Flange
1-----	0. 512	0. 208	0. 944	0. 064	0. 176	0. 064	0. 080
			0. 992	0. 064	?	0. 064	0. 080
2-----	0. 512	0. 176	1. 008	0. 064	0. 168	0. 064	0. 080
			0. 960	0. 064	0. 160	0. 064	0. 080
3-----	0. 528	?	0. 976	0. 064	0. 120	0. 064	0. 080
			?	?	?	?	?
4-----	0. 520	0. 240	0. 912	0. 064	?	0. 064	0. 080
			1. 040	0. 080	0. 112	0. 064	0. 080

The alate male and oviparous females just described were taken by Dr. A. C. Baker on wild raspberry. No viviparous forms were taken, but I feel certain that the specimens must belong to this species.

Biology.—But little is known of the biology of this species. It is found on the leaves and shoots of various species of *Rubus*. Dr. Edith M. Patch took an alate female with eight nymphs on wild red raspberry on August 1, 1906, in Maine. In Minnesota Pergande took apterous females and nymphs on July 14, 1903. In California Shinji took alate and apterous viviparous females on March 20, 1915, at Berkeley; Essig found them at the same place on March 29, 1916, at which time "there were also a number of young pink forms not observed during the summer"; he also found the species abundant on May 24, 1916; Davidson took them in the hilly canyons of Contra Costa County, on May 13, 1913—"at that date about 95 per cent of the lice were large pupae or recently transformed adults." Ross took alate and apterous forms at Ottawa, Canada on July 21, 1917, and Wilson at Vancouver, British Columbia, on July 12, 1915.

Shinji took his males at Berkeley, Calif., on April 4, 1915. Oestlund found them in Minnesota "as late as November first, together with the oviparous wingless females." Baker took the sexes described above at Guelph, Ontario, October 10, 1910.

Distribution.—From Maine to California; Ottawa and British Columbia.

Host.—*Rubus*.

Cotype.—Oestlund's collection.

AMPHOROPHORA SENSORIATA Mason

Figs. 158-163

Amphorophora sensoriata MASON, Proc. Ent. Soc. Wash., vol. 25, No. 9, 1923, p. 188.

As explained under *rubi* Kaltenbach, this is the species mentioned by Gillette as differing from *rubi*. It seems to be rather common on this continent and has no doubt often been confused with *rubi*. So far as I know, it is not found in Europe, the type continent of *rubi* Kaltenbach.

It is easily distinguished from *rubi* by the sensoria on IV and V of the alate, by the larger number of sensoria on III in both the alate and apterous forms, by the shorter hairs on the antenna, by the shorter cornicles, and by the smaller number of hairs on the cauda.

Alate viviparous female.—Large species. General color green. Antennae longer than body, dark colored, imbricated, hairs inconspicuous, much smaller than in *rubi*, numerous sensoria on III, IV, and some on V. Antennal tubercles large. Beak very short, in

some specimens not reaching second coxae. Prothoracic and abdominal tubercles not showing. Cornicles fairly long, moderately swollen, the tips imbricated, but not reticulated. Cauda of medium length, broad, not constricted, with about three sets of lateral hairs. Measurements as follows:

The first three are from cotype slides, the others from paracotype slides.

No.	III	Sensoria on III	IV	Sensoria on IV	V	Sensoria on V	VI
1-----	1. 088	75	0. 800	39	0. 576	5	0. 192+0. 960
	1. 104	82	0. 848	47	0. 560	3	0. 192+0. 960
2-----	1. 072	62	0. 936	30	0. 512	4	0. 176+0. 960
	1. 024	62	0. 800	34	0. 544	5	0. 176+0. 928
3-----	1. 176	65	0. 896	32	0. 608	1	0. 192+ ?
	1. 184	66	0. 848	38	0. 640	2	0. 192+1. 040
4-----	1. 040	61	0. 784	32	0. 544	0	0. 176+0. 928
	1. 120	69	0. 864	36	?	?	?
5-----	1. 040	62	0. 768	36	0. 544	0	0. 176+1. 040
6-----	0. 960	55	0. 736	31	0. 528	5	0. 160+0. 928
7-----	1. 040	59	0. 672	20	0. 496	3	0. 160+0. 880
8-----	1. 008	62	0. 784	31	0. 480	4	0. 160+0. 800
9-----	1. 008	49	0. 768	33	0. 496	5	0. 176+ ?

No.	Head	Cauda	Cornicle			
			Length	Wide X	Small X	Flange
1-----	0. 536	0. 288	0. 544	0. 072	0. 040	0. 048
			0. 560	0. 072	0. 040	0. 048
2-----	0. 528	0. 272	0. 480	0. 072	0. 040	0. 048
			0. 512	0. 072	0. 040	0. 048
3-----	0. 544	0. 256	0. 528	0. 072	0. 040	0. 048
			0. 512	0. 080	0. 048	0. 056
4-----	0. 528	0. 272	0. 576	0. 072	0. 040	0. 048
			0. 576	0. 072	0. 040	0. 048
5-----	0. 512	0. 288	0. 560	0. 080	0. 040	0. 048
6-----	0. 480	?	0. 496	0. 072	0. 040	0. 048
7-----	0. 512	0. 240	0. 512	0. 072	0. 040	0. 048
8-----	0. 504	0. 272	0. 560	0. 072	0. 040	0. 048
9-----	0. 544	0. 288	0. 608	0. 072	0. 040	0. 048

The following color notes were made by Pergande from the cotype specimens:

"Color of abdomen of migrant light to dark bluish green and highly polished; head and thoracic and sternal plate yellowish brown, the sutures of the lobes more or less black; disk of prothorax very pale brownish, darkest along its posterior margin; eyes reddish brown; ocelli bordered with black at inner margin; antenna black; legs black, the femora brownish yellow at base; nectaries black, greenish at base; tail greenish, or yellowish green; wings colorless, subcosta brown or yellowish brown, stigma dusky, veins black, those of stigmal vein and branches of third slightly clouded at tip."

Apterous viviparous female.—Antennae about a third longer than body, imbricated, the hairs inconspicuous, much shorter than width of segment, III with a row of sensoria. Antennal tubercles large. Beak reaching about to second coxae. Cornicles moderately long, plainly swollen, the tips imbricated, but not reticulated. The cauda broad, conical, not constricted, with about three sets of lateral hairs. Measurements as follows:

No. 1 is from the cotype slide. Other are paratypes.

No.	III	Sensoria on III	IV	V	VI
1-----	1. 088	?	0. 864	0. 608	0. 162+0. 992
2-----	1. 088	32	0. 864	0. 576	0. 192+ ?
3-----	1. 152	34	0. 864	0. 592	0. 176+ ?
4-----	1. 088	30	0. 704	0. 480	0. 176+0. 760
5-----	1. 104	23	0. 816	?	?

No.	Head	Cauda	Cornicle			
			Length	Wide X	Small X	Flange
1-----	0. 536	?	0. 608	0. 072	0. 040	0. 048
2-----	0. 544	0. 352	0. 608	0. 088	0. 040	0. 048
3-----	0. 544	0. 288	0. 592	0. 088	0. 040	0. 048
4-----	0. 528	0. 256	0. 576	0. 080	0. 040	0. 048
5-----	0. 496	0. 256	0. 608	0. 080	0. 040	0. 048

Pergande left the following color notes of the cotype specimen:

“*Apterous female* pale bluish green; antennae black, the two basal joints and front edge of head brownish yellow, eyes brown, legs yellowish brown, the base of femora very pale bluish green; nectaries dusky, paler at base, tail of color of body.”

Intermediate.—Similar to other forms, except for very small wings, larger on left side, and for the number of sensoria, III have 37 on one side and 39 on the other, IV having 5 on each antenna. No ocelli present. Measurements as follows:

III	IV	V	VI
1. 152	0. 912	0. 560	0. 192+0. 896
1. 152	0. 848	0. 544	0. 192+0. 720

Head	Cauda	Cornicle			
		Length	Wide X	Small X	Flange
0. 496	0. 336	0. 640	0. 080	0. 040	0. 048

Biology.—I have found this species sparingly on the stems of raspberry, never on the leaves. Pergande says in his notes: "Found on stems of *Rubus*, which they sometimes covered for a distance of several inches. Drop readily, if disturbed." It probably remains on *Rubus* throughout the year. I have examined specimens taken June 26, 1903, in Virginia (type); July 11, 1903, Minnesota; June 20, 1905, District of Columbia; July 10, 1919, West Virginia; June 20, 1920, Pennsylvania; September 20, 1921, Maryland; and September 13, Massachusetts.

Distribution.—Massachusetts, Pennsylvania, Maryland, District of Columbia, Virginia, West Virginia, Ohio, Minnesota, and Kansas.

Host.—*Rubus*.

Cotypes.—Deposited in U. S. National Museum. Cat. No. 26379. Paracotype slides in the National Museum and in the collection of Dr. T. L. Guyton.

AMPHOROPHORA SOLANI (Thomas)

Figs. 10-13

Megoura solani THOMAS, Rept. Ill. State Ent., vol. 8, 1880, p. 73.—LICHTENSTEIN, Monographie des Aphidiens, 1885, p. 41.—ASHMEAD, Bull. Div. Ent. U. S. Dept. Agr. 14, 1887, p. 18.—WILSON and VICKERY, Trans. Wis. Acad. Sci. Arts and Letters, vol. 19, pt. 1, 1918, p. 158.

Rhopalosiphum solani (Thomas) OESTLUND, Rept. Minn. St. Geol., vol. 14, 1885, p. 29; Minn. Geol. and Nat. Hist. Surv. Bull. 4, 1887, p. 76.—HUNTER, Iowa Agr. Exp. Sta. Bull. 60, 1901, p. 107.—DAVIS, Journ. Econ. Ent., vol. 3, 1910, p. 495; Bull. Ill. St. Lab. Nat. Hist., vol. 10, 1913, p. 100.

Myzoides persicae (Sulzer) VAN DER GOOT, Beit. zur Kennt. der Hollandischen Blattlause, 1915, p. 170.

This species is not known to me. It was first taken by Thomas at Carbondale, Ill., on May 26, 1878, and described by him in 1880.

In 1913 Davis redescribed it from specimens in the Illinois collection, which he considered to be the type specimens and gave camera lucida drawings. These appear to be of a valid species of *Amphorophora*.

Ashmead⁶ discusses a tomato aphid under this name, but I am not certain that he had the same species.

Host plant.—Tomato.

Distribution.—Illinois.

Type.—Deposited in collection of Illinois State Laboratory of Natural History.

⁶U. S. Div. Ent. Bull. 14, 1887, pp. 18-19.

AMPHOROPHORA SPIRAECOLA (Patch)

Figs. 164-168

Macrosiphum spiraeicola PATCH, Maine Agr. Exp. Sta. Bull. 233, 1914, p. 271.—WILSON and VICKERY, Trans. Wis. Acad. Sci. Arts and Letters, vol. 19, pt. 1, 1918, p. 161.

Nectarosiphon spiraeicola PATCH, Conn. Geol. and Nat. Hist. Surv. Bull. 34, 1923, p. 310.

The writer has had the privilege of examining the cotype specimens which were kindly lent by Dr. Edith M. Patch. In the original account only the apterous form was discussed. Doctor Patch later took a single alate viviparous female in company with apterous forms. The drawings and the following description are from this specimen.

Alate viviparous female.—Antennae nearly twice as long as body, rather slender, dark colored, length of hairs less than half of diameter of the segment, III with 15-17 circular sensoria of varying sizes and not in an even row, IV, V, and VI distinctly imbricated and with no secondary sensoria; length of segments as follows:

III	IV	V	VI
0.896 mm.	0.816	0.880	0.224+1.312
0.848	0.848	0.896	0.224+1.280

The specimen which lays on its side shows a tubercle slightly back of the center of the head, with a knobbed hair directly in front of it. The antennal tubercles appear rather small from the lateral view. The beak is short, not reaching beyond the second coxae. The cornicles are moderately swollen, 0.784 mm. long, reticulated for 0.08 mm., imbricated over nearly the entire length, widest diameter 0.12 mm., smallest diameter 0.048 mm., flange 0.064 mm. wide. The cauda is twisted, but appears to be very long and moderately wide.

Doctor Patch, in a letter furnishes the following color notes: "Thorax pale brown; body pale brown; cornicle pale, tip dark."

Apterous viviparous female.—Antennae about twice as long as body, lighter colored than in the alate, hairs inconspicuous, shorter than width of segment, III with 3-7 sensoria near base, distal segments faintly imbricated. Antennal tubercles large and conspicuous.

Beak reaching second coxae. Cornicles long, moderately swollen, distinctly reticulate at tip. Cauda long, conical, slight indication of constriction, three sets of hairs.

Antennal measurements

III	Sensoria on III	IV	V	VI
1. 088	3	0. 880	0. 816	0. 192+1. 120
1. 088	5	0. 880	0. 832	0. 192+1. 088
0. 992	3	0. 912	0. 848	0. 208+(0. 736+)
0. 976	4	0. 880	0. 880	0. 208+1. 120
0. 992	7	0. 880	0. 848	0. 208+1. 264
0. 992	6	0. 848	0. 816	0. 208+1. 232
1. 088	5	0. 912	0. 840	0. 208+1. 168
1. 056	6	0. 912	0. 880	0. 208+1. 200
0. 864	3	0. 816	0. 800	0. 224+1. 152
0. 944	3	0. 800	0. 816	0. 208+1. 152
0. 784	3	0. 736	0. 608	0. 176+1. 040
0. 784	?	0. 704	0. 592	0. 192+1. 232

Other measurements

Head width	Cauda	Cornicle				
		Length	Reticulated	Wide X	Small X	Flange
0. 480	0. 480	0. 976	0. 064	0. 080	0. 048	0. 064
		0. 976	0. 064	0. 080	0. 048	0. 064
0. 480	0. 400	0. 864	0. 064	0. 080	0. 048	0. 064
		0. 928	0. 064	0. 088	0. 048	0. 064
0. 464	0. 448	0. 896	0. 064	0. 080	0. 048	0. 064
		0. 896	0. 064	0. 080	0. 048	0. 064
0. 536	0. 480	1. 008	0. 064	0. 096	0. 056	0. 072
		0. 992	0. 064	0. 096	0. 056	0. 072
0. 496	0. 416	1. 024	0. 064	0. 080	0. 048	0. 064
		0. 912	0. 064	0. 080	0. 048	0. 064
	0. 960	0. 064	0. 080	0. 056	0. 064	
	0. 960	0. 064	0. 080	0. 048	0. 072	
0. 480	0. 416	0. 752	0. 064	0. 064	0. 048	0. 064
		0. 768	0. 064	0. 072	0. 048	0. 056

This species was first taken by Doctor Patch on August 20, 1910, on the ventral side of the leaves of *Spiraea van houttei* at Orono, Me. The collection consisted of apterous viviparous females and nymphs. On July 11, 1916, she took a single alate female with young, and apterous females with young on *Spiraea salicifolia* at Orono, Me. There is in the National Museum a single slide containing two apterous viviparous females. These were taken by A. N. Caudell at Kaslo, British Columbia, June 23, 1903, on *Spiraea* species. I know of no other collections.

Cotypes.—Deposited in the collection of the Maine Agricultural Experiment Station—apterous No. 97-10, alate No. 84-16.

AMPHOROPHORA TAKAHASHII, new species

Figs. 78, 79

Amphorophora, species TAKAHASHI, Aphididae of Formosa, pt. 2, Report No. 4, Dept. of Agr., Government Research Institute, Formosa, Japan, 1923, p. 32.

Takahashi discusses this form without giving it a name, simply calling it *Amphorophora*, species. While I have not seen it, I do not recognize it from his description as belonging to any of the named species in this genus. It is evidently a border line species between *Amphorophora* and *Macrosiphum*. I take pleasure in naming it after Takahashi and quote his description.

Wingless viviparous female.—White, somewhat pale yellowish. Eyes black. Antennae white, apices of the third, fourth, and fifth joints, and the sixth black. Cornicles white with black apices. Legs white, apical halves of femora, apices of tibiae, and tarsi black; tibiae somewhat pale brownish on the basal half. Cauda white. Body oval, with some short bristles. Frontal tubercles large, somewhat convex on the inner side. Antennae very long and slender, provided with a few short hairs; the third joint provided with one or two small circular sensoria near the base; the fourth very slightly imbricated, lacking sensoria; the relative length of joints as follows: III-75, IV-53, V-48, VI-115 (18+97). Rostrum reaching beyond the hind coxae. Cornicles long, a little longer than the fourth antennal joint, about 1.8 times as long as the cauda, cylindrical, very slightly dilated about the middle and on the base, with a little imbrication at the tip. Cauda large, ensiform, with a few lateral bristles. Legs very long and slender; tibiae provided with many short bristles; tarsi rather short.

Length of body, 2.1 mm. Antennae, about 3.2 mm. Cornicle, 0.6 mm.

Host.—*Pollia japonica*, attacking the leaf.

Distribution.—Formosa; Rimogan near Urai.

Collected by Messrs. Kurosawa and Sueta in July, 1921.

Cotype.—Specimens in the Entomological Laboratory of the Department of Agriculture Government Research Institute, Formosa.

AMPHOROPHORA VACCINII, new species

Figs. 179-188, 191-192

Alate viviparous female.—Antennae about twice as long as body, dark colored, imbrications not conspicuous, hairs small and inconspicuous, III with a row of 12-16 circular sensoria on outer edge, other segments without secondary sensoria. Antennal measurements as follows:

No.	III	Sensoria on III	IV	V	VI
1-----	0.720	15	0.608	0.576	0.160+0.896
	0.688	16	0.624	0.592	0.176+0.784
2-----	0.704	14	0.560	0.544	0.176+0.896
	0.688	12	0.560	0.566	0.176+ ?

Antennal tubercles large and distinct. Beak reaching about to second coxae. Cornicles light at base, remainder darker, long and slender, plainly swollen, somewhat imbricated, distinctly reticulated at tip. Cauda light colored, long and slender, only slightly constricted, with three sets of lateral hairs.

No.	Head	Cauda	Cornicle				
			Length	Reticu- lated	Wide X	Small X	Flange
1-----	0. 44	0. 464	0. 688	0. 096	0. 072	0. 040	0. 064
2-----	0. 40	?	0. 688	0. 112	0. 072	0. 040	0. 056
			0. 688	0. 096	0. 064	0. 040	0. 056
			0. 672	0. 096	0. 064	0. 040	0. 056

Apterous viviparous female.—Antennae about twice as long as body, somewhat lighter in color than in the alates, imbrications not conspicuous, hairs very small and inconspicuous, a row of 2-4 sensoria near base of III. Antennal measurements as follows:

No.	III	Sensoria on III	IV	V	VI
1-----	0. 672	3	0. 512	0. 480	0. 160+0. 816
	0. 672	2	0. 512	0. 480	0. 160+0. 864
2-----	0. 704	4	0. 528	0. 496	0. 176+0. 896
	0. 736	4	0. 528	0. 512	0. 160+0. 896
3-----	0. 768	4	0. 608	0. 608	0. 176+0. 880
4-----	0. 704	4	0. 496	0. 496	0. 144+0. 800
	0. 688	4	0. 512	0. 504	0. 160+0. 784
5-----	0. 624	3	0. 480	0. 464	0. 160+0. 816
	0. 640	3	0. 480	0. 480	0. 144+0. 960
6-----	0. 672	2	0. 528	0. 560	0. 176+0. 832
	0. 672	3	0. 544	0. 544	0. 176+0. 880
7-----	0. 672	3	0. 496	0. 512	0. 176+0. 832
8-----	0. 640	2	0. 448	0. 464	0. 160+0. 816
	0. 640	2	0. 480	0. 496	0. 176+0. 848
9-----	0. 672	3	0. 496	0. 496	0. 160+0. 752
	0. 688	3	0. 512	0. 496	0. 160+0. 752
10G---	0. 800	2	0. 576	0. 656	0. 208+1. 408
	0. 784	?	0. 624	0. 672	0. 208+1. 216
11G---	0. 752	2	0. 656	0. 688	0. 192+1. 216
	0. 752	2	0. 656	0. 704	0. 192+1. 104
12G---	0. 768	2	0. 656	0. 688	0. 176+1. 152
	0. 768	2	0. 640	0. 672	0. 192+1. 120
13G---	0. 688	4	0. 544	0. 512	0. 176+0. 848
	0. 688	3	0. 560	0. 512	0. 176+0. 848
14G---	0. 640	3	0. 512	0. 528	0. 160+0. 864
	0. 640	2	0. 512	0. 512	0. 176+0. 848
	0. 624	4	0. 432	0. 448	0. 176+0. 912
15G---	0. 608	4	0. 448	0. 448	0. 176+0. 912

Antennal tubercles very large and distinct. Beak reaching beyond second coxae. Cornicles long, slender, somewhat swollen, plainly reticulated at tip, swollen portion imbricated. Cauda long, slender, not distinctly constricted, three sets of lateral hairs.

Measurements as follows:

No.	Head	Cauda	Cornicles				
			Length	Reticulations	Wide X	Small X	Flange
1-----	0. 408	?	0. 624	0. 064	0. 056	0. 040	0. 048
2-----	?	0. 352	0. 640	0. 064	0. 056	0. 040	0. 056
			0. 704	0. 080	0. 064	0. 040	0. 056
3-----	0. 432	0. 368	0. 704	0. 080	0. 064	0. 040	0. 056
			0. 880	0. 112	0. 072	0. 048	0. 056
4-----	0. 416	0. 304	0. 896	0. 104	0. 072	0. 040	0. 056
			0. 672	0. 080	0. 064	0. 040	0. 056
5-----	0. 416	0. 320	0. 704	0. 096	0. 064	0. 040	0. 056
			0. 656	0. 080	0. 064	0. 040	0. 056
6-----	0. 416	0. 296	0. 672	0. 080	0. 064	0. 040	0. 056
			0. 720	0. 080	0. 072	0. 040	0. 056
7-----	0. 400	0. 272	0. 704	0. 080	0. 064	0. 040	0. 056
			0. 608	0. 080	0. 056	0. 040	0. 056
8-----	0. 400	0. 304	0. 656	0. 080	0. 056	0. 040	0. 056
			0. 752	0. 080	0. 072	0. 040	0. 056
9-----	0. 408	0. 304	0. 752	0. 080	0. 072	0. 040	0. 064
			0. 720	0. 080	0. 072	0. 040	0. 056
10G-----	0. 448	0. 336	0. 704	0. 080	0. 072	0. 040	0. 064
			0. 720	0. 096	0. 064	0. 040	0. 056
11G-----	0. 448	0. 320	0. 720	0. 096	0. 072	0. 040	0. 056
			0. 720	0. 080	0. 064	0. 040	0. 056
12G-----	0. 392	0. 304	0. 704	0. 080	0. 064	0. 040	0. 056
			0. 704	0. 080	0. 072	0. 040	0. 056
13G-----	0. 416	?	0. 688	0. 080	0. 064	0. 040	0. 056
			0. 688	0. 080	0. 064	0. 040	0. 056
14G-----	0. 384	?	0. 560	0. 080	0. 056	0. 040	0. 064
			0. 560	0. 064	0. 056	0. 040	0. 056
15G-----	0. 376	0. 232	0. 512	0. 048	?	?	?
			0. 496	0. 064	0. 056	0. 040	0. 056

Apterous nymphal measurements

Head	Cornicle	III	IV	V	VI
0. 352	0. 368	0. 240	0. 208	0. 288	0. 096+0. 592
0. 360	0. 368	0. 240	0. 208	0. 272	0. 112+0. 592
	0. 384	0. 232	0. 208	0. 256	0. 112+0. 568
0. 416	?	0. 240	0. 208	0. 280	0. 120+ ?
	0. 560	0. 480	0. 528	0. 528	0. 160+1. 008
?	0. 560	0. 480	0. 512	0. 520	0. 152+1. 008
	0. 560	0. 432	0. 384	0. 416	0. 144+0. 736
	0. 560	0. 448	0. 384	0. 400	0. 128+0. 752

Apterous oviparous female.—Antennae about one-third longer than body, light colored (in balsam mount), imbrications not conspicuous, hairs small, shorter than width of segment, III with one to three circular sensoria near base. Antennal measurements as follows:

No.	III	IV	V	VI
1-----	0. 720	0. 608	0. 608	0. 160+0. 928
	0. 736	0. 608	0. 608	0. 160+0. 912
2-----	0. 640	0. 592	0. 560	0. 184+0. 848
	0. 640	0. 608	0. 560	0. 184+0. 864
3-----	0. 592	0. 528	0. 544	0. 176+ ?
	0. 592	0. 544	0. 560	0. 176+0. 864

Antennal tubercles large and prominent. Beak reaching second coxae. Hind tibiae with usual sensoria present, more numerous in center than at ends. Cornicles long and slender, only slightly swollen, distinctly reticulated at tip. Cauda conical, not constricted, with three sets of lateral hairs. Measurements as follows:

No.	Head	Cauda	Cornicle				
			Length	Reticu- lated	Wide X	Small X	Flange
1-----	0. 448	0. 304	0. 656	0. 064	0. 064	0. 048	0. 064
			0. 672	0. 064	0. 064	0. 048	0. 064
2-----	0. 432	0. 296	0. 704	0. 048	0. 064	0. 048	0. 064
			0. 704	0. 048	0. 064	0. 048	0. 064
3-----	0. 424	0. 304	0. 640	0. 048	0. 048	0. 040	0. 056
			0. 624	0. 048	0. 048	0. 040	0. 064

Described from two alates, nine apterous viviparous females, and three apterous oviparous females, all taken by H. V. Scammell at Whitesbog, N. J. The alates and viviparous apterous forms were taken on blueberry on June 28 and July 11, 1915. The oviparous females were taken on December 1, 1914, on "three square" while cranberry bog was being flooded. The specimens marked in the tables of measurements as 10G, 11G, and 12G were collected by Dr. T. L. Guyton at Hartstown, Pa., June 22, 1921, on *Vaccinium corymbosum*. They are designated as paratypes. Those marked 13G, 14G, and 15G are from Guyton, taken on *Vaccinium stamineum* and appear to be the same, but on a different species of *Vaccinium*. I have also received a single apterous viviparous female taken on *Vaccinium*, species in Massachusetts on July 8, 1921, by Harold Morrison.

Cotypes.—Deposited in the U. S. National Museum, No. 26380. Paratypes in the collection of Dr. T. L. Guyton.

AMPHOROPHORA VAGANS (Van der Goot)

Rhopalosiphum vagans VAN DER GOOT, Records of the Indian Museum, vol. 13, pt. 4, no. 2, 1917, p. 177.

All I know of this species is in Van der Goot's original account.

AMPHOROPHORA ZHURAVLEVI Mordvilko

Acyrthosiphon (Amphorophora) rubi zhuravlevi MORDVILKO, Fauna de la Russie, vol. 1, liv. 2, 1919, p. 265.

Mordvilko described this form as a subspecies of *rubi* Kaltenbach. I have not seen it, but judging from his description it is a good species. The apterous form can be distinguished from *rubi* Kaltenbach by the differences in proportion of the antennal segments (see page 54). I quote herewith a translation of Mordvilko by A. J. Bruman.

Apterous viviparous female.—Depth of frontal furrow represents about three-tenths the distance between the bases of the antennae. Mouth of furrow about two-thirds this distance. The projection of the vertex is distinct. Antennae somewhat longer than the body. The third segment is one and three-sevenths to one and one-half times longer than the fourth and this one is only slightly longer than the fifth. The base of VI equals one-fifth to two-elevenths the length of the third segment, and the unguis of the sixth segment is one and two-ninths times or thereabouts longer than the third. On the third segment near the base there are 3-4 sensoria, its longest hairs reach three-fifths to four-fifths of the diameter of the proximal part of the segment. The cornicles reach one-fifth to two-ninths the length of the body; toward the base they become wider, at one-fourth to one-third from the base they become narrow, from the point to one-third from the end they widen and finally, at the flange they again become narrow. Cornicles without sculpture, except at the very tip one may notice 2-3 transverse, ring-shaped ribs. The cornicles are two and one-half to two and one-third times longer than the cauda. The cauda is long-triangular with uneven lateral edges, with 4-5 bristly hairs on each side. Length of body of two specimens was 3.11-3.21 mm. Color as in *Ac. rubi rubi*; that is, pale yellowish-green.

Measurements of two specimens from Uralsk 3.11-1.47: Frontal furrow, 0.07; between bases of antennae, 0.23; mouth of furrow, 0.14; width of furrow at the middle of its depth, 0.12, at base 0.08; frontal vertex projection, 0.009; hairs on each side, 0.053. Antennae, 3.43, with the following measurements of individual segments: 0.13, 0.10, 0.86, 0.57 (0.59), 0.54, 0.18 (0.17), 1.06. Hairs on the third segment, 0.017-0.035 (0.017-0.031); diameter of proximal part of segment 0.043, near base 3 sensoria. Cornicles 0.66 (0.68), their thickness: 0.10 (base), 0.056 (0.22 from base), 0.070 (0.23 from tip), 0.046 (in front of flange), 0.063 (flange). Cauda, 0.26; its thickness 0.15 (base), 0.12 (0.11 from tip); on each side there are four hairs. The posterior femora, 1.16; tibia, 2.15; tarsi, 0.15 (0.046, 0.13); claws, 0.043; hairs on leg, 0.33, 0.066; the diameter of the proximal part of the leg 0.050, 3.21, 1.54. Frontal projection, 0.009; hairs on the sides, 0.060. Antennae, 3.52, with the following size of separate segments: 0.13, 0.10, 0.86, (0.87), 0.59 (0.61), 0.56 (0.58), 0.18 (0.17), 1.10 (1.06). Hairs on the third segment, 0.014-0.027; diameter of proximal part of segment, 0.047; near the base are 4 sensoria. Cornicles, 0.67; their thickness, 0.10, 0.053 (0.19 from base), 0.070 (0.22 from tip), 0.046 (0.016 from tip), 0.046 (in front of flange), 0.070 (flange). The cauda is 0.29 (length), 0.17 (base), 0.10 (0.14 from end); on each side 4-5 hairs. Posterior femora, 1.16; tibia, 2.32; tarsi, 0.15 (0.046, 0.12); claws, 0.043. Hairs on posterior tibia, 0.026-0.066; diameter of the proximal part of the tibia, 0.053.

Male.—The males are winged. Vertex as in *Ac. rubi rubi*. In the antennae the third segment considerably (for instance one and two-fifth times) exceeds the fourth, and this one is one and one-fifth longer than the fifth. The unguis of the sixth segment is one and one-sixth times longer than the third segment, the base

of the sixth segment is one-sixth the length of the third. The hairs on the third segment reach almost two-thirds the diameter of the proximal part of the segment. Secondary sensoria are found not only on the third and fifth segments, but also on the fourth. The cornicles reach one-fourth the length of the body, they widen toward the base; from this point to one-fourth from the base they become narrow, then to one-third from the end they widen; from this point to the flange they become narrow again. The head, prothorax, and tubercles of thorax are dark or tawny; the antennae, with the exception of the base of the third segment, and the cornicles are tawny. On the upper part of the abdomen there is on some specimens a median dark stripe (of spots) and on segments 2-5 there are marginal dark disks.

Measurements of one specimen 2.12-0.68: Frontal furrow, 0.07; between the bases of the antennae, 0.20; mouth of furrow, 0.13; width at the middle of its depth 0.11; at base 0.08; frontal vertex projection, 0.007. Antennae, 4.27, with the following measurements of individual segments: 0.12, 0.08, 1.14 (1.13), 0.83 (0.82), 0.69, 0.18+1.23. Hairs on the third segment, 0.017-0.029; diameter of proximal part of segment, 0.047. Sensoria on the third segment placed thickly over its entire length; on the fourth segment there are 3 (8) sensoria; on the fifth 15 (14) in addition to the permanent one. The cornicles are 0.55; their thickness, 0.066 (base), 0.042 (0.12 from base), 0.066 (0.17 from end), 0.042 (0.013 from end), 0.040 (in front of flange), 0.062 (flange). Cauda, 0.16 (length), 0.12 (base), 0.08 (0.09 from tip); on each side are five hairs. The posterior femur, 1.14; tibia, 2.28; tarsi, 0.14 (0.04, 0.11); claws, 0.043.

Distribution.—These aphids are so far known from the environs of the city of Uralsk. Apparently it is distributed over Siberia, at least Western Siberia. Unfortunately there is no material at present from various parts of Siberia. On the lower part of the river Amur occurs *Ac. rubi amurense*.

Life habits.—During the first part of September in the vicinity of Uralsk there were collected wingless females, a young oviparous female (in the fourth stage of development), a winged male and a nymph of a male. In general the life history must be identical with that of *Ac. rubi rubi*.

SPECIES NOT PLACED

Following are descriptions of two alate males, which I have not placed specifically.

Pergande No. 5591

Antennae about twice as long as body, dark colored, very tuberculate; hairs small, much shorter than width of segment. Antennal tubercles very small. Small prothoracic tubercles showing. Abdomen with lateral dark patches. Cornicles of uniform color, long, plainly swollen, faintly imbricated at tip. Cauda constricted, one dorsal and three lateral hairs present.

III	Sensoria on III	IV	Sensoria on IV	V	Sensoria on V	VI
0.768	56	0.512	25	0.448	8	0.128+0.784
0.752	60	0.512	22	0.432	9	0.152+0.928
Head	Cauda	Cornicle				
		Length	Wide X	Small X	Flange	
0.480	0.16	0.352	0.072	0.04	0.048	
		0.400	0.072	0.04	0.048	

Pergande left the following note:

"5591? *Rhop. lactucae*? December 4.94. Found one winged male on under side of leaf of turnip, which may belong to this species. Dark parts black; light parts yellow. Prothorax in front and behind orange; base and end of abdomen orange, rest yellow, six dusky transv. medio-dorsal spots; lateral spots black. Mounted in balsam."

Quaintance No. 22023, Bragg No. 117

Taken on grass at Marblehead, Mass., October 11, 1920, by L. C. Bragg.

Alate Male.—Antennae dark colored, very tuberculate. Hairs long, heavy, conspicuous. Antennal tubercles very short. Beak reaching second coxae. No prothoracic or abdominal tubercles showing. Cornicles long, moderately swollen, dark colored, lighter at base, inconspicuously reticulate at tip. Cauda long, slender, constricted. Measurements as follows:

Antennal measurements

No.	III	Sensoria on III	IV	Sensoria on IV	V	Sensoria on V	VI
1-----	0.864	90	0.480	25	0.448	14	0.112+?
	0.832	81	0.448	24	0.492	16	0.112+?
2-----	0.816	69	?	?	?	?	?
	0.816	66	?	?	?	?	?

Other measurements

No.	Head	Cauda	Cornicle			
			Length	Wide X	Small X	Flange
1-----	0.520	0.184	0.488	0.080	0.04	0.048
2-----	0.516	0.160	0.448	0.072	0.04	0.048
			0.432	0.072	0.04	0.048

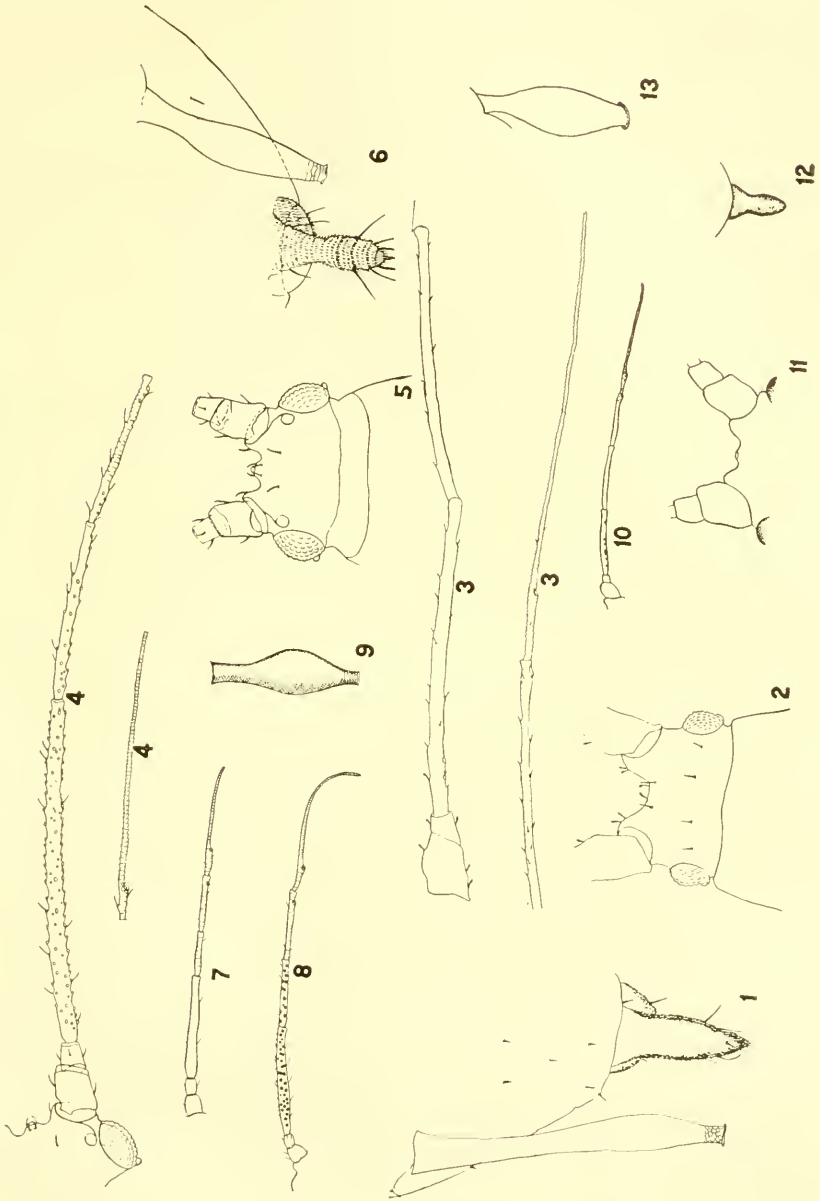
Last instar nymph

III	IV	V	VI	Head	Cornicle length	Cornicle width
0.480	0.304	0.304	0.08+0.784	0.608	0.416	0.096
0.480	0.272	0.288	0.08+ ?		0.416	0.112

EXPLANATION OF PLATES

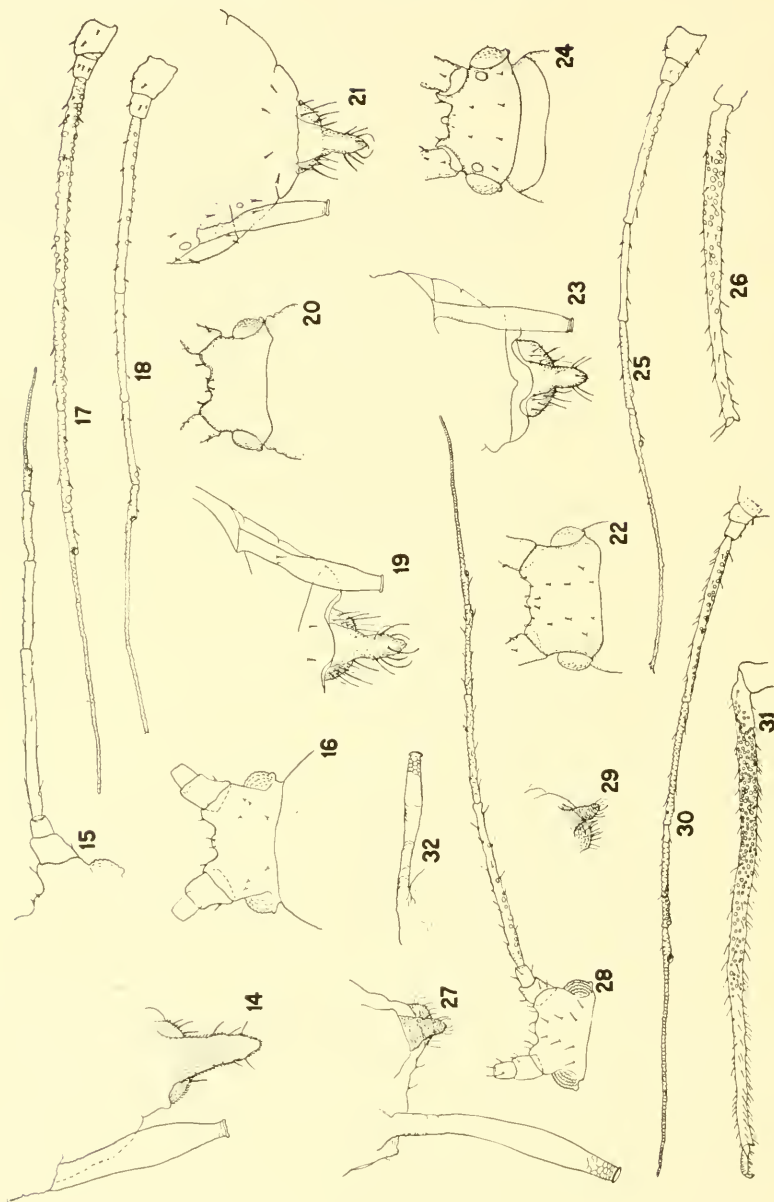
PLATE 1

- 1-3. *Amphorophora alni*, new species.
(Drawings by the author.)
1. Cornicle and cauda of apterous form. 2. Head of apterous form.
3. Antennae of apterous form.
- 4-6. *Amphorophora braggi*, new species.
(Drawings by Mrs. Awl.)
4. Antennae of alate form. 5. Head of alate form. 6. Cornicle and
cauda of alate form.
- 7-9. *Amphorophora brittenii* (Theobald).
(Redrawn by Mrs. Awl from Theobald.)
7. Antenna of apterous form. 8. Antenna of alate form. 9. Cornicles
of alate form.
- 10-13. *Amphorophora solani* (Thomas).
(Redrawn by Mrs. Awl from Davis.)
10. Antenna of alate form. 11. Head of alate form. 12. Cauda of
alate form. 13. Cornicle of alate form.



APHIDS OF THE GENUS AMPHOPHORA

FOR EXPLANATION OF PLATE SEE PAGE 74



APHIDS OF THE GENUS AMPHOROPHORA

FOR EXPLANATION OF PLATE SEE PAGE 76

PLATE 2.

14-26. *Amphorophora cosmopolitana*, new name.

(Drawings by the author.)

14. Cornicle and cauda of apterous spring form (drawing by Mrs. Awl).

15. Antenna of apterous, spring form (by Mrs. Awl). 16. Head of apterous spring form (by Mrs. Awl). 17. Antenna of alate summer form. 18. Antenna of apterous summer form. 19. Cornicle and cauda of apterous summer form. 20. Head of oviparous female. 21. Cornicle and cauda of alate summer form. 22. Head of apterous summer form. 23. Cornicle and cauda of oviparous female. 24. Head of summer alate form. 25. Antenna of oviparous female. 26. Posterior tibia of oviparous female.

27-32. *Amphorophora davidsoni*, new species.

(Drawings by Mrs. Awl.)

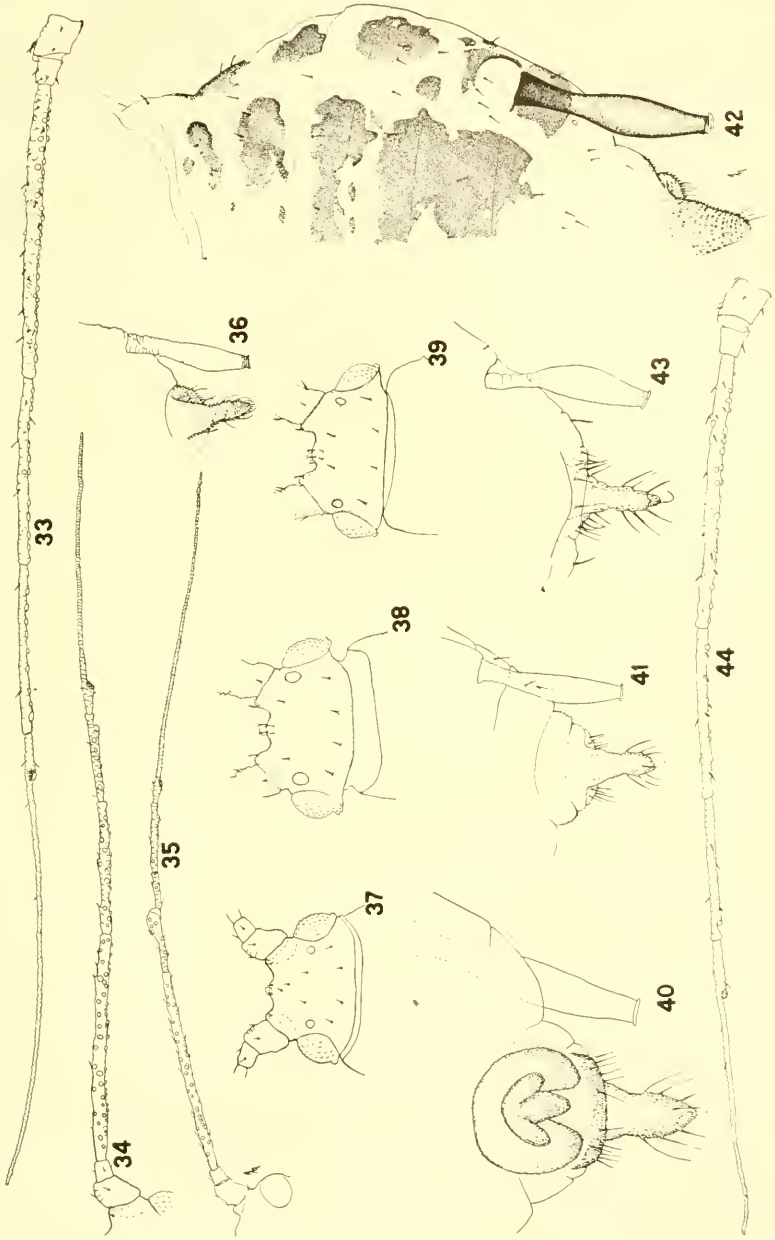
27. Cornicle and cauda of oviparous female. 28. Head and antenna of oviparous female. 29. Cauda of male. 30. Antenna of male. 31. Posterior tibia of oviparous female. 32. Cornicle of male.

PLATE 3.

33-44. *Amphorophora cosmopolitana*, new name.

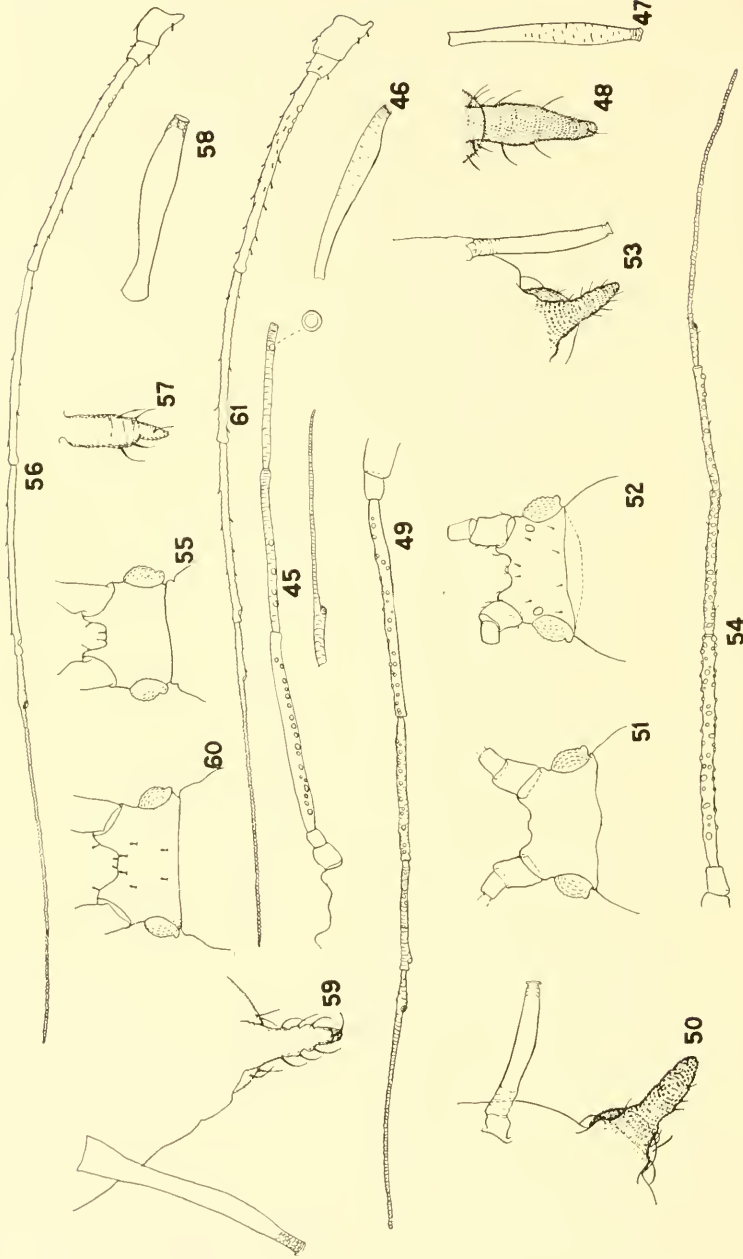
(Drawings by the author.)

33. Antenna of male. 34. Antenna of alate spring form (drawing by Mrs. Awl). 35. Deformed antenna of male (drawing by Mrs. Awl). 36. Cornicle and cauda of alate spring form (drawing by Mrs. Awl). 37. Head of alate spring form (drawing by Mrs. Awl). 38. Head of male. 39. Head of fall migrant. 40. Male. 41. Cornicle and cauda of male. 42. Abdomen of male (drawing by Mrs. Awl). 43. Cornicle and cauda of fall migrant. 44. Antenna of fall migrant.



APHIDS OF THE GENUS AMPHOROPHORA

FOR EXPLANATION OF PLATE SEE PAGE 76



APHIDS OF THE GENUS AMPHOROPHORA

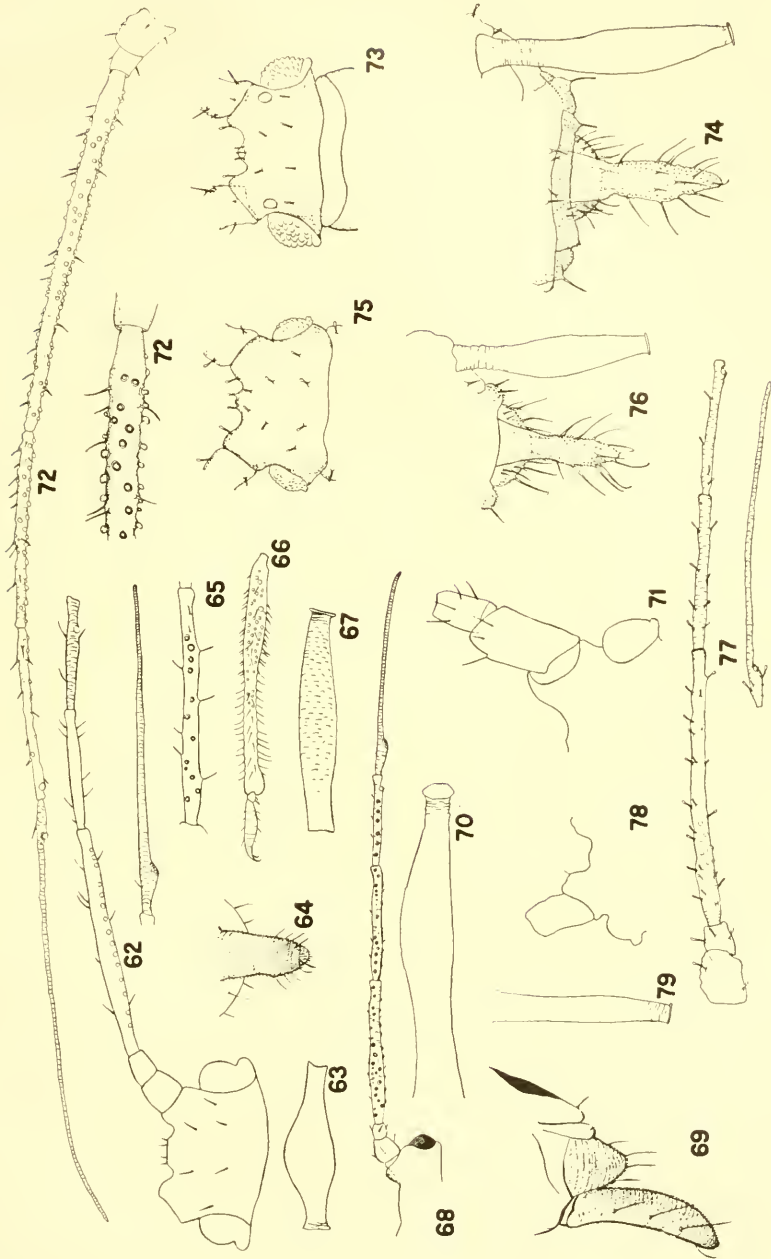
FOR EXPLANATION OF PLATE SEE PAGE 77

PLATE 4

- 45-48. *Amphorophora carduellina* (Theobald).
(Redrawn by Mrs. Awl from Theobald.)
45. Antenna of apterous form. 46-47. Cornicle of apterous form.
48. Cauda of apterous form.
- 49-54. *Amphorophora oleraceae* (v. d. Goot).
(Drawings by Mrs. Awl.)
49. Antenna of apterous form. 50. Cornicle and cauda of apterous
form. 51. Head of apterous form. 52. Head of alate form.
53. Cornicle and cauda of alate form. 54. Antenna of alate
form.
- 55-58. *Amphorophora pallida*, new species.
(Drawings by author.)
55. Head of apterous form. 56. Antenna of apterous form. 57
Cauda of apterous form. 58. Cornicle of apterous form.
- 59-61. *Amphorophora rhododendronia*, new species.
(Drawings by author.)
59. Cornicle and cauda of apterous form. 60. Head of apterous form.
61. Antenna of apterous form.

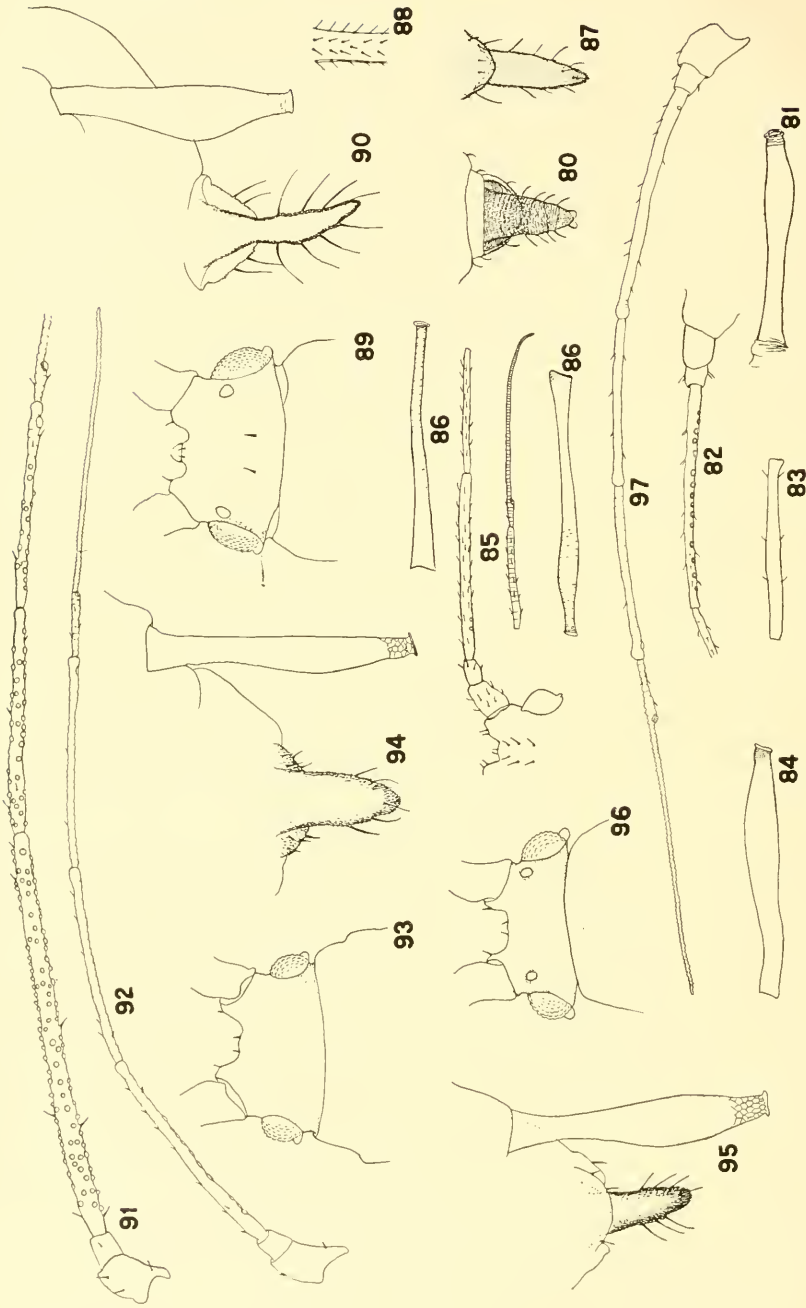
PLATE 5

- 62-66. *Amphorophora brittenii* (Theobald).
(Redrawn by Mrs. Awl from Jackson.)
62. Head and antenna of oviparous female. 63. Cornicle of oviparous female. 64. Cauda of oviparous female. 65. Segment III of antenna, oviparous female. 66. Posterior tibia and tarsi of oviparous female.
- 67-69. *Amphorophora carduellina* (Theobald).
(Redrawn by Mrs. Awl from Theobald.)
67. Cornicle of alate form. 68. Head and antenna of alate form. 69. Alate form.
- 70-71. *Amphorophora formosana* Takahashi.
(Redrawn by Mrs. Awl from Takahashi.)
70. Cornicle of apterous form. 71. Head of apterous form.
- 72-77. *Amphorophora pergandei*, new species.
(Drawings by the author.)
72. Antenna of alate form. 73. Head of alate form. 74. Cornicle and cauda of alate form. 75. Head of apterous form. 76. Cornicle and cauda of apterous form. 77. Antenna of apterous form.
- 78-79. *Amphorophora takahashii*, new species.
(Redrawn by Mrs. Awl from Takahashi.)
78. Head of apterous form. 79. Cornicle of apterous form.



APHIDS OF THE GENUS AMPHOROPHORA

FOR EXPLANATION OF PLATE SEE PAGE 78



APHIDS OF THE GENUS AMPHOROPHORA

FOR EXPLANATION OF PLATE SEE PAGE 79

PLATE 6

- 80-84. *Amphorophora cicutae* Shinji.
(Drawings by Mrs. Awl from photomicrograph of type.)
80. Cauda of alate form. 81. Cornicle of alate form. 82. Antenna of alate form. 83. Antennal segment III of apterous form (from Shinji). 84. Cornicle of apterous form (from Shinji).
- 85-88. *Amphorophora evansi* Theobald.
(Redrawn by Mrs. Awl from Theobald.)
85. Head and antenna of apterous form. 86. Cornicles of apterous form. 87. Cauda of apterous form. 88. Tibia of apterous form.
- 89-91. *Amphorophora hayhursti*, new species.
(Drawings by author.)
89. Head of alate form. 90. Cornicle and cauda of alate form. 91. Antenna of alate form.
- 92-97. *Amphorophora morrisoni* (Swain).
(Drawings by author.)
92. Antenna of alate form. 93. Head of apterous form. 94. Cornicle and cauda of apterous form. 95. Cornicle and cauda of alate form. 96. Head of alate form. 97. Antenna of apterous form.

PLATE 7

98-100. *Amphorophora corylina* (Davidson).

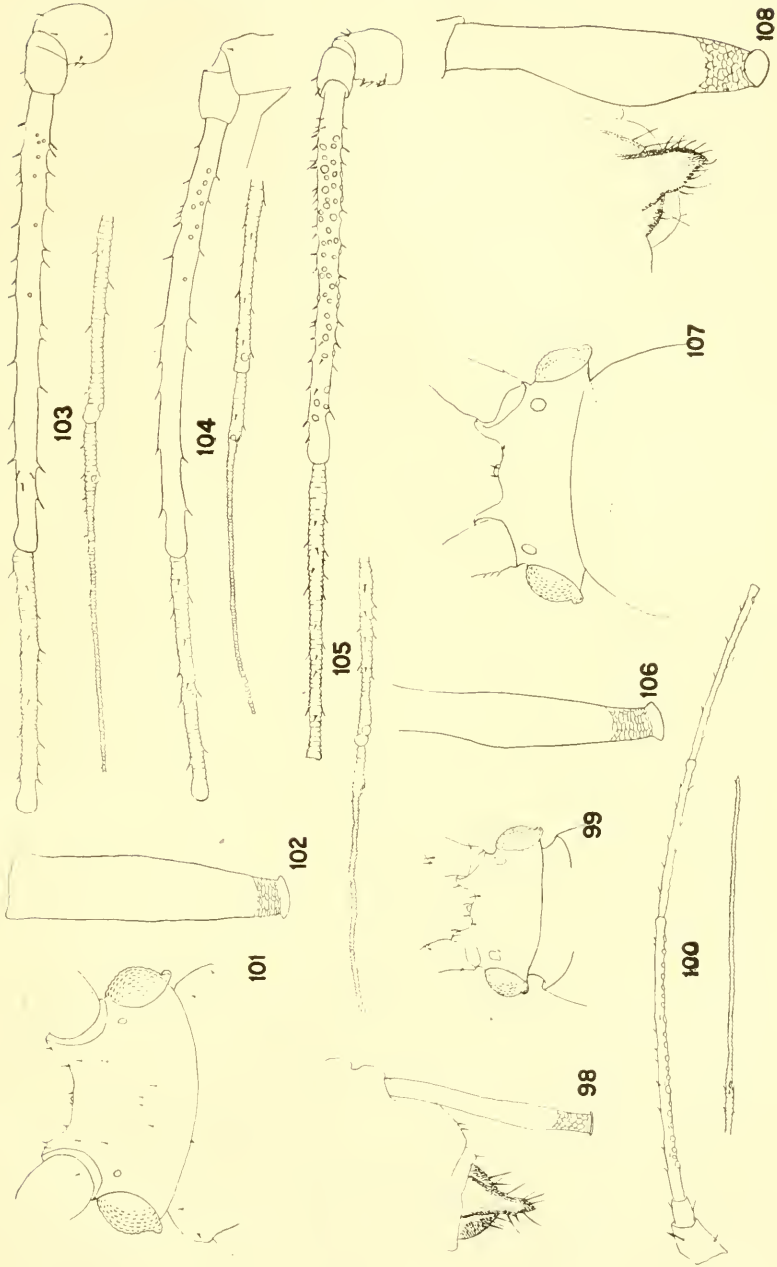
(Drawings by the author.)

98. Cornicle and cauda of alate form. 99. Head of alate form. 100. Antenna of alate form.

101-108. *Amphorophora essigwanai*, new name.

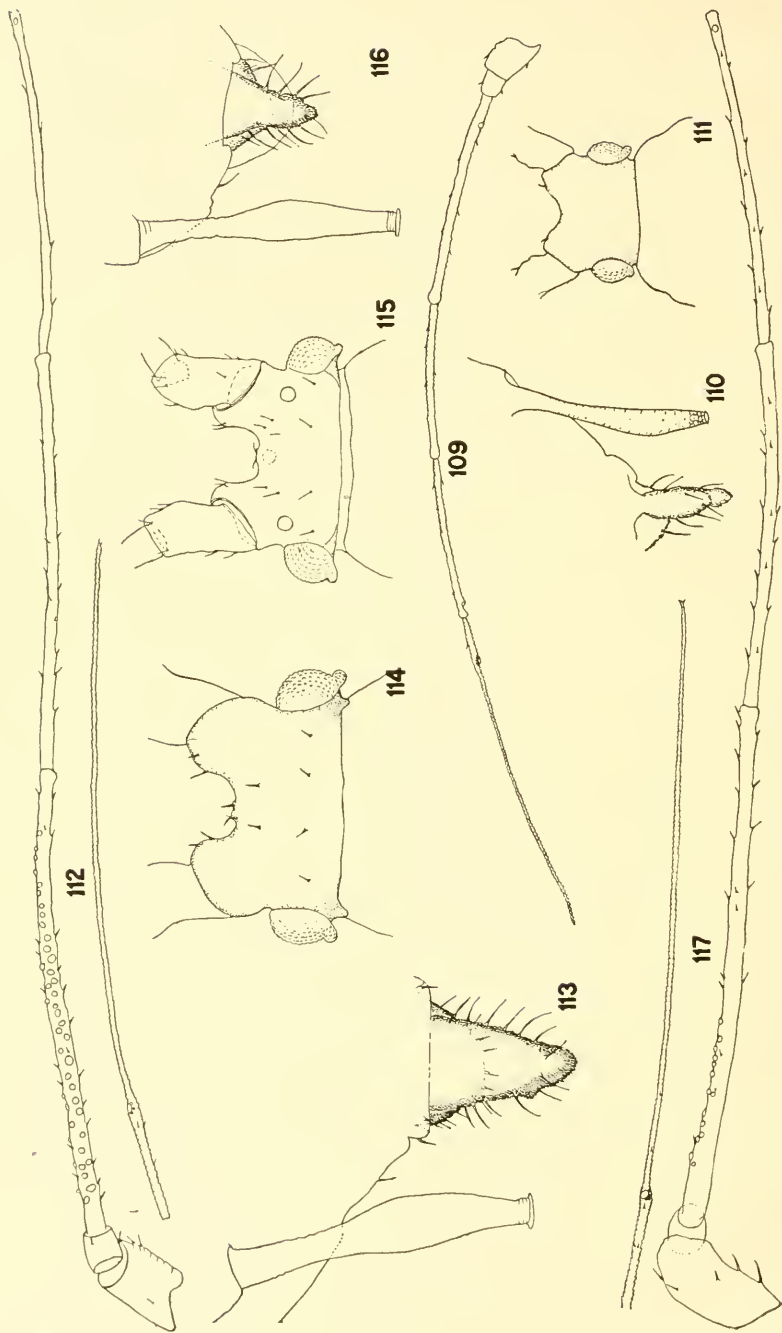
(Drawings by the author.)

101. Head of intermediate form. 102. Cornicle of intermediate form. 103. Antenna of intermediate form. 104. Antenna of apterous form. 105. Antenna of alate form. 106. Cornicle of apterous form. 107. Head of alate form. 108. Cornicle and cauda of alate form.



APHIDS OF THE GENUS AMPHOROPHORA

FOR EXPLANATION OF PLATE SEE PAGE 80



APHIDS OF THE GENUS AMPHOROPHORA

FOR EXPLANATION OF PLATE SEE PAGE 81

PLATE 8

109-111. *Amphorophora borealis*, new species.

(Drawings by the author.)

109. Antenna of apterous form. 110. Cornicle and cauda of apterous form. 111. Head of apterous form.

112-117. *Amphorophora laingi*, new species.

(Drawings by the author.)

112. Antenna of alate form. 113. Cornicle and cauda of apterous form.

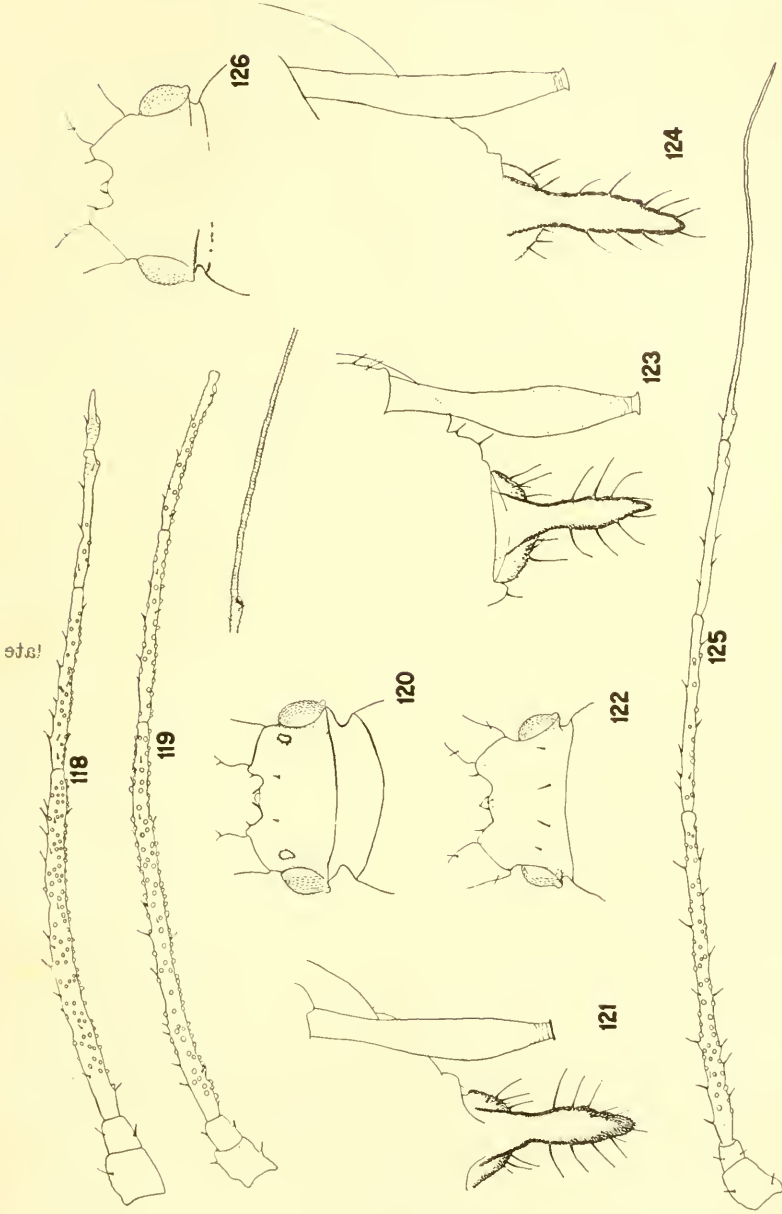
114. Head of apterous form. 115. Head of alate form (drawing by Mr. Awl). 116. Cornicle and cauda of alate form. 117. Antenna of apterous form.

PLATE 9

118-126. *Amphorophora nabali* (Oestlund).

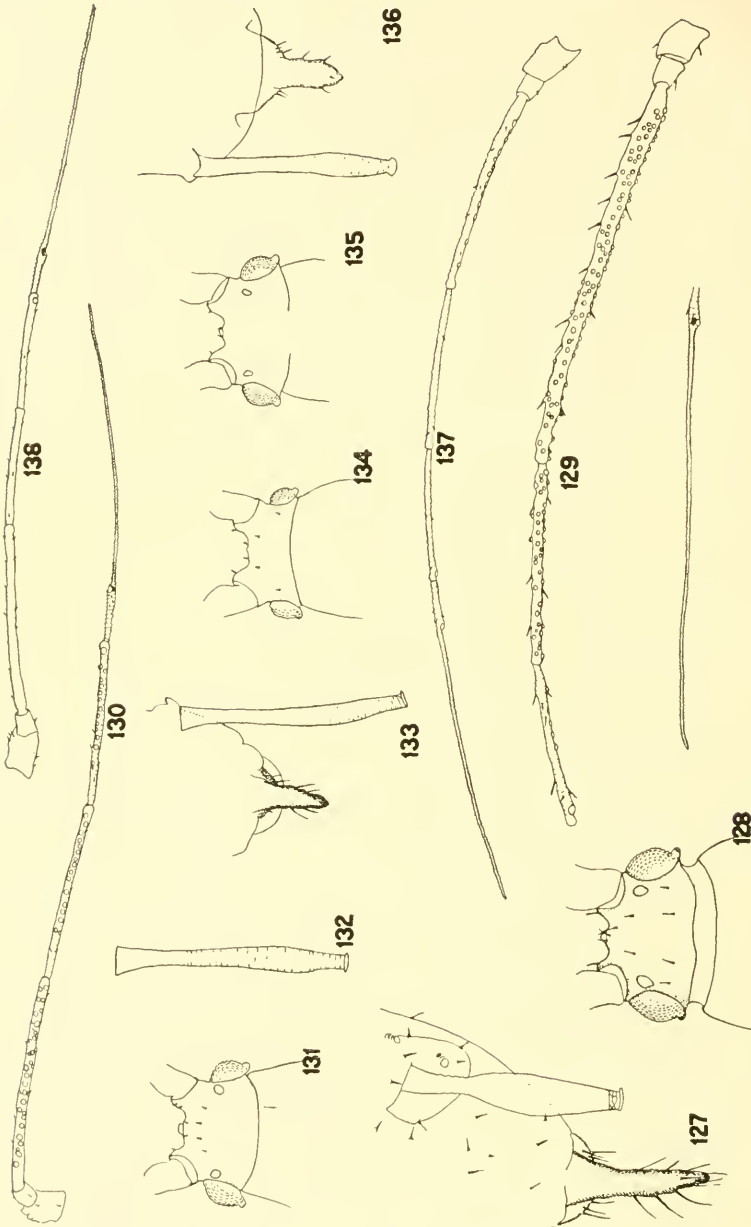
(Drawings by the author.)

118. Antenna of intermediate form. 119. Antenna of alate form. 120. Head of alate form. 121. Cornicle and cauda of apterous form. 122. Head of apterous form. 123. Cornicle and cauda of alate form. 124. Cornicle and cauda of intermediate form. 125. Antenna of apterous form. 126. Head of intermediate form.



APHIDS OF THE GENUS AMPHOROPHORA

FOR EXPLANATION OF PLATE SEE PAGE 82



APHIDS OF THE GENUS AMPHOROPHORA

FOR EXPLANATION OF PLATE SEE PAGE 83

PLATE 10

127-129. *Amphorophora mitchelli*, new species.

(Drawings by the author.)

127. Cornicle and cauda of alate form 128. Head of alate form
129. Antenna of alate form.

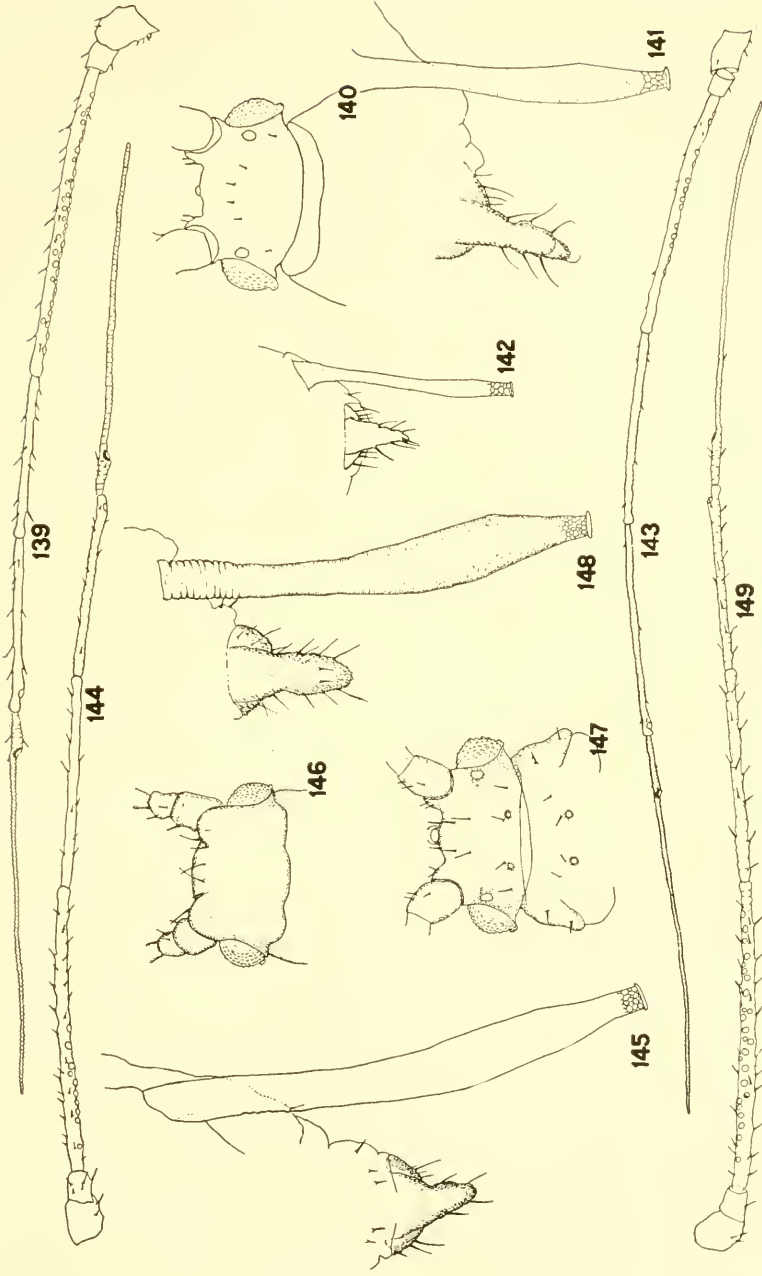
130-138. *Amphorophora nervata* (Gillette).

(Drawings by the author.)

130. Antenna of male. 131. Head of male. 132. Cornicle of male.
133. Cornicle and cauda of alate form. 134. Head of apterous
form. 135. Head of alate form. 136. Cornicle and cauda of
apterous form. 137. Antenna of alate form. 138. Antenna of
apterous form.

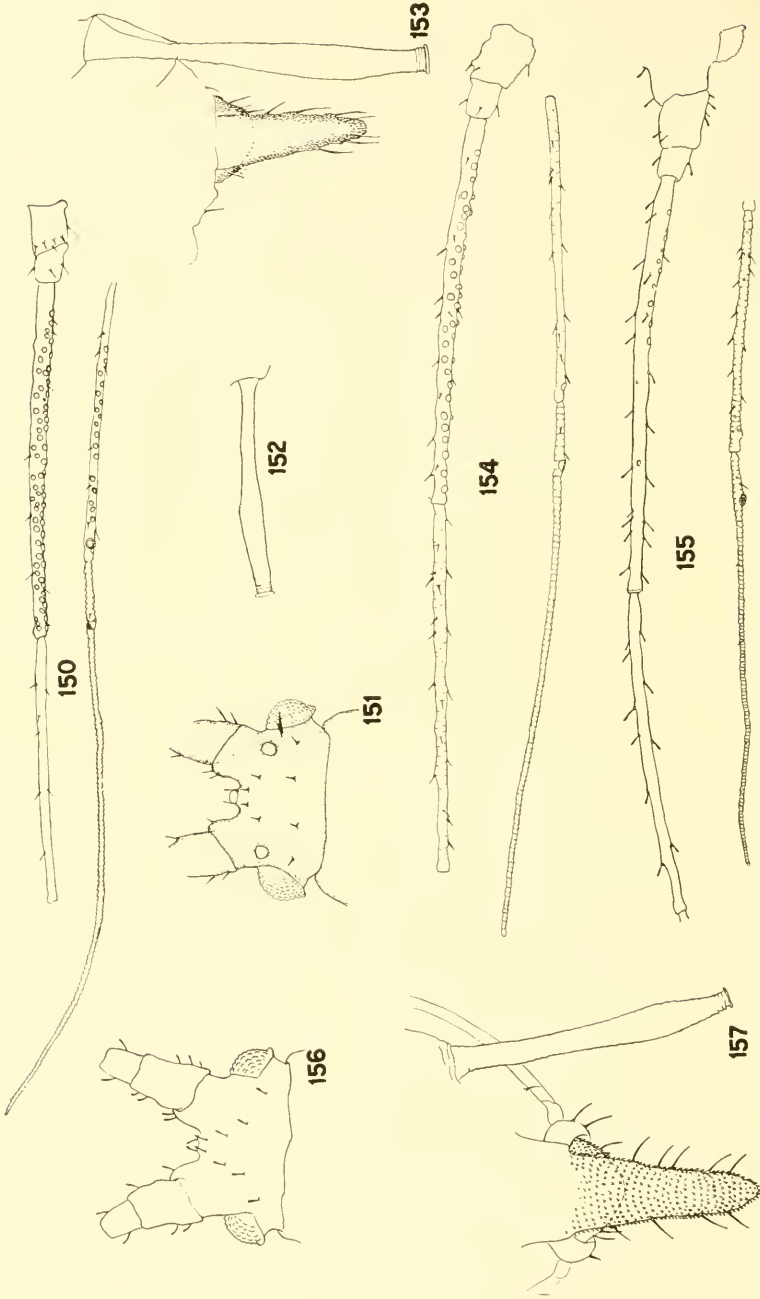
PLATE 11

- 139-141. *Amphorophora davidsoni*, new species.
(Drawings by the author.)
139. Antenna of alate form. 140. Head of alate form. 141. Cornicle
and cauda of alate form.
- 142-143. *Amphorophora reticulata*, new species.
(Drawings by the author.)
142. Cornicle and cauda of alate form. 143. Antenna of alate form.
- 144-149. *Amphorophora rubicola* (Oestlund).
(Drawings by the author.)
144. Antenna of apterous form. 145. Cornicle and cauda of apterous
form. 146. Head of apterous form. 147. Head of alate form.
148. Cornicle and cauda of alate form. 149. Antenna of alate
form.



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PLATE 12

150-157. *Amphorophora rubi* (Kaltenbach).

(Drawings by the author.)

150. Antenna of male. 151. Head of alate form. 152. Cornicle of male. 153. Cornicle and cauda of alate form. 154. Antenna of alate form. 155. Antenna of apterous form. (Drawing by Mrs. Awl.) 156. Head of apterous form. (Drawings by Mrs. Awl.) 157. Cornicle and cauda of apterous form. (Drawing by Mrs. Awl.)

PLATE 13

158-163. *Amphorophora sensoriata* Mason.

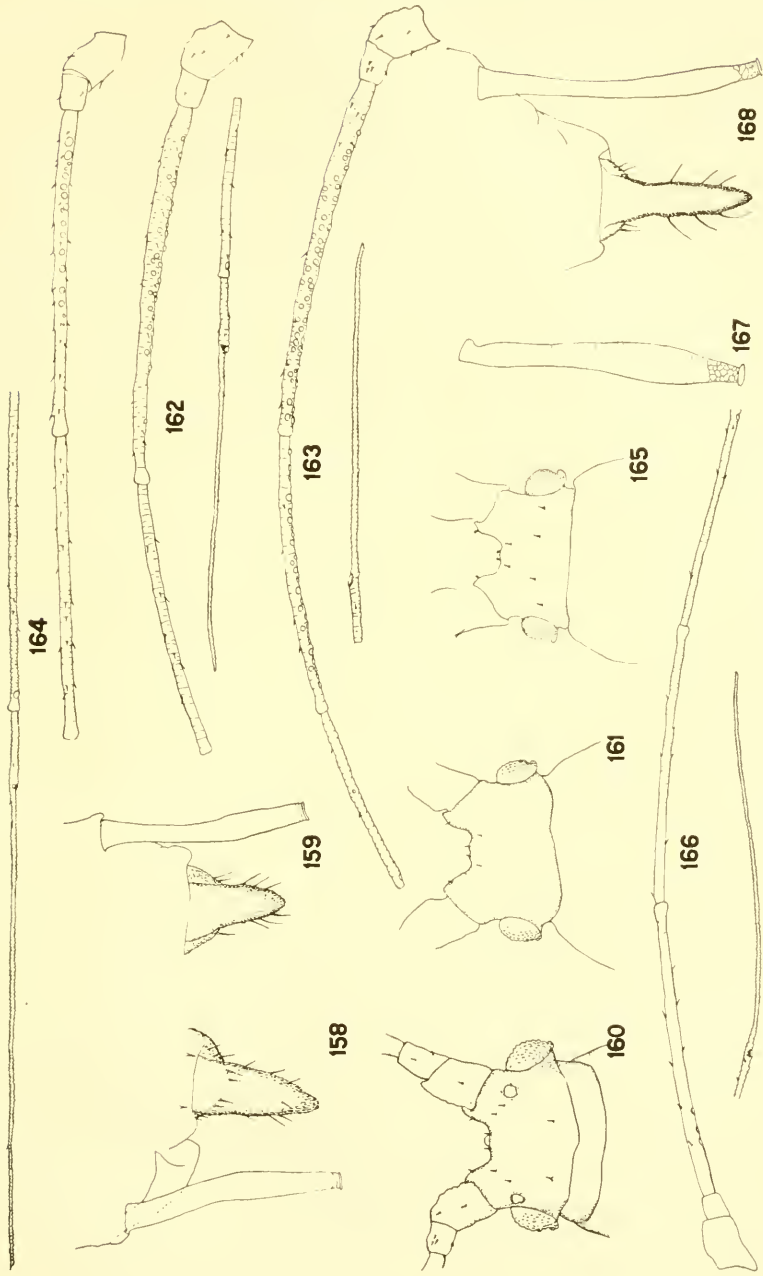
(Drawings by the author.)

158. Cornicle and cauda of apterous form. 159. Cornicle and cauda of alate. 160. Head of alate form. 161. Head of apterous form. 162. Antenna of apterous form. 163. Antenna of alate form.

164-168. *Amphorophora spiraeicola* (Patch).

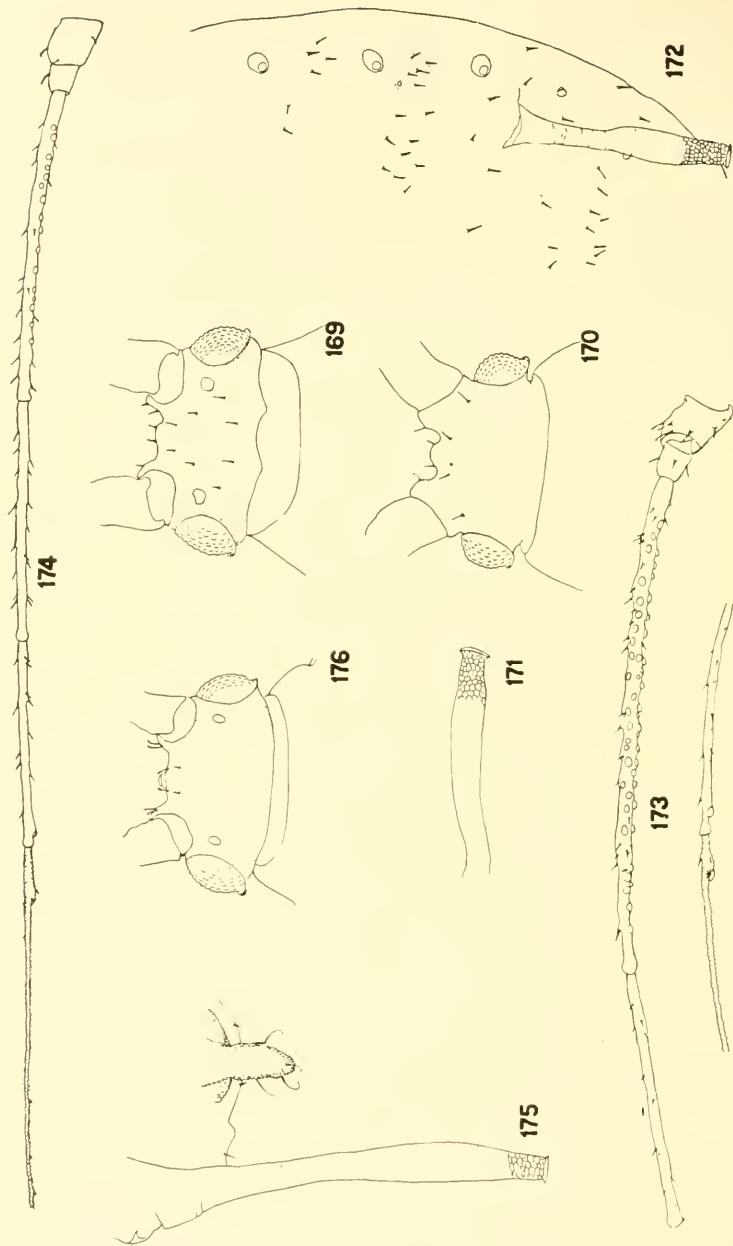
(Drawings by the author.)

164. Antenna of alate form. 165. Head of apterous form. 166. Antenna of apterous form. 167. Cornicle of alate form. 168. Cornicle and cauda of apterous form.



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PLATE 14

169-173. *Amphorophora aconiti* (van der Goot).

(Drawings by the author.)

169. Head of alate form. 170. Head of apterous form. 171. Cornicle
of apterous form. 172. Abdomen and cornicle of alate form.
173. Antenna of alate form.

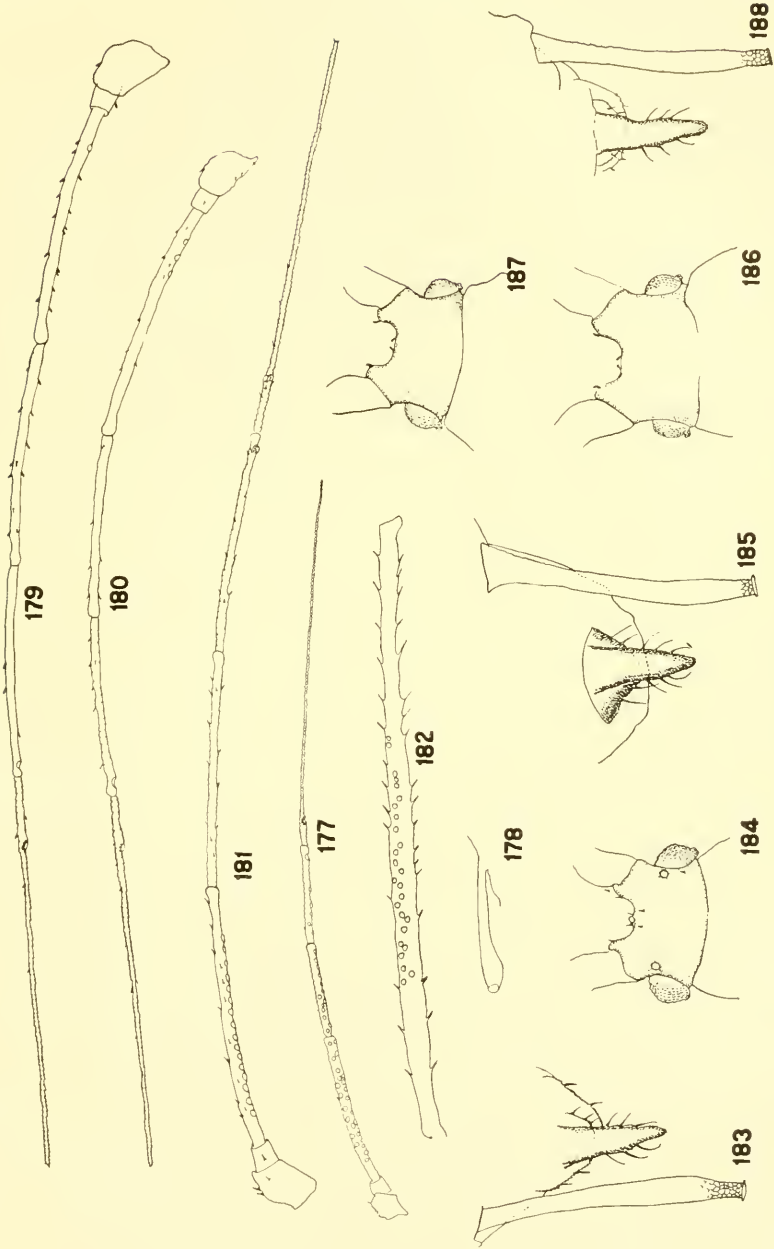
174-176. *Amphorophora maxima*, new species.

(Drawings by the author.)

174. Antenna of alate form. 175. Cornicle and cauda of alate form.
176. Head of alate form.

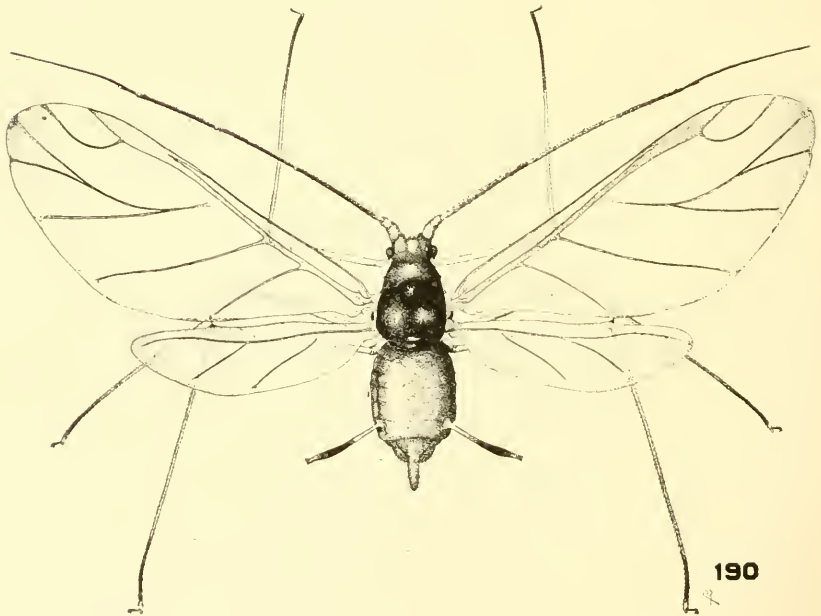
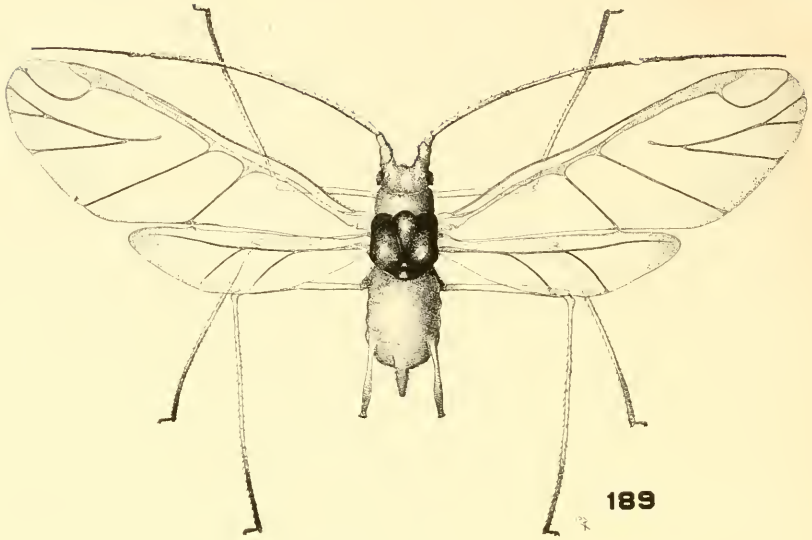
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- 177-178. *Amphorophora minima*, new species.
(Drawings by the author.)
177. Antenna of alate form. 178. Cornicle of alate form.
- 179-188. *Amphorophora vaccinii*, new species.
(Drawings by the author.)
179. Antenna of oviparous female. 180. Antenna of apterous form.
181. Antenna of alate form. 182. Posterior tibia of oviparous female.
183. Cornicle and cauda of alate form. 184. Head of alate form.
185. Cornicle and cauda of oviparous female. 186. Head of oviparous female.
187. Head of apterous form. 188. Cornicle and cauda of apterous form.



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PLATE 16

(Drawings by Carlo Zeimet.)

189. *Amphorophora laingi*, new species.

190. *Amphorophora rubi* (Kaltenbach).

PLATE 17

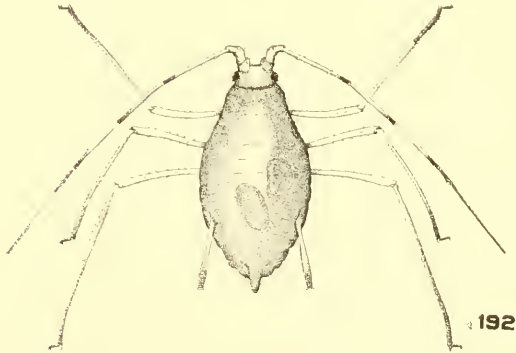
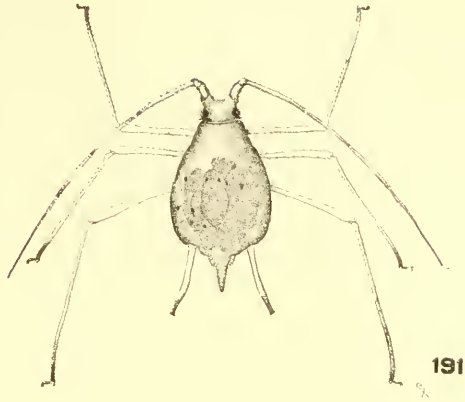
(Drawings by Carlo Zeimet.)

191. *Amphorophora vaccinii*, new species.

Apterous form.

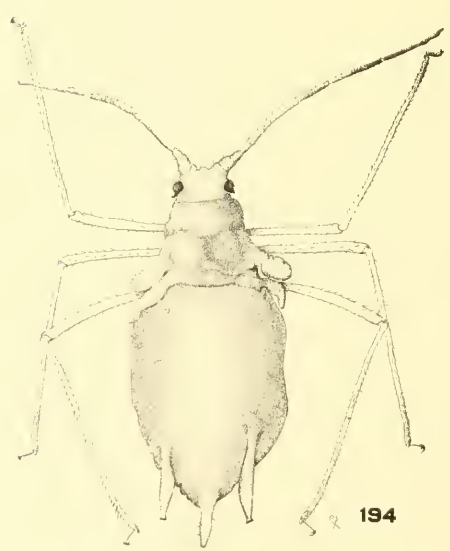
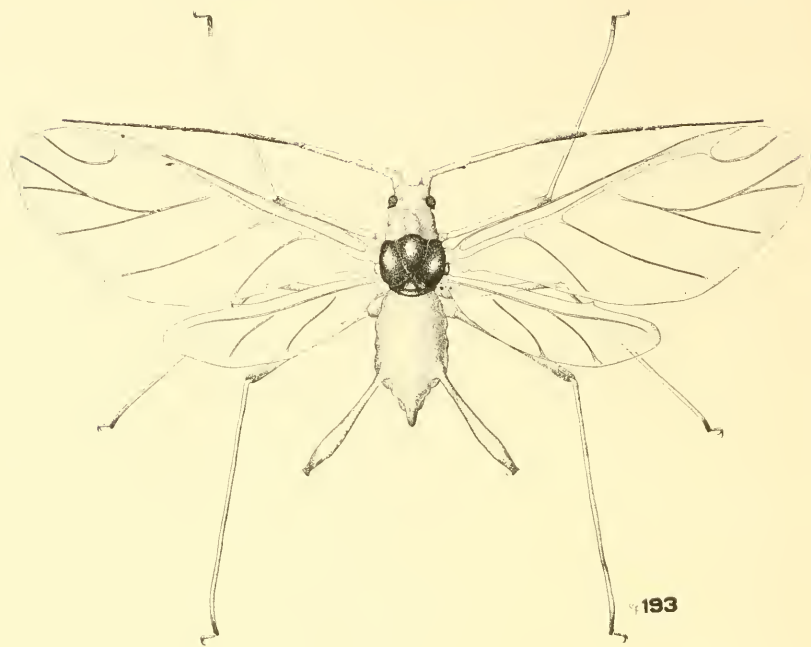
192. *Amphorophora vaccinii*, new species.

Oviparous female.



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(Drawings by Carlo Zeimet.)

193. *Amphorophora rubicola* (Oestlund).

194. *Amphorophora nabali* (Oestlund).

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