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SOME SPECIES OF AULACORTHUM OF JAPAN*

(APHIDIDAE, HOMOPTERA)

By the late RYOICHI TAKAHASHI

In this paper is presented a key for differentiating 16 Japanese species of the genus *Aulacorthum* Mordvilko, the specimens of which are available to the present study, with descriptions of 7 new and little known species. A new subgenus is here erected.

This group has been often confused with other genera and the Japanese species have been referred to diverse genera including *Macrosiphum*, *Acyrthosiphon*, *Myzus*, *Amphorophora* and *Rhopalosiphum*.

Aulacorthum lonicerae Hori, 1938, and *A. loochooense* Takahashi, 1939, are not species of the genus and are excluded in this paper, and *Aulacorthum brevicaudum* Moritsu, 1958, is not here dealt with, as the specimens are not at hand.

I am much indebted to Dr. D. Hille Ris Lambers for informations and European specimens sent for comparison; and to Dr. V. F. Eastop for his opinions.

Aulacorthum Mordvilko

Aulacorthum* (*Perillaphis*) *perillae Shinji

Macrosiphum perillae Shinji, Zool. Mag., Tokyo, XXXVI, p. 363 (1924).

Acyrthosiphum perillae Takahashi, Dept. Agr., Govt. Res. Inst. Formosa, Rept. 53, p. 64 (1931); Shinji, Monogr. Japan. Aphid., p. 716 (1941).

Macrosiphum perillae Takahashi, Dept. Agr., Govt. Res. Inst. Formosa, Rept. 10, p. 25 (Nov., 1924).

Apterous viviparous female: Head not protuberant at middle of front, with minute spinules on dorsum and over venter, chaetotaxy normal, venter without additional setae, setae blunt at apex; dorsal spinal tubercles rounded or conical, as large as, or larger than, bases of dorsal setae. Antennal tubercles well developed, with a long ventral seta; frontal tubercles diverging, with a long marginal seta. Antennae much longer than body, black; 1st segment longer than wide, with 6–7 setae; 2nd imbricated, with 4 setae; 3rd gradually narrowing at base, smooth, with a little imbrications at base, with 4–8 flat sensoria in a row on basal half; relative length of segments about as follows: III–35, IV–24, V–22, VI–9+52. Clypeus with 4 anterior setae, mandibular laminae with 2 setae; rostrum reaching

* It is to be deeply regretted that Dr. Ryoichi Takahashi passed away in 1963. Even on the bed of illness he continued his work and left several finished manuscripts, which will be published in the entomological journals, Mushi, Kontyû or Insecta Matsumurana, in near future. One of them is expected to be printed here as his memory. It should be noteworthy here that by his last injunction his collection of Aphidoidea and Coccoidea with the literature concerned is deposited in the Entomological Institute, Faculty of Agriculture, Hokkaido University for future reference by students in entomology. CHIHISA WATANABE

[Insecta Matsumurana, Vol. 27, No. 2, January, 1965]

hind coxae, ultimate segment about 1.6 times as long as 2nd segment of hind tarsus, a little longer than basal part of 6th antennal segment, with 2 pairs of secondary setae. Cornicles imbricated, black, as long as width of head across eyes, 1.5 times as long as cauda, about 9 times as long as wide at middle, with a few large cells at apex, and with distinct flange; subapical narrowest part as wide as middle part of hind tibia. Cauda pale, tapering, bluntly pointed, with 7 setae. Genital plate with 3 or 4 setae along hind margin on each side, and a pair of anterior setae. Femora almost smooth, with some long setae which are a little longer than half middle diameter of femur; tibiae smooth, with some setae a little longer than middle diameter of hind tibia; hind tibiae convex at base of outside, nymphs without spinules on tibiae; tarsi with 3 setae on 1st segment in all legs, 2nd segment of hind tarsus with a pair of secondary setae on each surface. Metanotum

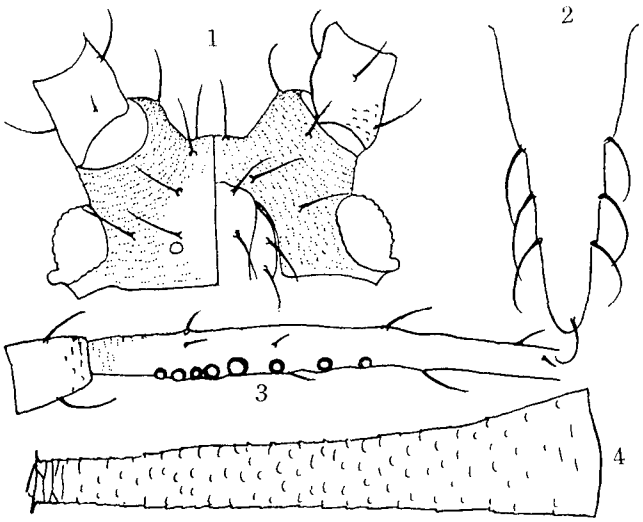

Fig. 1. *Aulacorthum* (*Perillaphis*) *perillae* Shinji, Apterous viviparous female: (1) Head. (2) Cauda. (3) 2nd and 3rd antennal segments. (4) Cornicle.

and basal 7 abdominal segments fused, 7th faintly defined. Dorsum sclerotized and yellowish brown, but paler on central area of abdomen, when cleared; abdomen without marginal sclerites defined, dorsal sclerotized area reaching beyond spiracles; dorsal setae about 8 or 9 on 3rd–5th abdominal segments including marginal single ones, 5 or 6 between cornicles, 4 on 7th and 8th; these setae about twice, or a little over, as long as middle diameter of 3rd antennal segment. Marginal tubercles present on 2nd or 3rd–5th abdominal segments. Distance between 6th and 7th abdominal spiracles nearly as long as that between 5th and 6th. Mesosternal furca with short base. Body 2 mm. in length.

Alate viviparous female: Head smooth on dorsum, but with spinules on anterior parts of frontal tubercles and over venter. Dorsal setae of head 1.5 times as long as middle diameter of 3rd antennal segment, dorsal setae of abdomen similar or a little longer. Setae on 3rd antennal segment slightly shorter than middle diameter of the segment. Tibial setae as long as, or a little longer than, middle diameter of hind tibia. Secondary sensoria

flat, 12 in a row along almost whole length on 3rd antennal segment, absent on 4th. Marginal sclerites of abdomen large on 2nd–4th or 5th segments, smaller on 5th on one side; dorsal sclerites divided into about 4–5 parts on 2nd–5th; 6th–8th sclerotized over dorsum. Distance between 6th and 7th spiracles a little longer than that between 5th and 6th. Subapical narrowest part of cornicles slightly broader than middle part of hind tibia. Wing veins normal. Other characters as in aptera. Body 2.1 mm. in length.

Described from a specimen.

Host plant: *Perilla.*

Specimens examined: Some apterae and alatae taken at Hirao, Osaka Prefecture (12. VI. 1954, R. Takahashi leg.).

Perillaphis, n. subg.

Different from *Aulacorthum* sens. str. in the longer setae on dorsum, antennae, femora and tibiae. In aptera dorsal setae about, or slightly over, twice as long as middle diameter of 3rd antennal segment; setae on 3rd antennal segment as long as, or a little longer than, middle diameter of the segment. In aptera sensoria present on about basal half of 3rd antennal segment.

Differs from *Cryptaphis* Hille Ris Lambers in the dorsal setae not dilated at tip, the head not protuberant at middle of front, with a pair of spinal tubercles, the elongate cauda, and by the 1st antennal segment longer than wide; and from *Eomyzus* Takahashi in the presence of sensoria on 3rd antennal segment in aptera and by the spinal tubercles on the head.

Type-species: *Macrosiphum perillae* Shinji, 1924.

Aulacorthum* (*Neomyzus*) *taiwanum Takahashi

Macrosiphum taiwanum Takahashi, Dept. Agr., Govt. Res. Inst. Formosa, Rept. 4 (Aphid. Formosa, Pt. 2), p. 16 (1923).

Amphorophora taiwana Takahashi, Dept. Agr., Govt. Res. Inst. Formosa, Rept. 10 (Aphid. Formosa, Pt. 3), p. 39 (1924); Trans. Nat. Hist. Soc. Formosa, XIX, p. 527 (1929).

Myzus taiwanus Takahashi, Dept. Agr., Govt. Res. Inst. Formosa, Rept. 53 (Aphid. Formosa, Pt. 6), p. 70 (1931).

Apterous viviparous female: Different from the original description in wanting a dark posterior band on the abdomen, the pronotum and metanotum with a pair of large dark patches, and in the rostrum not reaching the hind coxae; and may be a subspecies.

Differs from *Neomyzus circumflexus* Buckton* chiefly as follows:

Head smooth on dorsum except on anterior marginal area, with shorter dorsal setae, the posterior 3 pairs of which are distinctly shorter than half diameter of middle part of 3rd antennal segment. Antennal tubercles without ventral seta; frontal tubercles a little diverging or converging, with 2 minute setae. Mandibular laminae smooth, ultimate segment of rostrum shorter, nearly as long as or slightly shorter than 2nd segment of hind tarsus,

* *Neomyzus circumflexus* Buckton was collected on *Corydalis japonica* at Chihaya near Mt. Kongo, Osaka Prefecture (17. V. 1959).

much shorter than, and sometimes half as long as, basal part of 6th antennal segment. Antennae less imbricated on basal 3 segments, 1st segment with 4–7 setae; 3rd segment with none or 1 or 2 sensoria near base. Cauda constricted. Cornicles a little longer, more slender, about 10–11 times as long as wide at middle, as long as width of head across eyes, at apex excluding flange as wide as middle part of hind tibia. Mesonotum with 8 setae; anterior 6 abdominal segments with 2 dorsal (spinal) setae and 2 marginal setae on each side (pleural setae wanting). Fore and middle femora imbricated, longest femoral seta as long as, or shorter than, half of middle diameter of femur; tarsi with mostly 3 secondary setae on lower side of 2nd segment in hind pair, tibiae without spinules in larvae. Distance between 6th and 7th abdominal spiracles a little longer than that between 5th and 6th, 7th and 6th abdominal spiracles close to large patches on 6th segment behind cornicles. Body white in life, with different dark dorsal markings, which are more or less distinctly reticulated; hind femora mostly black; a lateral dark marking present on 3rd abdominal sternite, which is variable in size.

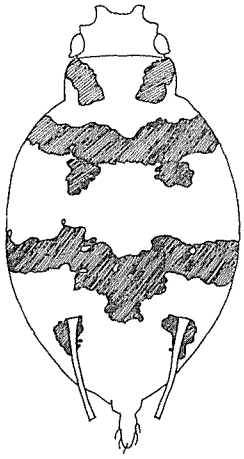

Fig. 2.
Aulacorthum (*Neomyzus*) *taiwanum* Takahashi, Apterous viviparous female: Patches on dorsum.

Host plant: *Codonopsis lanceolata* Sieb. et Zucc.

Specimens examined: A few apterae taken at Mt. Koya, Wakayama Prefecture (23. IX. 1960, R. Takahashi leg.).

Previously known from Formosa alone.

Aulacorthum nipponicum Essig et Kuwana

Macrosiphum nipponicum Essig et Kuwana, Proc. Calif. Acad. Sc., 4th ser., VIII, p. 48 (1918).

Macrosiphum paederiae Takahashi, Aphid. Formosa, Pt. 1, Pub. Govt. Agr. Expt. Formosa, p. 11 (1921); Dept. Agr., Govt. Res. Inst. Formosa, Rept. 4, p. 15 and 73 (1923).

Acyrthosiphon paederiae Takahashi, Dept. Agr., Govt. Res. Inst. Formosa, Rept. 53, p. 64 (1931); Shinji, Monogr. Japan. Aphid., p. 706 (1941).

Apterous viviparous female: Red in life. Head dark when cleared, antennae black on basal 2 and 6th segments and on apices of 3rd–5th. Cornicles and cauda black. Femora black, tibiae black at base and apex. Head with spinules almost over dorsum and venter, sometimes with indistinct spinal tubercles, slightly convex at middle of front; venter of head with 3 setae on each side. Frontal tubercles with 3–4 setae. Antennae about 1.2–1.3 times as long as body, imbricated, 1st segment longer than wide, with 7–9 setae; 2nd with 4–5 setae; 3rd with 1–2 sensoria near base and a few minute setae about one-third of middle diameter of the segment; relative length of segments about as follows: III–50, IV–32, V–35, VI–12+58. Mandibular laminae with spinules and 3 setae; ultimate segment of rostrum 1.3–1.4 times as long as 2nd segment of hind tarsus, shorter than basal part of 6th antennal segment, with 3 pairs of secondary setae. Cornicles longer than width of head across eyes, 7–9 times as long as wide at middle, rounded on mesal side, or slightly swollen on distal half, a little imbricated, over

2.5 times as long as cauda, at apex excluding flange wider than middle part of hind tibia. Cauda with 5–6 setae. Femora imbricated on distal part, with setae at most slightly longer than one-third of middle diameter of femur; tibial setae shorter than middle diameter of tibia; tarsi with 3 setae on 1st segment in all legs, 2nd segment of hind tarsus with about 4 secondary ones in all. Marginal sclerites of abdomen with 0–1 seta on 5th segment, absent or minute on 4th and 3rd, large and sometimes fused with those on 7th on 6th; abdomen with small intersegmental patches when dorsal sclerites developed; about 6–8 small setae on anterior segments besides marginal ones, 2 between cornicles, 4 on 7th, and on 8th; those on 8th longer, but longest one somewhat shorter than middle diameter of 3rd antennal segment. Distance between 6th and 7th abdominal spiracles a little longer than that between 5th and 6th. Mesosternal furca with base broader than long. Body 2.5 mm. in length.

Alate viviparous female: Third antennal segment with 8–10 sensoria on basal half to three-fourths. Mesosternum with many granules. Marginal sclerites of 6th abdominal segment large, fused with those of 7th. Wings a little infuscated along veins.

Host plant: *Paederia tomentosa.*

Common in Japan (Honshu, Shikoku and Kyushu), Naze, Amami-Oshima (7. IV. 1960) and Tokushima (VIII. 1958).

Third antennal segment with 2–5 sensoria in an alata, taken at Naze, Amami-Oshima.

Aulacorthum glechomae, n. sp.

Apterous viviparous female: White in life; antennae pale, pale brownish on apices of 3rd–6th segments; legs, cornicles and cauda pale. Head slightly convex at middle of front, with distinct spinules over whole surface, dorsal setae minute, posterior ones one-sixth of middle diameter of 3rd antennal segment, anterior pair longer; venter without additional setae. Antennal tubercles well developed, with 2–3 minute ventral setae, frontal tubercles parallel on mesal sides, or slightly converging, with 2–3 minute setae, frontal concavity broader than deep. Antennae imbricated, about 1.4–1.6 times as long as body; 1st segment nearly as long as wide, with 6–7 setae, 2nd with 4, 3rd as long as width of head across eyes, with a sensorium near base, with about 9 minute blunt setae, which are one-third to one-fourth of middle diameter of the segment; relative length of segments about as follows: III–25, IV–23, V–20, VI–9+42. Clypeus smooth, with 2 pairs of anterior setae, mandibular laminae with spinules and 2–3 setae; ultimate segment of rostrum reaching beyond middle coxae, shorter than basal part of 6th antennal segment, 1.3 times as long as 2nd segment of hind tarsus, with a pair of secondary setae. Cornicles cylindrical, as long as 4th antennal segment, 9–10 times as long as middle width, roughly imbricated, with distinct flange, a little over twice as long as cauda, at apex excluding flange slightly broader than middle part of hind tibia, on apical part not expanded to flange, with a few large cells on apical part, flange distinctly wider than middle part. Genital plate with 4 setae along hind margin on each side, and a pair of anterior setae. Cauda about twice as long as wide at base, scarcely constricted, bluntly pointed at apex, 4–5 setae. Femora a little imbricated at apex, with some small setae which are distinctly shorter than one-third middle

diameter of femur; tibiae smooth, with setae shorter than middle diameter of hind tibia; hind tibiae much shorter than body, with numerous spinules in immature stage; tarsi with 3 setae on 1st segment in all legs, 2nd segment of hind tarsus with a pair of secondary setae on each surface. Thorax and abdomen without sclerites and markings when cleared; corrugated and with pale reticulations on dorsum of abdomen; pleural setae absent on 1st–6th segments; 4 setae present on 7th and 8th; dorsal setae minute, narrowed basally and about one-sixth of middle diameter of 3rd antennal segment on anterior segments; bluntly pointed and about half, or slightly over half, that diameter on 8th. Mesosternal furca with a very short, but not broad base. Basal 2 abdominal spiracles closely placed, distance between 6th and 7th as long as that between 5th and 6th. Body 1.5 mm. in length.

Host plant: *Glechoma hederacea,* subsp. *grandis.*

Described from some apterae (cotypes) taken near Mt. Iwawaki, Osaka Prefecture (29. VI. 1960, R. Takahashi leg.).

This species is remarked by the presence of numerous spinules on the hind tibiae in larvae, the ultimate segment of rostrum with only a pair of secondary setae, and the 1st antennal segment not longer than wide, and is also similar to *Neomyzus* in other characters, though different in the absence of dorsal dark markings. Different from *Ovatus glechomae* Hille Ris Lambers in the head with spinules over whole surface, the presence of a sensorium on 3rd antennal segment, and hind tibiae with spinules in larvae.

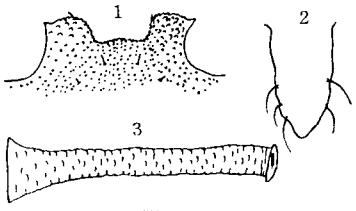

Fig. 3.
Aulacorthum glechomae, n. sp. Apterous viviparous female: (1) Frontal tubercles. (2) Cauda. (3) Cornicle.

Aulacorthum asteris, n. sp.

Apterous viviparous female: White or pale yellowish in life. Head white; antennae pale, dusky on 3rd segment, blackish at bases of 4th–6th and on apical parts of 3rd–5th; 6th paler on basal part of processus terminalis. Cornicles black on apical one-sixth and basal one-third, pale brownish on middle area when cleared. Cauda white. Femora blackish at apex, tibiae black at apex, slightly dusky at base, tarsi black. Head without spinal tubercles, smooth on dorsum, with minute spinules on anterior marginal areas of frontal tubercles and over venter; dorsal setae as long as, or somewhat shorter than, middle diameter of 3rd antennal segment; venter of head with similar usual setae, without additional setae. Antennal tubercles well developed, with a ventral similar seta, frontal tubercles with 2 setae. Antennae about 1.5 times as long as body; 1st segment with spinules on basal part of venter, with 6–7 setae, longer than wide; 2nd scarcely imbricated, with 4 setae; 3rd smooth, with 17–29 flat sensoria almost in a row or scattered, along outside except on basal and apical short parts, and some short blunt setae which are mostly one-third, or less than half, as long as middle diameter of the segment, 4th a little imbricated, usually without sensoria (with a sensorium on one side in a specimen); relative length of segments about as follows: III–60, IV–43, V–37, VI–13+60–70. Clypeus with 2 pairs of anterior setae, mandibular laminae with 2–3 setae, rostrum reaching middle coxae, ultimate segment much shorter than basal part of

6th antennal segment, about 1.1–1.2 times as long as 2nd segment of hind tarsus, with 3 pairs of secondary setae. Cornicles cylindrical, as long as width of head across eyes, about 10 times as long as middle width, slightly shorter than 4th antennal segment, twice as long as cauda, imbricated, at apical part excluding flange as wide as narrowest part of hind tibiae (slightly narrower than middle part of hind tibia), with a few large cells at apex. Cauda stout, with 7 setae. Genital plate pale, with over 10 setae along hind margin and 2–4 anterior setae. Femora almost smooth, with many short setae which are shorter than one-third of middle diameter of femur; tibiae smooth, with setae shorter than middle diameter of hind tibia; hind tibiae a little shorter than body; tarsi with 3 setae on 1st segment in all legs, 2nd segment of hind tarsus with an upper pair and 2 lower pairs of secondary setae. Thorax and abdomen without sclerites and markings, membranous, somewhat corrugated; anterior dorsal setae of abdomen minute, about, or less than, one-fourth of middle diameter of 3rd antennal segment; 4 setae on 7th tergite longer, 8th tergite with 6 setae which are as long as, or a little longer than, that diameter. Mesosternal furca with a short basal stem. Basal 2 abdominal spiracles separated, distance between 6th and 7th spiracles nearly as long as that between 5th and 6th. Body 3–3.5 mm. in length.

Described from some apterae (cotypes) taken at Kuroyama, Osaka Prefecture (10. XI. 1957, M. Sorin leg.).

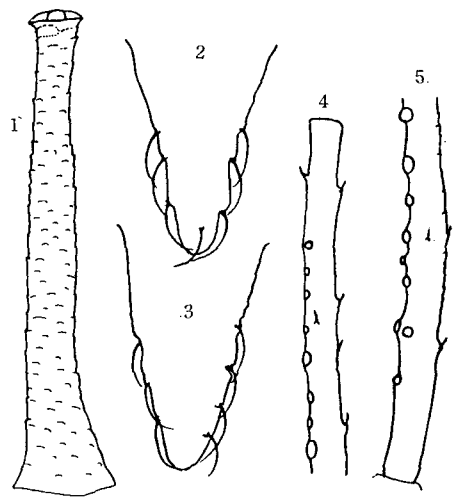

Fig. 4. *Aulacorthum asteris*, n. sp. Apterous viviparous female: (1) Cornicle. (2) and (3) Caudas. (4) Third antennal segment.

Alate viviparous female: Head, thorax and basal 2 antennal segments dark; cornicles dusky, darker on basal part; cauda pale, when cleared. Wings infuscated along veins. Head sparsely with spinules over venter; dorsal setae of head shorter than middle diameter of 3rd antennal segment. Third antennal segment almost smooth with 30 sensoria scattered along outside; relative length of segments about as follows: III–57, IV–42, V–37, VI–14+62. Cornicles at apex excluding flange as wide as middle part of hind tibia. Abdomen with a band on 2nd–7th segments, which are divided on 2nd and 3rd, fused on 3rd–6th; marginal sclerites separated from spiracles, with 2 or 3 setae on 3rd and 4th, a seta on 5th; larger on 6th; dorsal sclerite of 7th reaching beyond spiracles; 6th membranous on dorsum of posterior half between marginal sclerites; anterior abdominal segments with minute spinal setae, without pleural ones; 4 setae between cornicles and 7th tergite longer; 8th segment pale, with 8 setae which are as long as middle diameter of 3rd antennal segment. Distance between 6th and 7th abdominal spiracles a little longer than that between 5th and 6th. Basal 2 abdominal spiracles fused. Body 2.8 mm. in length.

Described from an alata (morphotype) taken at Kuroyama, Osaka Prefecture (10. XI.

1957, M. Sorin leg.).

Host plant: *Aster yomena*.

This species is characterized by the greater number of sensoria on the 3rd antennal segment in apterae.

Aulacorthum syringae, n. sp.

Apterous viviparous female: Pale yellow in life. Antennae pale on 1st and 2nd segments, black on 3rd–6th. Cornicles black, paler on basal part when cleared. Cauda pale. Femora pale, black at tip; tibiae black, a little paler near apical part. Head with spinules over venter and on dorsum except on median area of posterior half; dorsal setae subequal in length to, or a little longer than, middle diameter of 3rd antennal segment, venter of head with similar usual setae only. Antennal tubercles well developed, with a ventral seta, frontal tubercles with 1 or 2 setae. Antennae much longer than body, imbricated, 1st

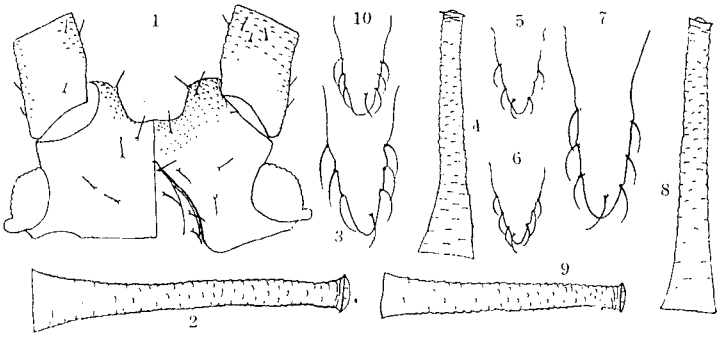

Fig. 5. 1–3, *Aulacorthum cirsicola* Takahashi, Apterous viviparous female: 1. Head; 2. Cornicle; 3. Cauda. 4–6, *Aulacorthum muradachi* Shinji, Apterous viviparous female: 4. Cornicle; 5. Cauda. Alate viviparous female: 6. Cauda. 7–8, *Aulacorthum ibotum* Essig et Kuwana, Apterous viviparous female: 7. Cauda; 8. Cornicle. 9–10, *Aulacorthum syringae*, n. sp., Apterous viviparous female: 9. Cornicle; 10. Cauda.

segment with about 7 setae, 2nd with 4; 3rd with a sensorium near base and some blunt setae which are about one-fourth to less than half, or a little over one-third, as long as middle diameter of the segment; relative length of segments about as follows; III–40, IV–32, V–26, VI–11+56–59. Clypeus with 2 pairs of anterior setae; mandibular laminae with 2 or 3 setae; ultimate segment of rostrum reaching hind coxae, 1.3–1.4 times as long as 2nd segment of hind tarsus, with 3 pairs of secondary setae, shorter than basal part of 6th antennal segment. Cornicles a little longer than width of head across eyes, slightly longer than or as long as 4th antennal segment, about 10 times as long as wide at middle, cylindrical, rather sparsely imbricated, almost smooth on basal one-third, slightly over twice as long as cauda, at apex excluding flange nearly as wide as middle part of hind tibia. Cauda with 7 setae, longer than basal part of 6th antennal segment. Genital plate with 5–6 setae on each side of hind margin, and a pair of anterior ones. Femora with a few imbrications at tip, with setae which are one-fourth or one-fifth of middle diameter of

femur; tibiae with a few striates on apical part, with setae shorter than, or at most as long as, middle diameter of hind tibia; tarsi with 3 setae on 1st segment in all legs; 2nd segment of hind tarsus 3 or 2 secondary setae on lower side besides 2 on upper side; hind tibiae distinctly shorter than body. Abdomen pale, membranous, without sclerites and intersegmental markings; anterior segments with 4 minute (pleural and spinal) setae, 6th segment with 2 dorsal setae between cornicles, 7th with 4 longer setae; 8th pale, with 6 setae which are a little or somewhat longer than middle diameter of 3rd antennal segment. Distance between 6th and 7th abdominal spiracles slightly longer than that between 5th and 6th. Mesosternal furca with basal stem which is slightly broader than, or nearly as broad as, long. Body 2 mm. in length.

Host plant: *Syringa reticulata.*

Described from some apterae (cotypes) taken at Sapporo (1. VII. 1960, R. Takahashi leg.).

Different from the description of *Macrosiphum syringae* Matsumura in the antennae black except on basal 2 segments, the black tibiae and the black cornicles, and in the processus terminalis about 5 times as long as base.

This species is closely related to *A. kerriae* (Shinji), but the body is pale, the cornicles are paler at base, the femora are black at tip only, the shorter basal stem of mesosternal furca, etc.

Different from *A. smilacis* n. sp. by the longer setae on the body and 3rd antennal segment, and the dorsum not sclerotized at all, without intersegmental markings.

Aulacorthum smilacis, n. sp.

Apterous viviparous female: Yellow in life; when cleared head pale brownish, thorax and abdomen faintly sclerotized and slightly pale dusky on dorsum except on median area of abdomen, abdomen with submarginal intersegmental dusky parts which are rather large, not well defined and with some areolations, antennae brownish, dusky on 1st segment, apices of 3rd to 5th and on 6th; femora blackish at apex, tibiae yellowish, with blackish apices and tarsi; cornicles pale brownish, blackish at tip, cauda pale brownish. Head with spinules over whole surface, not convex at median part of front, without spinal tubercles; posterior dorsal setae less than one-third of diameter of middle part of 3rd antennal segment, anterior pair longer, at most as long as that diameter; venter without additional setae. Antennal tubercles well developed, with a short ventral seta; frontal tubercles somewhat diverging with 2 short setae. Antennae about 1.5 times as long as body, imbricated; 1st segment with 7 setae, 2nd with 4; 3rd with 1 or 2 small sensoria near base, and with about 18 minute setae less than one-fourth of middle diameter of the segment, not constricted basally; relative length of segments about as follows: III–40, IV–31, V–27, VI–12 +57. Clypeus with 2 pairs of rather short anterior blunt setae; mandibular laminae with a few spinules and 2 similar setae; ultimate segment of rostrum reaching hind coxae, 1.3–1.4 times as long as 2nd segment of hind tarsus, with 3 pairs of secondary setae, distinctly shorter than basal part of 6th antennal segment. Cornicles cylindrical, as long as width of head including eyes, and as 4th antennal segment, over 10 times as long as middle width,

a little over twice of cauda, imbricated with a few cells at tip, at apex excluding flange as wide as or slightly broader than middle part of hind tibia. Cauda not constricted, longer than basal part of 6th antennal segment, rather stout, with 5-6 setae. Genital plate pale brownish, with 5-6 setae on each side of posterior margin and a pair of longer blunt anterior setae. Femora imbricated on apical part, with some minute setae; tibiae smooth, tibial setae at most nearly as long as middle diameter of hind tibia; tarsi with 3 setae on 1st segment; 2nd segment of hind tarsus with a pair of secondary setae on upper side and 2 pairs on lower side. Metathorax and 1st-7th abdominal segments fused together, without tubercles; dorsal setae minute, 4 besides 2 or 3 marginal ones on each side; 4 between cornicles on 6th, 4 on 7th, 5 on 8th, those on 8th much longer, blunt, about one half of, or slightly shorter than, middle diameter of 3rd antennal segment. Mesosternal furca with a distinct basal stem. Spiracular sclerites pale. Distance between 6th and 7th abdominal spiracles as long as that between 5th and 6th. Body 1.8-1.9 mm. in length.

Host plant: *Smilax oldhami.*

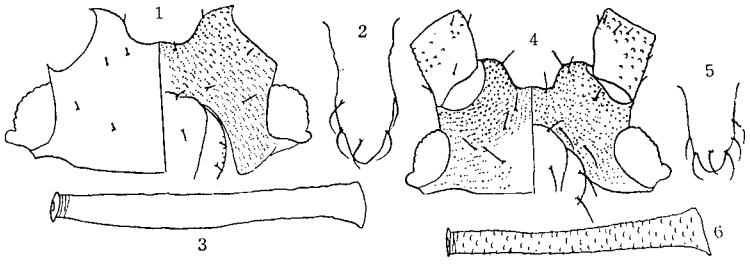

Fig. 6. 1-3, *Aulacorthum cercidiphylli* (Matsumura), Apterous viviparous female: 1. Head; 2. Cauda; 3. Cornicle. 4-6, *Aulacorthum kerriae* Shinji, Apterous viviparous female: 4. Head; 5. Cauda; 6. Cornicle.

Described from a few apterae (cotypes) taken at Takayama, Gifu Prefecture (13. VIII. 1959, R. Takahashi leg.).

Related to *A. kerriae* (Shinji), but differs in the body yellow, less sclerotized and much paler when cleared, the setae shorter on head and 8th tergite, the femora black on apices only, with shorter setae, and in the pale cornicles blackish at apex only.

Different from the description of *Rhopalosiphum smilacis* Matsumura from Hokkaido.

Key to subgenera and species

(Apterous viviparous female)

This key is based upon apterous forms unless otherwise stated.

(1) Dorsal setae of body long, at least twice as long as middle or basal diameter of 3rd antennal segment. . . . . Subgenus *Perillaphis*, n. subg.
Only one species, on *Perilla*, in Honshu. . . . . *A.* (*P.*) *perillae* (Shinji), 1924.

– Dorsal setae of body usually much shorter than middle diameter of 3rd antennal segment, sometimes as long as, or slightly longer than, that diameter. . . . . (2)

(2) Body not sclerotized over dorsum, but with large pigmented dorsal patches on thorax and abdomen, with marginal sclerites on 6th abdominal segment behind cornicles, but without them on 5th;

sensoria sometimes absent on 3rd antennal segment (Subg. *Neomyzus* van der Goot). . . . . (3)

– Body without such combination of characters. . . . . (4)

(3) Hind tibiae with spinules in larva, head with spinules over dorsum, frontal tubercles converging, ultimate segment of rostrum longer than 2nd segment of hind tarsus; polyphagous in Hokkaido and Honshu (on *Corydalis*, Mt. Kongo near Osaka). . . . . *A.* (*N.*) *circumflexum* (Buckton).

– Hind tibiae without spinules in larva, head smooth on dorsum except along anterior margin, frontal tubercles parallel or diverging, ultimate segment of rostrum as long as, or slightly shorter than, 2nd segment of hind tarsus; on *Codonopsis*, in Honshu. . . . *A.* (*N.*) *taiwanum* (Takahashi), 1923.

(4) Cornicles usually swollen on distal half, or rather stout and rounded on mesal side; abdomen sometimes with pigmented or pale marginal sclerites on 5th segment anterior to cornicles; body not sclerotized throughout dorsum, though pigmented dorsal sclerites sometimes present on 1st–6th abdominal segments. . . . . (5)

– Cornicles cylindrical, slender, not swollen; abdomen without marginal sclerites on 5th segment anterior to base of cornicles, or body sclerotized and dark over dorsum, except on marginal pale areas on 5th, in which marginal sclerites present. . . . . (7)

(5) Abdomen always with pigmented marginal sclerites on 5th segment, often with dorsal median sclerites on 1st–6th segments, which are variable in size and shape; head sometimes with apical tubercles, cornicles black; body pink in life, on *Paederia*, in Honshu, Shikoku, Amami-Oshima. . . . . *A. nipponicum* (Essig et Kuwana), 1918.

– Abdomen sometimes with pale or faint marginal sclerites on 5th segment, never with dorsal median sclerites on 1st–7th; cornicles usually pale, darker at apex; body green or yellow in life; other characters various. . . . . (6)

(6) Head with spinules over dorsum, though sometimes almost smooth on posterior part, sometimes with spinal tubercles, when cleared pale brownish or dusky especially on frontal area, with 0–2 additional setae on each side of venter, usually slightly convex at middle of front; tibiae usually black throughout; antennae often black throughout, over 1.5 times as long as body excluding cauda, 3rd segment with 1–3 sensoria near base, with setae distinctly shorter than half diameter of the segment, processus terminalis about 4–4.5 times as long as basal part; ultimate segment of rostrum about 1.2–1.3 times as long as 2nd segment of hind tarsus, with 2 pairs of secondary setae; cornicles usually a little swollen on distal half, usually pale, with dark tips, about 8.5–9 times as long as wide at middle, imbricated; cauda half length of cornicle, with 5–8 setae, usually constricted, pale brownish when cleared, abdomen pale, without markings, often with pale marginal sclerites on 5th segment, which is wanting in apterous oviparous female; sometimes with marginal tubercles on 1st–5th segments; dorsal setae minute, about 8 besides marginal ones on 4th segment, 4 between spiracles on 7th; 8th with 4–6 setae shorter than diameter of 3rd antennal segment; nearly as long as longest ones of head; tibiae smooth, with setae shorter than middle diameter of tibia; mesosternal furca with base broader than long, green in life; body 3 mm. in length. In alata 3rd antennal segment with 18–23 sensoria; abdomen with divided brownish dorsal bands, marginal sclerites of 6th segment not fused with sclerite of 7th, mesosternum smooth. On *Sambucus* (primary host), a wide range of plants including *Magnolia*, *Pieris*, *Dioscorea*, *Lagerstroemia*, *Citrus*, *Rhus*, and *Prunus* (intermediate hosts), in Hokkaido and Honshu. . . . . *A. magnoliae* (Essig et Kuwana)*, 1918.

– Head pale, smooth over dorsum or on posterior area and on broad midregion on dorsum with minute dorsal setae, without additional setae on venter; antennae about 1.5 times as long as body

* *Rhopalosiphum sambucicola* Takahashi, 1918, is a synonym. *Myzus magnolifoliae* Shinji, 1941, seems to be this species.

excluding cauda, 3rd segment with 0–4 small sensoria near base, with minute setae, longest one of which is about one-third of middle diameter of the segment, processus terminalis about 5 times as long as base; ultimate segment of rostrum as long as or a little shorter than 2nd segment of hind tarsus, with 1–3 pairs of secondary setae; cornicles pale, scarcely imbricated, 9–10 times as long as wide at middle, slightly swollen on distal half; cauda pale, with 4–6 setae; tibiae smooth, pale; abdomen pale, without markings, but sometimes with pale faint marginal sclerites on 5th and 6th segments, with 4–5 minute setae excluding marginal ones on 4th segment; 2–4 excluding marginal ones on 7th; 4 setae on 8th as long as, or slightly longer than, half middle diameter of 3rd antennal segment, but sometimes longer than that diameter; mesosternal furca broad at base; yellow in life, body 1.3–1.5 mm. in length, on *Cercidiphyllum* in Honshu (Hirayu, Hida) and Hokkaido. . . . . *A. cercidiphylli* (Matsumura), 1918.*

(7) Hind tibiae with numerous spinules in larva, abdomen with pale reticulations on dorsum, frontal tubercles converging, ultimate segment of rostrum with only a pair of setae, setae on body and antennae minute; cornicles cylindrical, pale; about 9 or 10 times as long as middle width; cauda pale, 1.7–2 times as long as wide at base; head with spinules over whole surface, 1st antennal segment not longer than wide, 3rd antennal segment with a sensorium near base. . . . . *A. glechomae*, n. sp.

– Hind tibiae without spinules in larva, abdomen not reticulated on dorsum, 1st antennal segment longer than wide; other characters various. . . . . (8)

(8) Third antennal segment with many (about 20 or more) sensoria along whole length, almost smooth; body white or yellow in life, on *Aster*, in Honshu. . . . . *A. asteris*, n. sp.

– Third antennal segment with fewer (1–8) sensoria near base or on about basal one-third, imbricated. . . . . (9)

(9) Ultimate segment of rostrum as long as, or a little shorter than, 2nd segment of hind tarsus; legs very long, hind tibiae nearly as long as or a little shorter than body excluding cauda; head smooth on dorsum, with spinules on anterior margins of frontal tubercles; antennae about 1.8–1.9 times as long as body, 3rd segment with 1–3 sensoria near base and with setae, longest one of which is about half, or a little over half, as long as middle diameter of the segment; processus terminalis about five or six times as long as base; ultimate segment of rostrum with a pair of secondary setae; cornicles cylindrical, 9 or 10 times as long as wide at middle, pale brownish or black; cauda pale, conical, with 6–7 setae; tibiae with some striates on distal part; abdomen without sclerites and markings, 6 setae including marginal ones on 4th segment, 4 setae on 7th and 8th; anterior dorsal setae minute, those on 8th much longer, as long as, or a little longer than, middle diameter of 3rd antennal segment; mesosternal furca with broad base; alata with 8–11 sensoria on 3rd antennal segment, with dorsal bands not well developed on abdomen, green or pale yellowish in life, body 2 mm. in length, on deciduous trees of Lauraceae in Honshu (Mt. Mitake, Tokyo District; Mts. Kongo and Iwawaki, Osaka Prefecture). . . . . *A. muradachi* (Shinji), 1928.

– Ultimate segment of rostrum distinctly longer than 2nd segment of hind tarsus, other characters various. . . . . (10)

(10) Body sclerotized and black over dorsum except on pale marginal areas of 5th abdominal segment anterior to bases of cornicles, where rather small marginal sclerites are present; abdomen sometimes paler on median area of dorsum, always with submarginal intersegmental clusters of areolations. . . . . (11)

– Body yellow, green or pale pinkish, never black over dorsum, though sometimes slightly dusky

* Originally described as *Macrosiphum*; cornicles almost smooth, and this species may be included in *Utamphorophora* Knowlton. *Amphorophora katsurae* Shinji, 1930, is a synonym.

on dorsum of abdomen when cleared. . . . . (12)

(11) Head with spinules over dorsum, slightly convex at median part of front; antennae about 1.5 times as long as body excluding cauda, 3rd segment with a sensorium near base, longest seta of the segment as long as, or slightly shorter than, half middle diameter of the segment, much shorter than dorsal setae of head, processus terminalis 5 times as long as basal part; mandibular laminae smooth; ultimate segment of rostrum 1.2–1.3 times as long as 2nd segment of hind tarsus, with 2–3 pairs of secondary setae; cornicles cylindrical, blackish, paler at middle part when cleared, about 10–11 times as long as wide at middle; cauda dark, stout, slightly less than half length of cornicle, with 7 setae; abdomen paler on median area when cleared, dorsal setae of abdomen minute and 4 besides 2 marginal ones on 5th segment, 4 between cornicles, 4 and longer on 7th; 8th tergite with 6 setae which are subequal to those of dorsum of head and as long as, or a little longer than, middle diameter of 3rd antennal segment; tibial setae as long as, or slightly longer than, middle diameter of hind tibiae; mesosternal furca with basal stem longer than wide; body 2.2 mm. in length. In alata, 3rd antennal segment with 9–12 sensoria except on apical part, abdomen with well developed dorsal bands, which are fused on median area on 4th–6th segments, mesosternum with some large granules on anterior half of midregion, on *Kerria* and *Petasites*, in Honshu. . . . . *A. kerriae* (Shinji), 1930.

– Head smooth on median area of dorsum, sometimes convex at median part of front; antennae about 1.3–1.4 times as long as body excluding cauda, 3rd segment with a small sensorium near base, with setae as long as, or longer than, half diameter at middle part of the segment, sometimes as long as middle diameter of the segment in specimens from Amami-Oshima; 1st segment much longer than wide, processus terminalis about 5 times as long as base; mandibular laminae with spinules; ultimate segment of rostrum about 1.3 times as long as 2nd segment of hind tarsus, with 3–4 pairs of secondary setae; cornicles cylindrical, pale brownish, darker at base, and blackish at apex when cleared, 10–11 times as long as wide at middle; cauda black, tapering, half length of cornicle, with 7 setae; abdomen not paler on median area, 5th abdominal segment with 4 dorsal setae besides marginal 2, which are a little longer than half middle diameter of 3rd antennal segment, 4 similar ones on 6th between cornicles, 4 longer setae on 7th between spiracles; 8th tergite with 4 setae which are equal in length to, or 1.5 times as long as, middle diameter of 3rd antennal segment, as long as those on head; tibial setae shorter than, or as long as, middle diameter of hind tibia; mesosternal furca with base shorter than wide; body 2.2 mm. in length, on *Paederia tomentosa* in Honshu and Kyushu; Amami-Oshima. . . . . *A. esakii* (Takahashi), 1924.

(12) Legs very long, hind tibiae as long as body excluding cauda; head smooth on dorsum except on frontal tubercles, with 1–2 additional setae on each side of venter; frontal tubercles very well developed; antennae 1.6–1.7 times as long as body excluding cauda, 1st segment much longer than wide, 3rd with 4–8 flat sensoria in a row near base or on basal one-third or more, with many setae longest one of which is one-third of middle diameter of the segment; 4th a little shorter than 3rd; processus terminalis about 6.5 times as long as base; ultimate segment of rostrum 1.4–1.5 times as long as 2nd segment of hind tarsus, with 3 pairs of secondary setae; cornicles pale or black, over 10 times as long as wide at middle, well imbricated, distinctly longer than width of head across eyes; cauda pale, as long as, or longer than, half length of cornicle, with 7 setae; abdomen pale, corrugated, without sclerites and markings; dorsal setae minute, 8 besides marginal ones on 4th segment, 4–6 between cornicles; 8th segment with 6–8 setae which are at most as long as middle diameter of 3rd antennal segment, and as longest dorsal seta on head; tibiae with some imbrications on apical parts, with setae shorter than, or as long as, middle diameter of hind tibia; mesosternal furca with basal stem longer than wide; body 2.7–3 mm. in length, yellow or

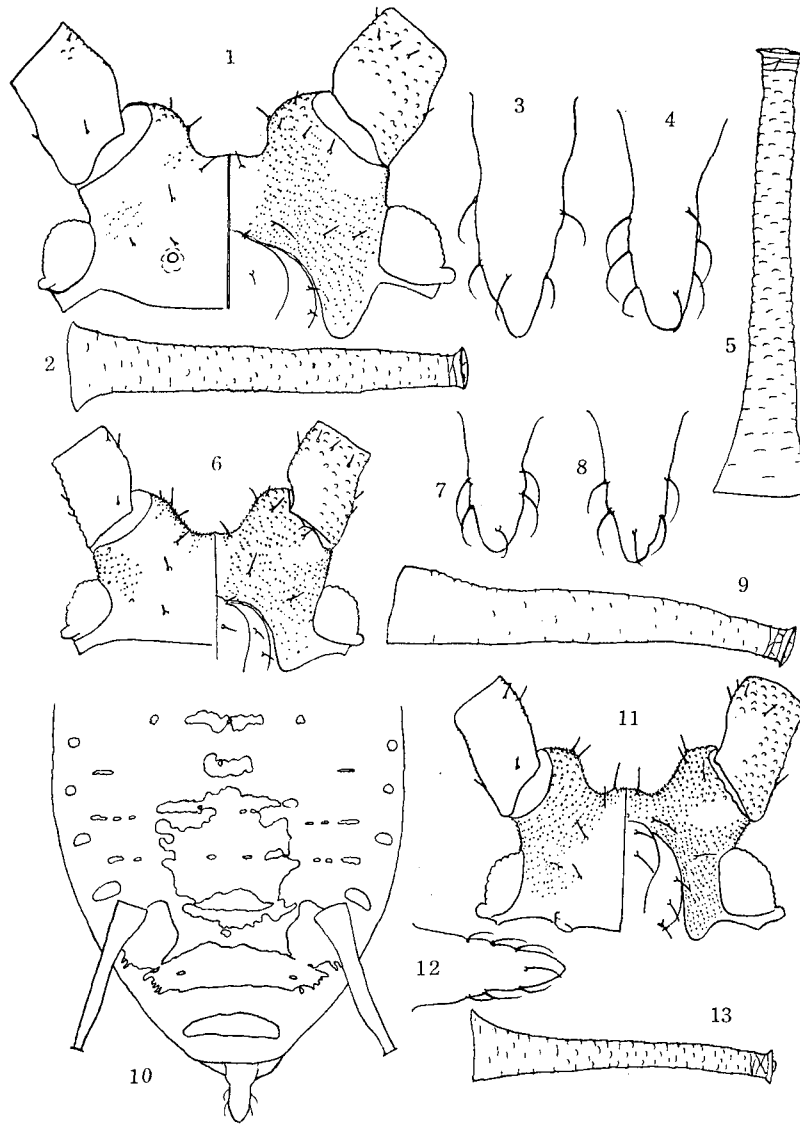

Fig. 7. *Aulacorthum magnoliae* Essig et Kuwana, Apterous viviparous female: 1. Head; 2. Cornicle; 3. Cauda. *Aulacorthum smilacis*, n. sp., Apterous viviparous female: 4. Cauda; 5. Cornicle. *Aulacorthum nipponicum* Essig et Kuwana, Apterous viviparous female: 6. Head; 7–8. Caudas; 9. Cornicle; 10. Abdomen of form with well developed dorsal sclerites (Schematic). *Aulacorthum esakii* Takahashi, Apterous viviparous female: 11. Head; 12. Cauda; 13. Cornicle.

green in life, on *Cirsium*, in Hokkaido and Honshu. . . . . *A. cirsicola* (Takahashi), 1923.*

- Hind tibiae distinctly shorter than body excluding cauda. . . . . (13)

(13) Yellow in life, but when cleared abdomen slightly sclerotized and pale brownish on lateral marginal areas like dorsum of thorax, pale on median area of dorsum, with darker submarginal intersegmental parts which are not well defined, without areolations; head with spinules over dorsum; antennae with minute setae; mandibular laminae with a few spinules; cornicles pale, blackish at tip, over 10 times as long as wide at middle; cauda pale, with 5–7 setae; body 1.9 mm. in length; on *Smilax* in Honshu. . . . . *A. smilacis*, n. sp.

- When cleared, abdomen not sclerotized on lateral marginal areas and pale, without intersegmental markings; mandibular laminae smooth; other characters various. . . . . (14)

(14) Head with spinules over dorsum or except on posterior half of median area of dorsum; antennae imbricated throughout; mandibular laminae with 2 or 3 setae; ultimate segment of rostrum with 3 pairs of secondary setae; mesosternal furca with basal part longer than wide, or nearly as long as wide. . . . . (15)

- Head with some spinules only in a subcircular cluster anteromesad of each eye on dorsum, 1st antennal segment partly imbricated; 3rd segment smooth except at basal part; mandibular laminae with 1 or 2 long setae; ultimate segment of rostrum with only a pair of secondary setae on each surface; mesosternal furca with very short broad base. Head with spinules over venter, slightly convex at median part of front, frontal tubercles very well developed; antennae about 1.5 times as long as body, 1st segment much longer than wide, 3rd with 1–4 flat sensoria near base, with setae subequal to or shorter than half diameter of middle part of the segment; processus terminalis about 5–7 times as long as basal part; ultimate segment of rostrum about 1.2–1.4 times as long as 2nd segment of hind tarsus; cornicles long, slender, black, sometimes pale at base, over 10 times as long as wide at middle; cauda pale, long, with 7–8 setae, about two-thirds or three-fifths of cornicle in length; abdomen with minute dorsal setae on anterior segments, 2 setae between cornicles, 4 setae on 7th; 8th tergite with 5–7 setae which are at most as long as or a little longer than middle diameter of 3rd antennal segment; tibiae smooth, with setae which are at most as long as middle diameter of hind tibia; yellow in life, body 2–2.3 mm. in length. In alata 3rd antennal segment with 10–12 sensoria, abdomen with dorsal bands not developed, on *Ligustrum*, in Hokkaido and Honshu. . . . . *A. ibotum* (Essig et Kuwana), 1818.**

(15) Head with spinules over dorsum; antennae pale, with black apices of 3rd–4th or 5th segments; mesosternal furca with basal stem longer than wide; cornicles pale, dark at apex; tibiae pale, black at apex; body often green or yellow in life; body 2.5 mm. in length, polyphagous, found on various wild and cultivated plants, in Kurile Islands, Hokkaido, Honshu. . . . . *A. solani* (Kaltenbach).***

- Head smooth on posterior half of median area; antennae black on 3rd–6th segments, mesosternal furca with basal stem nearly as long as wide, or slightly wider than long; tibiae black, a little paler near apical part; cornicles black, pale on basal part, almost smooth on basal one-third, rather sparsely imbricated; body 2 mm. in length, yellow in life, on *Syringa*, in Hokkaido. . . . . *A. syringae*, n. sp.

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* *Acyrthosiphon cirsifoliae* Shinji, 1935, seems to be this species.

** *Macrosiphum ligustrumae* Shinji, 1927, is a synonym of this species. Dr. D. Hille Ris Lambers has examined this species and writes me that the species is referable to *Acyrthosiphon* rather than to *Aulacorthum*.

*** Host plants of *A. solani* (Kaltenbach) include *Astilbe*, bean, cucumber, *Galium*, *Cimicifuga*, *Polygonum*, potato, *Ranunculus*, Soy bean, lily, *Rumex*, *Thalictrum*, *Oxalis*, *Boehmeria*, *Stellaria*, *Juglans*, *Dianthus*, *Abelia*, *Alnus*, *Weigelia*, *Cissus*, *Aquilegia* in Japan. *Myzus kusaki* Shinji, 1941, *M. chelidonii* Shinji, 1941, and *Macrosiphum sobae* Shinji, 1922, may be this species. *Aulacorthum kuwanai* Takahashi, 1933, from Formosa, may be a subspecies.