KEYS FOR THE IDENTIFICATION OF *ACYRTHOSIPHON* (HEMIPTERA: APHIDIDAE)

BY

VICTOR FRANK EASTOP

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KEYS FOR THE IDENTIFICATION OF *ACYRTHOSIPHON* (HEMIPTERA : APHIDIDAE)

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SYNOPSIS

Keys are given for the identification of the viviparous morphs of the world fauna of *Acyrthosiphon* and of a few other species of similar genera which have been confused with *Acyrthosiphon*. References are given to the original descriptions, principal redescriptions and synonyms of each species. The known host plant range and geographical distribution are summarized and where possible references are given to accounts of the biology of each species.

CONTENTS

INTRODUCTION

THE purpose of this paper is to provide a means of identifying specimens of the genus *Acyrthosiphon* Mordwilko, 1914. Only the viviparous morphs are considered, as the sexuales of most species have not been seen. The previous accounts of *Acyrthosiphon* (p. 6) each deal with only a particular geographical region and the most comprehensive contain less than one quarter of the world fauna. About 110 species have been described in or transferred to *Acyrthosiphon* but only 60 of these are both available and still regarded as members of *Acyrthosiphon*. There are about 90 valid described species which belong to the present concept of *Acyrthosiphon*.

There is a vast literature concerning the 'Pea aphid' *Acyrthosiphon* (*A.*) *pisum*, and a smaller amount concerning the 'Pelargonium aphid' *A.* (*A.*) *pelargonii*, the

'Rose-Grain aphid' *Acyrthosiphon* (*Metopolophium*) *dirhodum*, the 'Grass aphid' *A.* (*M.*) *festucae* and the 'Yellow Rose aphid' *Acyrthosiphon* (*Rhodobium*) *porosus* and a few other species occurring on cultivated plants. Because of the rather uniform general appearance (Text-figs 2–5 on pp. 29, 40, 42, and 45), there is a long history of misidentification and confusion between the few species occurring on tultivated plants and the more numerous species occurring on wild plants. Although the majority of *Acyrthosiphon* species are palaearctic in origin a few species are now found in most parts of the world. Some of the European species were described as new when first found in the continents to which they had been introduced and conversely some indigenous species have been misidentified with pests described from Europe.

Hundreds of specimens from many localities and collection dates have been studied for a few species but only one or two specimens for other species. Because the variation at least within the latter species must be much greater than can be estimated at present, the keys have been constructed on the principle of removing species one at a time. This has the disadvantage that the genus is not split into easily remembered groups but has the advantage that specimens must always be taken to their correct couplet and cannot be misled to the wrong part of the key by an early couplet. A few species, some morphs of which are difficult to distinguish from *Acyrthosiphon* but which properly belong in other genera, have been included in both the keys and the host plant catalogue.

Since the first draft of this paper, Hille Ris Lambers (1966 : 17) has transferred *primulae* Theobald to *Microlophium* and Ilharco (1968 : 133–142) has argued that *Rhodobium* should be regarded as fully distinct from *Acyrthosiphon*. It has been thought more useful to leave both species in *Acyrthosiphon* here rather than to omit them. The host plants of a few other species once regarded as *Acyrthosiphon* but now placed elsewhere are also included in the host plant catalogue. The present generic position of these species is indicated on pp. 87–91, together with a brief synonymy relevant to their sojourn in *Acyrthosiphon*. This paper is intended to aid the recognition of *Acyrthosiphon*-like aphids from different parts of the world rather than to indicate their evolutionary relationships.

The 'Specimens studied' are in the collection of the British Museum (Natural History) unless specified otherwise.

GENERIC AND SUBGENERIC SYNONYMY

ACYRTHOSIPHON Mordwilko, 1914

Aphis L., partim, auctores diversi, 1776–1855.
Siphonophora Koch, partim, auctores diversi, 1855–1901.
Nectarophora Oestlund, partim, auctores diversi, 1887–1911.
Macrosiphum Passerini, partim, auctores diversi, 1860–1952.

Subgenus *Acyrthosiphon* Mordwilko, 1914 : 75–198; Hille Ris Lambers, 1947 : 211–260; Stroyan, 1952 : 10. Type-species: *Aphis pisi* Kaltenbach, 1843, which is a synonym of *Aphis pisum* Harris, 1776.

Macchiatiella Del Guercio, 1917 : 210–211 nec 1909 : 5; 1931 : 292–499 partim. Type-species: *Macchiatiella trifolii* Del Guercio, 1917, which is a synonym of *Aphis pisum* Harris, 1776, which is the type-species of *Acyrthosiphon*.

?*Macrocaudus* Shinji, 1930 : 78–79. Type-species: *Macrocaudus phaseoli* Shinji, 1930 : 79–80, which may be a synonym of *Acyrthosiphon gossypii* Mordwilko, 1914, which is the type-species of *Tenuisiphon*.

Mirotarsus Börner, 1939 : 83; 1952 : 153. Type-species: *Siphonophora cyparissiae* Koch, 1855.

Tenuisiphon Mordwilko, 1948 : 215; Shaposhnikov, 1964 : 603. Type-species: *Acyrthosiphon gossypii* Mordwilko, 1914.

Hottesina Börner, 1950 : 12–13; 1952 : 151. Type-species: *Hottesina superba* Börner, 1950, which is a synonym of *Acyrthosiphon nigripes* Hille Ris Lambers, 1935.

Subgenus *Liporrhinus* Börner, 1939 : 82–83; Hille Ris Lambers, 1947 : 200, 257–260. Type-species: *Aphis chelidonii* Kaltenbach, 1843.

Subgenus *Metopolophium* Mordwilko, 1914 : 82; 1919 : 270–297; Hille Ris Lambers, 1947 : 211–260; Stroyan, 1952 : 45–46. Type-species: *Aphis dirhoda* Walker, 1849.

Goidanichiellum Martelli, 1950 : 314, 318–324. Type-species: *Macrosiphum dirhodum* (Walker, 1849) which is the type-species of *Metopolophium*.

Subgenus *Rhodobium* Hille Ris Lambers, 1947 : 255–257. Type-species: *Macrosiphum rosaefolium* Theobald, 1915, which is a synonym of *Myzus porosus* Sanderson, 1900.

Subgenus *Tlja* Mordwilko, 1914 : 72–73; 1932 : 55; 1948 : 211, 216. Type-species: *Macrosiphum lactucae* (Passerini, 1860), not mentioned until Mordwilko, 1932 : 55. *Tlja* was originally included in a key to genera without mention of any species.

Lactucobium Hille Ris Lambers, 1947 : 255–257. Type-species: *Acyrthosiphon scariolae* Nevsky, 1929, which is probably a synonym of *Siphonophora lactucae* Passerini, 1860, which is the type-species of *Tlja*, and is the species Hille Ris Lambers described, even if it is not synonymous with *scariolae*.

GENERIC DIAGNOSIS

Medium sized to rather large, body $1\frac{1}{2}$–$3\frac{3}{4}$ mm long, green, brownish green, yellow or pink aphids. Antennal tubercles usually well developed. Head usually smooth but the inner sides of the antennal tubercles sometimes scabrous or the under sides of the tubercles are weakly spinulose. Antennae $\frac{2}{5}$–$1\frac{1}{2}$ (but usually $\frac{7}{10}$–$1\frac{1}{4}$) times as long as the body. Third antennal segment of apterae usually bearing 1–3 rhinaria near its base but sometimes without secondary rhinaria and sometimes with more numerous rhinaria extending over the whole length of the segment. Alatae viviparae usually with secondary rhinaria confined to the third antennal segment but a few species also have secondary rhinaria on the fourth segment and rarely also on the fifth. Antennal and body hairs usually inconspicuous. The longest hairs on the third antennal segment are usually only $\frac{1}{6}$–$\frac{2}{3}$ as long as the basal diameter of the segment and the longest hairs on the anterior abdominal segments are usually from $\frac{1}{3}$ to equal in length to the proximal articular diameter of the third antennal segment. Processus terminalis 1$\frac{3}{5}$–9$\frac{1}{2}$ times as long as the base of the sixth antennal segment but commonly 3–5 times as long. Ultimate rostral segment 90–190μ long, reaching to between the mid and hind coxae, normal in shape or rather short in some of the species living on Gramineae, Leguminosae and Euphorbiaceae. Ultimate rostral segment without or bearing 1–19 accessory hairs, commonly with 4–10. Wing venation normal. First tarsal segments usually bearing 3 hairs but a few species belonging to several different groups bear 5 hairs on the first tarsal segments. Empodial hairs about half as long as the claws. Hind tibiae of larvae without spinules. Apterae with mid thoracic furca stalked. Spiracles reniform, those of abdominal segments 1 and 2 about 3 spiracular diameters apart. Lateral abdominal tubercles often present on segments 2–4 but rather inconspicuous. Siphunculi cylindrical or tapering, $\frac{1}{11}$–$\frac{1}{2}$ (commonly $\frac{1}{5}$–$\frac{1}{3}$) as long as the body. Siphunculi $\frac{4}{5}$–4 (commonly 1$\frac{1}{3}$ to twice) as long as the cauda which bears 5–23 hairs. Eighth abdominal tergite bearing 2–13 (commonly 4–6) hairs.

BIOLOGY. Mostly holocyclic on Rosaceae, Leguminosae, Euphorbiaceae or Gramineae. When heteroecious the primary host is *Rosa* or perhaps sometimes other Rosaceae: host plant catalogue on pp. 92–99.

DISTRIBUTION. World-wide but particularly palaearctic.

NOTES. As understood here, a genus of about 100 described species. Hille Ris Lambers (1947 : 211–260, 272–296, 300–304) has given detailed accounts of the Western European species. Mordwilko (1914 : 75–236; 1919 : 237–297), Narzikulov & Umarov (1969 : 154–194), Nevsky (1929 : 77–92) and Shaposhnikov (1964 : 601–603) give accounts of the Russian species, Shinji (1935 : 249–253; 1941 : 705–724), Takahashi (1931 : 62–65) and Tao (1963 : 190–192) give keys to the Oriental species. Eastop (1958 : 18–21; 1966 : 421–427) separates the species which have been introduced to East Africa and Australia respectively. The American species are mostly to be found in accounts of *Macrosiphum* but Richards (1963 : 254) has given a key to Canadian *Acyrthosiphon.*

According to Article 30 (a) of the International Code of Zoological Nomenclature adopted by the 15th International Congress of Zoology (1961 : 31) the gender of *Acyrthosiphon* is masculine. The original spelling of trivial names has been retained as far as possible except when they were evidently adjectives agreeing with a feminine or neuter genus. In a few cases of doubt, as with the insect described as *Aphis dirhoda*, the well known form *dirhodum* has been retained.

KEY TO THE SPECIES OF *ACYRTHOSIPHON* Mordwilko
(including some species of other genera that may be confused with it)

Apterae viviparae

1 Siphunculi 0·9–1·3 mm long, attenuated before the apex and then abruptly expanded into a flange with a diameter 1$\frac{1}{2}$ to twice that of the attenuated sub-apical part. Processus terminalis 6–8 times as long as the base of the sixth antennal segment, the ultimate rostral segment and the second segment of the hind tarsus, which are each about 140–180μ long. Longest hair on eighth abdominal tergite 50–75μ long. Siphunculi 2$\frac{1}{2}$–3 times as long as the cauda, which bears 7–15 hairs. Antennal tubercles well developed with almost parallel inner margins. On *Urtica*, Holarctic **MICROLOPHIUM** (p. 84)

– Siphuncular flange less well developed, the apical siphuncular diameter 1–1$\frac{2}{5}$ that of the sub-apical diameter. If siphunculi more than 0·9 mm long, then either the processus terminalis, ultimate rostral segment or body hairs are shorter 2

2 (1) Third antennal segment bearing 6–20 rhinaria concentrated on the distal half. Fourth antennal segment rarely without but usually bearing 1–6 rhinaria. Mid-thoracic furca with widely separated arms. Body 3$\frac{1}{3}$–4$\frac{2}{3}$ as long as the weakly clavate siphunculi, which are 0·3–0·4 mm long and 1$\frac{1}{2}$–1$\frac{3}{4}$ times as long as the cauda. Processus terminalis 5$\frac{1}{2}$–7$\frac{1}{4}$ times as long as the base of the sixth antennal segment. Ultimate rostral segment 160–190μ long, 1$\frac{1}{5}$–1$\frac{2}{5}$ as long as the second segment of the hind tarsus and bearing 7–15 accessory hairs. Cauda bearing 7–10 hairs. On *Silene alba*, Central and Southern Europe . . . . **Volutaphis schusteri** (p. 85)

– Third antennal segment often with 6 or more rhinaria but they are placed in a row and not concentrated on the distal half of the segment. Fourth antennal segments without rhinaria. Arms of the mid-thoracic furca arising from a common base and if the body is less than 5 times as long as the siphunculi, the base of the mid-thoracic furca is elongate. Siphunculi usually cylindrical or tapering, but if the distal two-fifths are slightly swollen the siphunculi are 1·1–1·7 mm long and 2$\frac{1}{2}$–4 times as long as the cauda 3

3 (2) All abdominal tergites bearing conspicuous capitate hairs, those on the third abdominal tergites 80–110μ long. Third antennal segment also bearing conspicuous capitate hairs from 20–50μ long. Abdominal dorsum uniformly pigmented and the pigmentation extending laterally almost as far as the spiracles.

Siphunculi 220–370μ long, with a well developed flange, 2–2$\frac{1}{2}$ times as long as the cauda, which usually bears only 5 hairs. Ultimate rostral segment 1–1$\frac{1}{3}$ times as long as the second segment of the hind tarsus and bearing 4–6 accessory hairs. On Gramineae, holarctic *Cryptaphis* (p. 82) . . 4

– If body hairs capitate then those on the middle abdominal tergites are shorter, not exceeding 40μ. The antennal hairs are usually also shorter and the abdomen is usually pale dorsally 5

4 (3) Siphunculi dark, as dark as or darker than the abdominal tergum, 6$\frac{1}{2}$–8 times as long as their middle diameter and 4$\frac{1}{2}$–6 times as long as the longest hair on third antennal segment. On *Bromus*, Manitoba . **Cryptaphis bromi** (p. 82)

– Siphunculi dusky, as dark as or paler than the abdominal tergum, 10–14 times as long as their middle diameter and 8–15 times as long as the longest hair on the third antennal segment. On *Festuca*, *Holcus* and more rarely than other grasses in Central and Western Europe . . . **Cryptaphis poae** (p. 83)

5 (3) Processus terminalis only $\frac{2}{3}$ to equal in length to the base of the sixth antennal segment. First tarsal segments bearing only 2 hairs. Secondary rhinaria absent.

Ultimate rostral segment only $\frac{1}{2}$–$\frac{3}{5}$ as long as the second segment of the hind tarsus but bearing 4 or 5 accessory hairs. Body about 5 times as long as the slender siphunculi, which are 2$\frac{3}{4}$–3 times as long as the cauda, which bears 7–13 hairs. Eighth abdominal tergite bearing 7–13 conspicuous hairs. Antennal tubercles little developed. On *Potentilla fruticosa*, Ontario **Myzaphis canadensis** (p. 84)

– Processus terminalis 1$\frac{1}{5}$–10$\frac{1}{2}$ times as long as the base of the sixth antennal segment. First tarsal segments usually bearing 3 hairs, rarely with 4 or 5 and very rarely the first segments of the hind tarsi bear only 2 hairs. Most species with at least one rhinarium near the base of the third antennal segment . 6

6 (5) Antennal segments I & III, cauda and femora brown or black, all other appendages black.

Longest hairs on third antennal segments 45–60µ long. Body 2–$3\frac{1}{5}$ times as long as the siphunculi, which are 0·9–1·3 mm long and $2\frac{1}{4}$–$3\frac{1}{2}$ times as long as the cauda. Ultimate rostral segment only 110–120µ long, $\frac{2}{5}$–$\frac{4}{5}$ as long as the second segment of the hind tarsus 7

– Usually with only the tips of the appendages dark and with the cauda pale . 8

7 (6) Ultimate rostral segment $\frac{3}{4}$–$\frac{4}{5}$ as long as the second segment of the hind tarsus which is about 140µ long. Processus terminalis 4–$4\frac{2}{3}$ as long as the base of the sixth antennal segment which is $2\frac{1}{4}$–$2\frac{2}{3}$ as long as the ultimate rostral segment. Body 2–$2\frac{1}{3}$ as long as the siphunculi, which are $2\frac{3}{4}$–$3\frac{1}{2}$ times as long as the cauda, which bears only 6 hairs. On *Purshia*, Colorado

Macrosiphum purshiae (p. 85)

– Ultimate rostral segment $\frac{2}{5}$–$\frac{1}{2}$ as long as the second segment of the hind tarsus, which is 260–270µ long. Processus terminalis $2\frac{1}{2}$–$3\frac{1}{2}$ times as long as the base of the sixth antennal segment, which is 3–$3\frac{3}{4}$ as long as the ultimate rostral segment. Body $2\frac{1}{3}$–$3\frac{1}{10}$ as long as the siphunculi which are $2\frac{1}{4}$–$2\frac{3}{4}$ as long as the cauda, which bears 12–18 hairs. On Umbelliferae, Europe . 16

8 (6) Abdomen bearing conspicuous and evidently capitate hairs which are 5–11µ wide near the apex. Siphunculi $1\frac{1}{2}$–$2\frac{1}{4}$ times as long as the cauda which usually bears only 5 hairs (Text-fig. 1). Processus terminalis 1·3–1·8 mm long, 7–$9\frac{1}{2}$ times as long as the base of the sixth antennal, segment and $2\frac{1}{2}$–$3\frac{1}{2}$ times as long as the siphunculi.

Ultimate rostral segment $\frac{4}{5}$–$\frac{19}{20}$ as long as the second segment of the hind tarsus and bearing 4–7 accessory hairs. The longest hairs on the third abdominal tergites are 25–35µ long and those on the eighth tergites are 40–50µ long. Body 4–5 times as long as the siphunculi. On *Aster*, North Eastern United States of America . . . **A. (A.) asterifoliae** (p. 26)

– Long abdominal hairs when present pointed, or if with somewhat thickened or blunt apices, their greatest sub-apical diameter does not exceed the basal diameter of the hairs, 2–5µ. Cauda bearing 5–23 hairs, if with only 5 or 6, then the processus terminalis is usually very much shorter, but if only a little shorter (1·1–1·4 mm in *pseudodirhodum*, which has 5–10 caudal hairs) then the siphunculi are only about equal in length to the cauda. . . 9

9 (8) Processus terminalis 1·1–1·4 mm long, 6–10 times as long as the base of the sixth antennal segment and $2\frac{1}{4}$–$3\frac{1}{4}$ times as long as the siphunculi. Ultimate rostral segment 100–120µ long, $\frac{7}{10}$–$\frac{9}{10}$ as long as the second segment of the hind tarsi and bearing 2–6 accessory hairs.

Body $4\frac{3}{4}$–$6\frac{1}{2}$ times as long as the siphunculi which are $\frac{4}{5}$–$1\frac{1}{5}$ as long as the cauda which bears 5–10 hairs. First antennal segments usually bearing 6–9 but sometimes with up to 12 hairs. Third antennal segment bearing 5–30 rhinaria. On *Rosa* and *Spiraea*, Eastern North America

A. (A.) pseudodirhodum (p. 67)

– Processus terminalis usually shorter, but if not, then siphunculi usually relatively longer so that the processus terminalis is less than twice as long as the siphunculi. If the processus terminalis is $4\frac{1}{2}$–$6\frac{1}{2}$ times as long as the base of the sixth antennal segment and $2\frac{1}{2}$–$3\frac{1}{2}$ times as long as the siphunculi, then the ultimate rostral segment is only $\frac{1}{2}$–$\frac{2}{3}$ as long as the second segment of the hind tarsus 10

10 (9) Processus terminalis 1·3–1·6 mm long, $4\frac{1}{2}$–$6\frac{1}{2}$ times as long as the base of the sixth antennal segment and $2\frac{1}{2}$–$3\frac{1}{2}$ times as long as the siphunculi.

Siphunculi $1\frac{1}{10}$–$1\frac{2}{5}$ as long as the cauda which bears 9–12 hairs. Ultimate rostral segment 130–160µ long, $\frac{1}{2}$–$\frac{2}{3}$ as long as the second segment of the hind tarsus (200–270μ) and usually bearing 6 accessory hairs. Third antennal segments usually bearing 1–5 rhinaria. On *Mertensia*, Colorado **A. (A.) *niwanista*** (p. 50)

– Processus terminalis usually less than 1 mm long but if more than 1 mm long, then it is less than twice as long as the siphunculi 11

11 (10) Siphunculi 0·8–1·1 mm long, mostly black but the very base paler, 2–2¾ times as long as the pale cauda which bears 6–8 hairs. Antennae and tibiae pale or dusky, except for the very apices of the segments, which are dark. Ultimate rostral segment 1⅕–1⅓ times as long as the second segment of the hind tarsus and bearing 8–11 accessory hairs. First segments of fore tarsi bearing 4 or 5 hairs, of mid and hind legs 3 or 4 hairs. Processus terminalis 3¾–6½ times as long as the base of the sixth antennal segment.

Proximal ⅖ of the third antennal segment bearing 4–14 rhinaria in an irregular row or cluster. On *Rubus*, Japan & Taiwan **A. (A) *rubiformosanus*** (p. 68)

– If siphunculi long and black then cauda, antennae and tibiae usually black also and the ultimate rostral segment is relatively shorter, being only about half as long as the second segment of the hind tarsus. If the first tarsal segments bear more than 3 hairs, then the siphunculi are less than 1½ times as long as the cauda, the processus terminalis is less than 4½ times as long as the base of the sixth antennal segment and the ultimate rostral segment is only about half as long as the second segment of the hind tarsus. . . 12

12 (11) First tarsal segments bearing 5 hairs. Ultimate rostral segment only 90–130μ long, ⅖–⅗ as long as the second segment of the hind tarsus (180–240μ).

Siphunculi from equal in length to 1½ times as long as the cauda. Processus terminalis 3–3⅓ times as long as the base of the sixth antennal segment . 13

– First tarsal segments normally bearing only 3 hairs; if an occasional fourth hair is present then the ultimate rostral segment is more than ⅗ as long as the second segment of the hind tarsus 15

13 (12) Body 7–10 times as long as the siphunculi which are 1⅕–1½ times as long as the cauda (200–280μ) which bears 5–7 hairs. Siphunculi 1–1½ times as long as the base of the sixth antennal segment. Processus terminalis 3–3¾ times as long as the base of the sixth antennal segment. Alternating between *Rosa* and *Capnoides-Corydalis*, Colorado . **A. (A.) *tutigula*** (p. 71)

– Body 3½–7 times as long as the siphunculi which are 1–1⅖ times as long as the cauda (300–600μ) which bears 9–15 hairs. Siphunculi 1¾–3 times as long as the base of the sixth antennal segment. Processus terminalis 3⅔–4½ times as long as the base of the sixth antennal segment. On *Euphorbia*, Europe (*A*. (*A*.) *cyparissiae*, s. lat.) 14

14 (13) Front half of head, antennal segments III to VI, distal ¾ of siphunculi, proximal ⅓ of tibiae and distal apices of femora and tibiae black. Usually in more cool situations . . . **A. (A.) *cyparissiae*** sensu stricto (p. 34)

– Only the distal apices of the siphunculi, tibiae and antennal segments black, the remainder of the insect pale to dusky. Usually in warmer situations **A. (A.) *cyparissiae*** form ***propinquum*** (p. 35)

15 (12) Head, antennae, tibiae, distal ⅔ of femora, siphunculi, cauda and tibiae black. Body 2¼–3⅕ times as long as the siphunculi which are more than 1 mm long and 2¼–2¾ times as long as the cauda, which bears 12–18 hairs.

Ultimate rostral segment ⅖–½ as long as the second segment of the hind tarsus and bearing 4 accessory hairs. Processus terminalis 2½–3½ times as long as the base of antennal VI. On *Umbelliferae* 16

– Cauda usually pale and only the tips of the other appendages dark. If cauda brown then the body is 5–5½ times as long as the siphunculi which are

$1\frac{2}{5}$–$1\frac{2}{3}$ as long as the cauda which bears not more than 10 hairs 18

16 (7, 15) On *Seseli* . . . . **A. (A.) *nigripes blattnyi*** (p. 49)

– On *Laserpitium* and *Peucedanum* 17

17 (16) Only the basal $\frac{1}{5}$–$\frac{1}{4}$ of the hind femora pale. Ultimate rostral segment $\frac{2}{5}$–$\frac{1}{2}$ as long as the second segment of the hind tarsus. On *Laserpitium* **A. (A.) *n. nigripes*** (p. 49)

– Basal half of hind femora pale. Ultimate rostral segment $\frac{11}{20}$–$\frac{13}{20}$ as long as the second segment of the hind tarsus. On *Peucedanum* **A. (A.) *nigripes peucedani*** (p. 49)

18 (15) Siphunculi more than 1 mm long and $2\frac{2}{3}$–5 times as long as the cauda. Ultimate rostral segment $\frac{3}{5}$–$\frac{9}{10}$ as long as the second segment of the hind tarsus. . 19

– Siphunculi usually less than 1 mm long but if more then only $1\frac{1}{5}$–$1\frac{9}{10}$ times as long as the cauda 20

19 (18) Processus terminalis 6–9 times as long as the base of the sixth antennal segment which is $1\frac{1}{4}$–$1\frac{3}{4}$ times as long as the ultimate rostral segment which is $\frac{7}{10}$–$\frac{9}{10}$ as long as the second segment of the hind tarsus and bears only 2 accessory hairs. First antennal segments bearing 8 or 9 hairs. Siphunculi from half as long to nearly as long as the body and 3–4 times as long as the cauda which bears 7 or 8 hairs. On *Amelanchier*, North America **A. (A.) *macrosiphum*** (p. 47)

– Processus terminalis $2\frac{3}{4}$–4 times as long as the base of the sixth antennal segment, which is 2–$2\frac{1}{2}$ times as long as the ultimate rostral segment, which is $\frac{3}{5}$–$\frac{3}{4}$ as long as the second segment of the hind tarsi and bears 7 or 8 accessory hairs. First antennal segments bearing 12–18 hairs. Siphunculi $\frac{1}{3}$–$\frac{1}{2}$ as long as the body and $2\frac{1}{2}$–$3\frac{1}{2}$ times as long as the cauda which bears 9–13 hairs. (Text-fig. 4). Mostly on Leguminosae and Malvaceae, Southern Russia, Middle East, North Africa, India . . **A. (A.) *gossypii*** (p. 41)

20 (18) Antennal tubercles distinctly scabrous. Small dark ante-siphuncular sclerites present, remainder of dorsum pale. Ultimate rostral segment 110–120μ long, about equal in length to the second segment of the hind tarsus (110–125μ) and usually bearing only 2 accessory hairs. Processus terminalis $3\frac{3}{4}$–$5\frac{1}{4}$ times as long as the base of the sixth antennal segment.

Siphunculi $1\frac{3}{5}$ to twice as long as the cauda, which bears 4 long hairs proximally and 2–4 short distal hairs. Third antennal segment usually bearing 1–3 but sometimes without, rhinaria near its base. Living hidden under the runners of *Trifolium*, North Western Europe **Subacyrthosiphon *cryptobius*** (p. 84)

– Antennal tubercles smooth or imbricated. Ante-siphuncular sclerites usually not pigmented unless dorsal pigmentation is also present. If the ante-siphuncular sclerite is dark when the dorsum is pale then the ultimate rostral segment is $\frac{7}{10}$–$\frac{4}{5}$ as long as the second segment of the hind tarsus and the processus terminalis is $2\frac{1}{2}$–$3\frac{1}{2}$ times as long as the base of the sixth antennal segment 21

21 (20) Small pigmented ante-siphuncular sclerite present, dorsum pale.

Body 4–$4\frac{1}{2}$ times as long as the siphunculi which are $1\frac{1}{2}$–$1\frac{9}{10}$ as long as the cauda which bears 8–10 hairs. Third antennal segment bearing 4–11 rather large rhinaria extending over the proximal $\frac{1}{3}$–$\frac{7}{8}$ of its length. Ultimate rostral segment 120–140μ long and bearing 9–11 accessory hairs. Second segments of hind tarsi 155–195μ long. Processus terminalis $2\frac{1}{2}$–$3\frac{1}{2}$ times as long as the base of the sixth antennal segment. (Text-fig. 3). On *Sonchus*, Pakistan. . . . . **A. (A.) *ghanii*** (p. 38)

– Ante-siphuncular sclerites not pigmented unless dorsal abdominal pigmentation is also present 22

22 (21) Antennal tubercles spinulose, well developed, with almost parallel inner margins, median tubercle evident: spinules extending on to the ventral surface of the head near the antennal tubercles. Third antennal segment bearing 4–16 rather large rhinaria in a row over the basal half of more of the segment. Cauda bearing 5–8, usually 7, hairs, the basal 2 pairs being long and pointed and the apical 2–4 hairs short and blunt, less than $\frac{1}{3}$ as long as the more proximal caudal hairs. Ultimate rostral segment 95–130μ long, $\frac{4}{5}$ to equal in length to the second segment of the hind tarsus.

Dorsal cephalic hairs short and inconspicuous, 6–8μ long; hairs on the 8th abdominal tergite 7–14μ long. Processus terminalis $3\frac{1}{3}$–$4\frac{3}{5}$ times as long as the base of the sixth antennal segment. On *Rosa* and *Fragaria*, widespread . . . . . . ***A. (Rhodobium) porosus*** (p. 79)

– Antennal tubercles usually smaller and less spinulose, under surface of head not at all spinulose. When the third antennal segment bears more than 4 rhinaria the rhinaria are usually small. All caudal hairs usually pointed and the distal hairs more than half as long as the proximal hairs. If the distal caudal hairs are short and blunt then the ultimate rostral segment is less than $\frac{3}{4}$ as long as the second segment of the hind tarsus . . . 23

23 (22) Cauda $\frac{3}{5}$–$\frac{3}{4}$ as long as the siphunculi and bearing 9–13 hairs, the basal two pairs of which are long and fine-pointed but the apical hairs are short and blunt, from 10 to 20μ long, less than $\frac{2}{5}$ as long as the basal caudal hairs. The first antennal segments bear 8 to 10 hairs. Third antennal segment bearing 7–30 rhinaria. Processus terminalis 3–$3\frac{1}{2}$ times as long as the base of the sixth antennal segment. Ultimate rostral segment short, only about $1\frac{1}{3}$ as long as broad at base and $\frac{3}{5}$–$\frac{3}{4}$ as long as the second segment of the hind tarsus. On *Euphorbia*, Bulgaria . ***A. (A.) thracicus*** (p. 70)

– Usually with all caudal hairs pointed, the distal hairs being more than half as long as the proximal hairs. When the apical caudal hairs are short and blunt, then they are at least 25μ long and the third antennal segment bears only 1–3 rhinaria. When the third antennal segment bears 7 or more rhinaria then both the ultimate rostral segment and the processus terminalis are relatively longer 24

24 (23) Ultimate rostral segment 110–140μ long, $\frac{3}{5}$–$\frac{7}{10}$ as long as the second segment of the hind tarsus (180–200μ) and bearing 16–25 accessory hairs.

Processus terminalis $2\frac{1}{2}$–$4\frac{1}{2}$ times as long as the base of the sixth antennal segment. Third antennal segment without or bearing 1–11, but usually 3–6 rhinaria. Body $3\frac{1}{2}$–$4\frac{4}{5}$ times as long as the siphunculi which are $1\frac{2}{5}$ to twice as long as the cauda which bears 7–10 hairs. On *Lactuca*, Europe, Central Asia, Middle East, North America . ***A. (Tlja) lactucae*** (p. 81)

– If the ultimate rostral segment bears more than 14 accessory hairs then it is longer than the second segment of the hind tarsus 25

25 (24) Third antennal segment without rhinaria. Processus terminalis $2\frac{3}{4}$–$3\frac{1}{3}$ times as long as the base of the sixth antennal segment. Body $2\frac{3}{4}$–$3\frac{1}{3}$ times as long as the siphunculi which are $1\frac{3}{4}$–$2\frac{1}{4}$ times as long as the cauda which bears 9–14 hairs. Ultimate rostral segment 130–150μ long, $\frac{4}{5}$–$\frac{9}{10}$ as long as the second segment of the hind tarsus (150–180μ) and bearing 8–10 accessory hairs.

First antennal segments usually bearing 8 or 9 hairs. On *Chelidonium*, Central Europe . . . . . ***A. (Lipporhinum) chelidonii*** (p. 72)

– Third antennal segment usually bearing at least one rhinarium; if without rhinaria on the third antennal segment then either the processus terminalis is relatively longer or shorter, the ultimate rostral segment bears fewer accessory hairs or the body is $4\frac{1}{2}$–$7\frac{1}{4}$ times as long as the siphunculi . . 26

26 (25) Body $7\frac{3}{4}$–$9\frac{1}{2}$ times as long as the siphunculi which are $\frac{4}{5}$–$1\frac{1}{10}$ as long as the cauda which bears 10–17 hairs. Siphunculi about half as long as the third antennal segment. Ultimate rostral segment 90–120μ long, $\frac{3}{5}$–$\frac{7}{10}$ as long as the second segment of the hind tarsus (160–180μ long) and bearing 4 accessory hairs.

Eighth abdominal tergite usually bearing 6 hairs. Processus terminalis $2\frac{1}{2}$–$3\frac{1}{2}$ times as long as the base of the sixth antennal segment. On *Elymus*, Colorado . . . . . . ***Hyalopteroides palmerae*** (p. 83)

– Siphunculi usually relatively longer, but if not then the third antennal segment is relatively shorter and about equal in length to the siphunculi and the ultimate rostral segment is relatively longer and bears 5–9 accessory hairs . 27

27 (26) Ultimate rostral segment 90–110μ long, $\frac{2}{5}$–$\frac{3}{5}$ as long as the second segment of the hind tarsi (170–210μ long) and bearing only 2–4 accessory hairs. Body $3\frac{3}{4}$–$4\frac{3}{4}$ times as long as the siphunculi which are $1\frac{1}{5}$–$1\frac{3}{5}$ as long as the cauda which bears 12–21 hairs. Antennal tubercles moderately developed, without a median tubercle. On *Euphorbia*, Europe (*A*. (*A*.) *euphorbiae*) . . 28

– Ultimate rostral segment usually more than $\frac{3}{5}$ as long as the second segment of the hind tarsi but if not then the frons with a median tubercle, the body is $4\frac{3}{4}$–6 times as long as the siphunculi and the insect lives on Gramineae . 29

28 (27) First antennal segments bearing 7–9 hairs. Cauda bearing about 12 hairs. On *Euphorbia palustris*, Central Europe . . ***A. (A.) e. euphorbiae*** (p. 36)

– First antennal segments bearing 8–18, but usually 12 or more hairs. Cauda bearing 13–21 usually 16 or more, hairs. On *Euphorbia esula*, Europe ***A. (A.) euphorbiae neerlandicum*** (p. 37)

29 (27) Eighth abdominal tergite bearing only 2 hairs. Ultimate rostral segment about $\frac{2}{3}$ as long as the second segment of the hind tarsus and bearing 2 or 3 accessory hairs.

Third antennal segment bearing 2–7 tuberculate rhinaria. Antennal tubercles weakly developed, median tubercle broad and flat. Body $5\frac{3}{4}$–$6\frac{2}{3}$ as long as the siphunculi which are $1\frac{2}{5}$–$2\frac{1}{5}$ as long as the cauda, which bears about 6 hairs. On *Gramineae*, India ***A. (Metopolophium) chandrani*** (p. 74)

– Eighth abdominal tergite usually bearing 4–13 hairs, if with only 2 or 3 then the ultimate rostral segment is $\frac{4}{5}$–$\frac{9}{10}$ as long as the second segment of the hind tarsus and bears 6–9 accessory hairs. 30

30 (29) First antennal segments bearing 9–23, usually 12 or more, hairs. Ultimate rostral segment $\frac{3}{5}$–$\frac{19}{20}$ as long as the second segment of the hind tarsus. Body $2\frac{3}{4}$–$4\frac{1}{2}$ times as long as the strongly tapering siphunculi (Text-fig. 7b) which are $1\frac{1}{5}$–$1\frac{4}{5}$ as long as the cauda which bears 8–23 hairs. Processus terminalis 3–5 times as long as the base of the sixth antennal segment which is $1\frac{1}{2}$–$2\frac{1}{2}$ times as long as the ultimate rostral segment. On *Leguminosae* (*A*. (*A*.) *pisum s. lat.*) 31

– First antennal segments bearing 5–13, but rarely more than 11 hairs . . 32

31 (30) Base of the sixth antennal segment 2–$2\frac{1}{2}$ times as long as the ultimate rostral segment which is $\frac{2}{3}$–$\frac{17}{20}$ as long as the second segment of the hind tarsus and bears 3–7 or rarely 8 accessory hairs. Cauda bearing 8–14 hairs. On many Papilionaceae, widespread ***A. (A.) p. pisum*** & ***A. (A.) pisum spartii*** (pp. 58 & 65)

– Base of sixth antennal segment $1\frac{1}{2}$ to twice as long as the ultimate rostral segment which is $\frac{3}{4}$–$\frac{19}{20}$ as long as the second segment of the hind tarsus and bears rarely 6 or 7 but usually 8–12 accessory hairs. Cauda bearing 11–23 hairs. On *Ononis*, Europe . . . . ***A. (A.) pisum ononis*** (p. 64)

32 (30) Ultimate rostral segment 100–110μ long, $\frac{1}{2}$–$\frac{2}{3}$ as long as the second segment of the hind tarsus and bearing only 1–3 accessory hairs. Processus terminalis about $1\frac{1}{5}$ mm long, $5\frac{3}{4}$–$7\frac{1}{4}$ times as long as the base of the sixth antennal

segment and nearly twice as long as the siphunculi which are $1\frac{1}{4}$–$1\frac{2}{5}$ as long as the cauda.

Longest hair on the eighth abdominal tergite about 15μ long. On Gramineae, Russia & Sweden. ***A. (Metopolophium) graminearum*** (p. 78)

– If the ultimate rostral segment is less than $\frac{2}{3}$ as long as the second segment of the hind tarsus, then the processus terminalis is less than $5\frac{1}{2}$ times as long as the base of the sixth antennal segment and less than $1\frac{2}{3}$ as long as the siphunculi 33

33 (32) Ultimate rostral segment only about half as long as the second segment of the hind tarsus and without or with 1–3 accessory hairs. Siphunculi $1\frac{1}{5}$–$1\frac{2}{5}$ times as long as the cauda which bears 15–21 hairs.

Body about 6 times as long as the siphunculi. Processus terminalis $4\frac{1}{2}$–$5\frac{1}{2}$ times as long as the base of the sixth antennal segment. Host plant unknown, Quebec. . . . ***A. (Metopolophium) beiqueti*** (p. 74)

– Ultimate rostral segment $\frac{3}{5}$–$1\frac{2}{5}$ as long as the second segment of the hind tarsus and only rarely bearing less than 4 accessory hairs, if without or with only 1–3 accessory hairs then the cauda bears only 5–8 hairs. Cauda bearing 5–13 hairs, if with 11–13 hairs then either the ultimate rostral segment $\frac{4}{5}$–$1\frac{1}{10}$ as long as the second segment of the hind tarsus or if shorter, then the siphunculi are $1\frac{2}{5}$–$1\frac{3}{4}$ as long as the cauda 34

35 (34) Ultimate rostral segment $\frac{3}{5}$–$\frac{7}{10}$ as long as the second segment of the hind tarsus and bearing 4–7 accessory hairs. Body $4\frac{3}{4}$–6 times as long as the siphunculi which are $1\frac{2}{5}$–$1\frac{3}{4}$ as long as the cauda which bears 7–13 hairs. Processus terminalis $2\frac{1}{2}$–4 times as long as the base of the sixth antennal segment. Antennal segments III to V with dusky apices so that the base of VI is paler than the apex of V. On *Rosa* and many Gramineae ***A. (Metopolophium) dirhodum*** (p. 74)

– Ultimate rostral segment $\frac{2}{3}$–$1\frac{2}{5}$ as long as the second segment of the hind tarsus, if less than $\frac{7}{10}$ then either the body is 3–4 times as long as the siphunculi which are $1\frac{7}{10}$ to twice as long as the cauda which bears 7–10 hairs and the processus terminalis is $4\frac{1}{2}$–$5\frac{1}{3}$ times as long as the base of the sixth antennal segment (*ignotus*, p. 44), or the body is $3\frac{4}{5}$–5 times as long as the siphunculi which are $1\frac{3}{5}$–$2\frac{1}{10}$ times as long as the cauda which bears only 6–9 hairs and the processus terminalis is $3\frac{1}{2}$–$4\frac{1}{2}$ times as long as the base of the sixth antennal segment, and antennal flagellum darkening gradually from base to apex so that the base of the sixth segment is as dark as or darker than the apex of the fifth segment (*albidus*, p. 72) 35

35 (34) Body $2\frac{1}{10}$–$2\frac{4}{5}$ as long as the siphunculi.

Siphunculi $1\frac{2}{5}$–$1\frac{9}{10}$ as long as the cauda which bears 7–11 hairs. Processus terminalis $4\frac{1}{4}$–5 times as long as the base of the sixth antennal segment. Ultimate rostral segment from $\frac{7}{10}$ to equal in length to the second segment of the hind tarsus and bearing 4–6 accessory hairs. First antennal segments bearing 6–8 hairs 36

– Body $2\frac{9}{10}$–$8\frac{1}{4}$ times as long as the siphunculi 37

36 (35) Siphunculi $5\frac{1}{2}$–$6\frac{1}{2}$ times as long as the ultimate rostral segment, which is $\frac{7}{10}$–$\frac{4}{5}$ as long as the second segment of the hind tarsus and usually bears 4 accessory hairs. Cauda bearing 4 long proximal and 3 short and blunt distal hairs. On *Vaccinium*, Germany, Sweden . . . . . ***A. (A.) knechteli*** (p. 46)

– Siphunculi $3\frac{3}{4}$–5 times as long as the ultimate rostral segment which is $\frac{9}{10}$ to equal in length to the second segment of the hind tarsi and usually bearing 6 accessory hairs. Cauda bearing 8–11 pointed hairs. On *Potentilla* (*Dasyophora*), North America . . . . ***A. (A.) wasintae*** (p. 71)

37 (35) Body $5\frac{1}{2}$–$8\frac{1}{4}$ times as long as the siphunculi. Mostly arctic or alpine species . 38

– Body $2\frac{9}{10}$–$5\frac{1}{2}$ times as long as the siphunculi 44

38 (37) Processus terminalis $1\frac{2}{3}$ to twice as long as the siphunculi and $2\frac{1}{4}$–$4\frac{1}{2}$ times as long as the base of the sixth antennal segment. Siphunculi from equal in length to $1\frac{1}{3}$ times as long as the cauda which bears 7–8 hairs. Ultimate rostral segment $\frac{7}{10}$–$\frac{4}{5}$ as long as the second segment of the hind tarsus and bearing 3–7 accessory hairs. Third antennal segment bearing 1–5 rhinaria 39

– Processus terminalis $\frac{1}{2}$–$1\frac{1}{3}$ as long as the siphunculi 40

39 (38) First antennal segment bearing 5–6 hairs. Eighth abdominal tergite bearing 7–8 hairs. On *Vaccinium uliginosum*, Greenland, Iceland, Baffin Is., Switzerland . . . . ***A. (A.) brachysiphon*** (p. 32)

– First antennal segments bearing about 9 hairs. Eighth abdominal tergite bearing 5–6 hairs. Host plant unknown, Norway ***A. (A.) aurlandicus*** (p. 30)

40 (38) Processus terminalis $1\frac{1}{5}$–$2\frac{9}{10}$ as long as the base of the sixth antennal segment. Ultimate rostral segment $\frac{4}{5}$–$1\frac{1}{10}$ as long as the second segment of the hind tarsi. Body often more than $5\frac{3}{4}$ times as long as the siphunculi which are $1\frac{3}{4}$–$2\frac{3}{4}$ as long as the base of the sixth antennal segment. Scandinavian and arctic species 41

– Processus terminalis 3–4 times as long as the base of the sixth antennal segment. Ultimate rostral segment $\frac{7}{10}$–$\frac{4}{5}$ as long as the second segment of the hind tarsus. Body $5\frac{1}{2}$–$5\frac{3}{4}$ times as long as the siphunculi which are 3–4 times as long as the base of the sixth antennal segment 44

41 (40) Dorsum bearing dark, segmentally arranged, paired dorsal bands. Siphunculi dusky. Processus terminalis $1\frac{1}{4}$–$1\frac{3}{5}$ times as long as the base of the sixth antennal segment.

Siphunculi $1\frac{1}{4}$–$1\frac{1}{3}$ as long as the cauda which bears 7 hairs. Host plant unknown, Spitzbergen . . . . . . ***A. (A.) svalbardicus*** (p. 70)

– Dorsum and siphunculi pale. Processus terminalis $1\frac{3}{5}$–$2\frac{9}{10}$ times as long as the base of the sixth antennal segment 42

42 (41) Longest hairs on the eighth abdominal tergite less than 20μ long. First antennal segments bearing only 5 hairs.

Third antennal segment without or with only one rhinarium. Body 6–$7\frac{1}{2}$ times as long as the siphunculi which are $1\frac{2}{5}$–$1\frac{4}{5}$ as long as the almost triangular cauda which bears 6 or 7 hairs. Processus terminalis 2–$2\frac{1}{2}$ times as long as the base of the sixth antennal segment. Ultimate rostral segment $\frac{9}{10}$ to equal in length to the second segment of the hind tarsus and bearing 4–6 accessory hairs. On *Poa arctica*, Spitzbergen ***A. (A.) calvulus*** (p. 32)

– Longest hairs on eighth abdominal tergite 20–45μ long. First antennal segments bearing 6–8 hairs. 43

43 (42) Third antennal segment usually without, sometimes bearing one, rhinarium. Cauda bearing 6–8 hairs. Processus terminalis $1\frac{3}{5}$–$2\frac{3}{5}$ times as long as the base of the sixth antennal segment. On *Honkenya* and other maritime plants, North Western Europe . . . . . ***A. (A.) auctus*** (p. 30)

– Third antennal segment bearing 1–3 rhinaria. Cauda bearing 8–13 hairs. Processus terminalis $2\frac{1}{5}$–$2\frac{9}{10}$ times as long as the base of the sixth antennal segment. On *Dryas*, Sweden, Greenland, Southampton Is. ***A. (A.) brevicornis*** (p. 32)

44 (37, 40) Processus terminalis $5\frac{9}{10}$–$7\frac{1}{5}$ times as long as the base of the sixth antennal segment. Ultimate rostral segment $1\frac{1}{10}$–$1\frac{2}{5}$ as long as the second segment of the hind tarsus and bearing 8–14 accessory hairs. Cauda bearing only 7 hairs, the apical hair being short and blunt.

Body $2\frac{9}{10}$–4 times as long as the siphunculi which are $1\frac{2}{3}$–$2\frac{1}{5}$ times as long as the cauda. Siphunculi often with 1–3 rows of polygonal reticulation near the apex. First antennal segments usually bearing 6 or 7 hairs. On Compositae, South America and West Indies **A. (A.) *bidenticola*** (p. 31)

– Processus terminalis $1\frac{3}{5}$–$6\frac{3}{5}$ times as long as the base of the sixth antennal segment but if more than $5\frac{1}{2}$ times as long, then either the ultimate rostral segment is only $\frac{3}{4}$–$\frac{9}{10}$ as long as the second segment of the hind tarsus or if it is $\frac{9}{10}$–$1\frac{2}{5}$ as long, then all the 6–12 caudal hairs are long and pointed 45

45 (44) Processus terminalis $2\frac{1}{2}$–3 times as long as the base of the sixth antennal segment (210–290µ long) and $1\frac{1}{10}$–$1\frac{2}{5}$ as long as the siphunculi. Ultimate rostral segment about $\frac{3}{4}$ as long as the second segment of the hind tarsus and bearing 2–4 accessory hairs. Cauda of oviparae bearing 9–13 hairs, of which at least the distal 3 have blunt apices.

Body $3\frac{3}{4}$–$4\frac{3}{4}$ times as long as the siphunculi which are just thicker than the middle diameter of the tibiae and $1\frac{3}{5}$–$1\frac{9}{10}$ times as long as the cauda. Body hairs short, those on the anterior tergites 4µ long and those on the eighth abdominal tergite about 16µ long. On *Genista anglica*, Switzerland **A. (A.) *ericetorum*** (p. 36)

– Processus terminalis usually more than 3 times as long as the base of the sixth antennal segment but if not, then the ultimate rostral segment $\frac{19}{20}$–$1\frac{1}{10}$ as long as the second segment of the hind tarsi and the cauda bears only 6–10 hairs, or if the ultimate rostral segment is only about $\frac{3}{4}$ as long as the second segment of the hind tarsus and bears only 3 or 4 accessory hairs, then the processus terminalis is $1\frac{2}{3}$–$2\frac{1}{4}$ times as long as the siphunculi or the base of the sixth antennal segment is less than 200µ long 46

46 (45) Processus terminalis $1\frac{3}{5}$–3 times as long as the base of the sixth antennal segment and $\frac{9}{10}$–$1\frac{1}{4}$ times as long as the siphunculi. Ultimate rostral segment $\frac{19}{20}$–$1\frac{1}{10}$ as long as the second segment of the hind tarsus and bearing 4–9 accessory hairs. Third antennal segment without or bearing only 1 or 2 rhinaria 47

– Processus terminalis usually 3–$6\frac{3}{5}$ times as long as the base of the sixth antennal segment but if only $2\frac{1}{5}$–3 times as long then the ultimate rostral segment is only $\frac{7}{10}$–$\frac{19}{20}$ as long as the second segment of the hind tarsi and is without or bears 1–7 accessory hairs, but if with 3 or more then the processus terminalis is $1\frac{2}{3}$–$2\frac{1}{4}$ times as long as the siphunculi. Third antennal segment usually bearing 1 or more rhinaria 48

47 (46) Siphunculi 1–$1\frac{3}{5}$ times as long as the cauda which bears 6–8 hairs. Third antennal segment usually without, sometimes bearing a single rhinarium. First antennal segments bearing 6–8 hairs. Eighth abdominal tergite bearing 6–8 hairs. On *Dryas*, arctic . . . **A. (A.) *brevicornis*** (p. 32)

– Siphunculi $1\frac{4}{5}$–$2\frac{1}{10}$ times as long as the cauda which bears 5–7 hairs. Third antennal segment bearing 0–2 rhinaria. First antennal segments bearing 8–10 hairs. Eighth abdominal tergites bearing 4–5 hairs. On *Deschampsia & Festuca* in the shade, North West Europe **Acyrthosiphon (Metopolophium) *tener*** (p. 79)

48 (46) Siphunculi only 1–$1\frac{1}{3}$ as long as the cauda, which bears 7 or 8 hairs. Body $5\frac{1}{4}$–$6\frac{1}{2}$ times as long as the siphunculi. Processus terminalis 3–$4\frac{1}{3}$ times as long as the base of the sixth antennal segment. Ultimate rostral segment $\frac{7}{10}$–$\frac{4}{5}$ as long as the second segment of the hind tarsi. 49

– Siphunculi usually $1\frac{2}{3}$–$2\frac{2}{5}$ times as long as the cauda but if only $1\frac{1}{5}$–$1\frac{2}{5}$ times as long, then body only 3–$4\frac{1}{2}$ times as long as the siphunculi (*loti*, p. 46) . 50

49 (48) Siphunculi dusky, about 6 times as long as their middle diameter and $\frac{1}{2}$–$\frac{2}{3}$ as long as the width of the head across the eyes. Processus terminalis usually

more than twice as long as the cauda. First antennal segments bearing 5–6 hairs. On *Vaccinium*, arctic and alpine . **A. (A.) *brachysiphon*** (p. 32)

– Siphunculi pale, about 10 times as long as their middle diameter and about equal in length to the width of the head across the eyes. Processus terminalis about $1\frac{1}{2}$ times as long as the cauda. First antennal segments bearing 8 or 9 hairs. (On *Euphorbia*?), Pakistan . . . **A. (A.) *moltshanovi*** (p. 48)

50 (48) Siphunculi $2\frac{1}{5}$–$3\frac{1}{10}$ (rarely less than $2\frac{2}{5}$) times as long as the cauda which bears only 6–8 hairs. Processus terminalis $3\frac{4}{5}$–$5\frac{1}{5}$ times as long as the base of the sixth antennal segment. Ultimate rostral segment 1–$1\frac{1}{4}$ times as long as the second segment of the hind tarsus and bearing 8–12 accessory hairs. First antennal segments bearing 9–11 hairs. On *Primula*, widespread **A. (A.) *primulae*** (p. 66)

– Siphunculi $1\frac{2}{5}$–$2\frac{2}{3}$ as long as the cauda, if more than $2\frac{1}{5}$ then the processus terminalis is $5\frac{1}{2}$–$7\frac{1}{2}$ times as long as the base of the sixth antennal segment, or the ultimate rostral segment is $\frac{3}{4}$–$\frac{9}{10}$ as long as the second segment of the hind tarsus, or the cauda bears more hairs or the first antennal segments bear fewer hairs 51

51 (50) Siphunculi 2–$2\frac{2}{3}$ as long as the rather triangular cauda which bears 7 or 8 hairs (Text-fig. 2). Processus terminalis 3–$4\frac{1}{10}$ as long as the base of the sixth antennal segment. Ultimate rostral segment $\frac{4}{5}$–$\frac{9}{10}$ as long as the second segment of the hind tarsus, and bearing 5–7 accessory hairs. Cauda $1\frac{2}{5}$ to twice as long as the base of the sixth antennal segment. Longest hair on the eighth abdominal tergite 35–50μ long. Body $3\frac{1}{5}$–$3\frac{2}{3}$ as long as the siphunculi.

Siphunculi strongly imbricated and are 12–16 times as long as their middle diameter which is from equal to $1\frac{1}{3}$ times the middle diameter of the hind tibiae. Base of the sixth antennal segment $1\frac{1}{10}$–$1\frac{1}{2}$ times as long as the ultimate rostral segment. On *Astragalus*, Pakistan **A. (A.) *astragali*** (p. 27)

Siphunculi $1\frac{2}{5}$–$2\frac{2}{5}$ as long as the cauda, if more than twice as long, then the processus terminalis is $4\frac{1}{5}$–$7\frac{1}{2}$ times as long as the base of the sixth antennal segment and/or the ultimate rostral segment is longer than the second segment of the hind tarsus, or if shorter bears 1–3 accessory hairs, or the cauda has a distinct basal constriction and is either $2\frac{1}{4}$–$2\frac{2}{3}$ times as long as the base of the sixth antennal segment or the longest hair on the 8th abdominal tergite is less than 35μ long, or the body is $4\frac{1}{2}$–$5\frac{1}{2}$ times as long as the siphunculi . 52

52 (51) Abdominal tergites 1–4 each bearing 8–10 evidently blunt or weakly capitate hairs, 25–40μ long. Ultimate rostral segment 1–$1\frac{1}{5}$ as long as the second segment of the hind tarsi and bearing 4–8 accessory hairs. Processus terminalis 3–4 times as long as the base of the sixth antennal segment.

Dorsum pale but strongly sclerotic. Hairs on eighth abdominal tergite 40–50μ long. On *Potentilla*, Canada . . . **A. (A.) *scalaris*** (p. 69)

– Dorsal abdominal setae less conspicuous, usually both shorter and less capitate, those on the anterior abdominal tergites usually 10–25μ long. If the ultimate rostral segment is longer than the second segment of the hind tarsus then the processus terminalis is usually more than 4 times as long as the base of the sixth antennal segment 53

53 (52) Processus terminalis $4\frac{1}{2}$–6 times as long as the base of the sixth antennal segment and ultimate rostral segment only $\frac{2}{3}$–$\frac{17}{20}$ as long as the second segment of the hind tarsus and bearing 4–6 accessory hairs. Body 3–4 times as long as the siphunculi which are $1\frac{2}{3}$ to twice as long as the cauda which bears 7–10 hairs 54

– Processus terminalis usually shorter but if $4\frac{1}{2}$–6 times as long as the base of the sixth antennal segment then the ultimate rostral segment is at least $\frac{9}{10}$

and is usually as long as or longer than the second segment of the hind tarsus 55

54 (53) Eighth abdominal tergite usually bearing 6 hairs which are 25–30μ long. Ultimate rostral segment bearing 5 or 6 accessory hairs. First antennal segments bearing 9 or 10 hairs. On *Spiraea*, Europe **A. (A.) *ignotus*** (p. 44)

– Eighth abdominal tergite bearing 4–9 hairs which are only 15–25μ long. Ultimate rostral segment bearing 4 accessory hairs. First antennal segment bearing 6–10 hairs. On *Trifolium*, Eastern Asia **A. (A.) *kondoi*** (p. 46)

55 (52) Tergum smoky brown. Ultimate rostral segment $\frac{3}{4}$–$\frac{19}{20}$ as long as the second segment of the hind tarsus and without or with only 1 or 2 accessory hairs. Siphunculi $2\frac{1}{10}$–$2\frac{1}{3}$ times as long as the cauda which bears only 5 or 6 hairs. Processus terminalis $2\frac{1}{2}$–$3\frac{1}{2}$ times as long as the base of the sixth antennal segment. On *Poa*, Europe . . **A. (*Metopolophium*) *frisicum*** (p. 78)

– Tergum usually unpigmented. Ultimate rostral segment usually bearing 4–23 accessory hairs, but if with only 2 or 3 then the siphunculi $1\frac{2}{5}$–$2\frac{1}{10}$ times as long as the cauda and processus terminalis 3–$4\frac{1}{2}$ times as long as the base of the sixth antennal segment 56

56 (55) Ultimate rostral segment $\frac{9}{10}$–$1\frac{2}{5}$ as long as the second segment of the hind tarsus and bearing 6–23 accessory hairs. Processus terminalis $4\frac{1}{5}$–$7\frac{1}{2}$ times as long as the base of the sixth antennal segment 57

– Ultimate rostral segment $\frac{2}{3}$–$\frac{9}{10}$ as long as the second segment of the hind tarsus and bearing 2–11 but rarely more than 8 accessory hairs. Processus terminalis 3–$4\frac{1}{2}$ times as long as the base of the sixth antennal segment. If ultimate rostral segment more than $\frac{4}{5}$ as long as the second segment of the hind tarsus then the processus terminalis is less than $4\frac{1}{5}$ times as long as the base of the sixth antennal segment. Mostly on Leguminosae and Gramineae 59

57 (56) Base of the sixth antennal segment 180–210μ long, distinctly longer than the ultimate rostral segment which is 130–170μ long and bears 6–11 accessory hairs. On *Rosa*, *Cytisus* and Gramineae, Central Europe 58

– Base of sixth antennal segment 100–170μ long, as long as or shorter than the ultimate rostral segment which is 110–190μ long and bears 6–23 accessory hairs. On Rosaceae (other than *Rosa*) and Geraniaceae, widespread **A. (A.) *pelargonii/rubi*** complex (pp. 52 & 67)

58 (57) Siphunculi 3–$4\frac{1}{2}$ times as long as the ultimate rostral segment which bears 6 accessory hairs. Body $3\frac{1}{10}$–$4\frac{1}{5}$ times as long as the siphunculi which are $1\frac{1}{2}$–$1\frac{9}{10}$ as long as the cauda which bears 6–9 hairs. On *Cytisus*, central Europe **A. (A.) *parvus*** (p 51)

– Siphunculi $5\frac{1}{4}$–$6\frac{1}{2}$ times as long as the ultimate rostral segment which bears 8–11 accessory hairs. Body 4–5 times as long as the siphunculi which are $1\frac{4}{5}$–$2\frac{1}{10}$ as long as the cauda which bears 9–13 hairs. On *Rosa* and *Poa alpina*, alpine . . . . . . **A. (*Metopolophium*) *alpinus*** (p. 73)

59 (56) Siphunculi and cauda brown. Third antennal segment bearing 3–8 rhinaria. Processus terminalis 3–$3\frac{1}{2}$ times as long as the base of the sixth antennal segment. Body 5–$5\frac{1}{2}$ times as long as the siphunculi which are $1\frac{1}{2}$–$1\frac{3}{5}$ as long as the cauda which bears 9 or 10 hairs. *Taraxacum*, Canadian arctic **A. (*Metopolophium*) *arctogenicolens*** (p. 73)

– Siphunculi pale or dusky, cauda pale. 60

60 (59) Third antennal segment bearing 5–15 rhinaria. Body 4–5 times as long as the siphunculi which are $1\frac{2}{5}$–$1\frac{3}{5}$ as long as the cauda which bears only 5 or 6 rather short hairs. Processus terminalis $3\frac{1}{3}$–$4\frac{1}{3}$ times as long as the base of sixth antennal segment. Mongolia. . . . **A. (A.) *dauricum*** (p. 36)

– Third antennal segment without or bearing 1–4 rhinaria 61

61 (60) Siphunculi gradually decreasing in diameter from base to apex, about 10 times as long as their middle diameter which is about $1\frac{1}{2}$ times as thick as the middle diameter of the hind tibiae. Body 3–4 times as long as the siphunculi which are $4\frac{3}{4}$–$6\frac{3}{4}$ times as long as the ultimate rostral segment and $1\frac{1}{2}$–$2\frac{1}{10}$ times as long as the cauda which bears 7–10 hairs. On *Caragana*, *Colutea* and *Coronilla emerus*, Europe and introduced to North America **A. (A.) caraganae** (p. 33)

– Siphunculi more slender, tapering from the base to the middle but thereon cylindrical and with their middle diameter little if any more than that of the hind tibiae. If middle diameter of siphunculi up to $1\frac{1}{4}$ times that of the hind tibiae, then the body is $4\frac{1}{3}$–$5\frac{1}{3}$ times as long as the siphunculi . . . 62

62 (61) Body $2\frac{9}{10}$–$3\frac{9}{10}$ times as long as the siphunculi, only in large specimens (body length $2\frac{1}{2}$ mm or more) more than $3\frac{1}{2}$ times as long. Siphunculi $1\frac{4}{5}$–$2\frac{2}{5}$ times as long as the cauda which bears 5–8 hairs, only small specimens (body length $1\frac{1}{2}$–2 mm) with siphunculi less than twice as long as the cauda.

Siphunculi very slender, usually 16–22 times as long as their least middle diameter but small specimens (body length $1\frac{1}{2}$–2 mm) may have siphunculi only 13–16 times as long as their middle diameter. Siphunculi usually $4\frac{1}{2}$–$5\frac{1}{2}$ times as long as the ultimate rostral segment but in small specimens only $3\frac{3}{4}$–$4\frac{1}{2}$ times as long. First antennal segments bearing 5–8 hairs. On *Bidens pilosa* and more rarely other dicotyledons, Yemen, North and East Africa . . . . **A. (A.) bidentis** (p. 31)

– Body $3\frac{1}{5}$–$5\frac{1}{2}$ times as long as the siphunculi but if less than $3\frac{9}{10}$ then the siphunculi are less than $1\frac{4}{5}$ times as long as the cauda. 63

63 (62) Ultimate rostral segment 140–150μ, long and slender, 5–$6\frac{1}{4}$ times as long as its diameter across the 6 primary hairs at the apex of the fourth segment.

Processus terminalis 3–$3\frac{2}{3}$ times as long as the base of the sixth antennal segment and 3–4 times as long as the ultimate rostral segment, which bears 8 accessory hairs. Body $3\frac{1}{5}$–$4\frac{2}{5}$ times as long as the siphunculi which are $1\frac{1}{2}$–$1\frac{4}{5}$ as long as the cauda which is strongly constricted on the basal half. Longest hairs on eighth abdominal tergite 30–40μ long. On Papaveraceae, Middle East, Southern Russia . . . . . . **A. (A.) ilka** (p. 44)

– Ultimate rostral segment 90–130μ long and 3–$4\frac{1}{2}$ times as long as the diameter across the distal primary hairs. Central and Western Europe . . . 64

64 (63) Ultimate rostral segment 110–130μ long and $3\frac{3}{4}$–$4\frac{1}{2}$ times as long as its diameter across the 6 distal primary hairs. Body $3\frac{1}{5}$–$4\frac{2}{5}$ as long as the siphunculi which are $1\frac{1}{5}$–$1\frac{4}{5}$ as long as the cauda. On *Lotus*, Europe. **A. (A.) loti** (p. 46)

– Ultimate rostral segment 90–130μ long and 3–$4\frac{1}{4}$ times as long as its diameter across the 6 distal primary hairs, if more than $3\frac{3}{4}$ times as long then the body is $4\frac{1}{2}$–$5\frac{1}{2}$ times as long as the siphunculi. On *Rosa* and Gramineae (sg. *Metopolophium*) 65

65 (64) Longest hairs on the eighth abdominal tergite 35–45μ long. Ultimate rostral segment 120–130μ long and bearing 6–9 accessory hairs. On *Rosa* and Gramineae, alpine . . . . . . **A. (Metolophium) montanus** (p. 79)

– Longest hairs on the eighth abdominal tergite 12–30μ long. Ultimate rostral segment 90–120μ long and bearing 2–6 accessory hairs. On Gramineae, Europe 66

66 (65) Antennae about as long as or longer than the body which is $3\frac{4}{5}$–5 times as long as the siphunculi which are $1\frac{3}{4}$–$2\frac{1}{10}$ times as long as the cauda and $3\frac{1}{2}$–5 times as long as the second segment of the hind tarsi. Processus terminalis $3\frac{1}{2}$–$4\frac{1}{2}$ times as long as the base of the sixth antennal segment which is $1\frac{1}{10}$–$1\frac{1}{2}$ (rarely less than $1\frac{1}{5}$) times as long as the second segment of the hind tarsus. On *Arrhenatherum* . . **A. (Metopolophium) albidus** (p. 72)

– Antennae $\frac{3}{5}$–$\frac{9}{10}$ as long as the body which is $4\frac{1}{2}$–$5\frac{1}{3}$ times as long as the siphunculi which are $2\frac{1}{2}$–$4\frac{1}{2}$ times as long as the second segment of the hind tarsi. Processus terminalis 3–4 times as long as the base of the sixth antennal segment which is 1–$1\frac{1}{3}$, but rarely more than $1\frac{1}{4}$ times as long as the second segment of the hind tarsi. Various Gramineae
A. (Metopolophium) festucae (p. 77)

Alatae viviparae

1 Processus terminalis only $1\frac{1}{5}$–$1\frac{1}{2}$ times as long as the base of the sixth antennal segment. Secondary rhinaria distributed, III, 6–13; IV, 1–4; V, 3. First tarsal segments bearing only 2 hairs.
Ultimate rostral segment 60–75μ long and bearing 3–5 accessory hairs. On *Potentilla*, Ontario . . . . . **Myzaphis canadensis** (p. 84)

– Processus terminalis 2–10 times as long as the base of the sixth antennal segment. First tarsal segments usually bearing 3, sometimes with 5, hairs 2

2 (1) Processus terminalis $7\frac{1}{2}$–8 times as long as the base of the sixth antennal segment and $2\frac{1}{4}$–$2\frac{2}{3}$ as long as the weakly clavate siphunculi. Secondary rhinaria distributed, III, 34–41; IV, 5–8; V, 0–1.
Ultimate rostral segment 160–180μ long and bearing 13–19 accessory hairs. On *Melandrium*, Europe . . . . **Volutaphis schusteri** (p. 85)

– Processus terminalis 2–10 times as long as the base of the sixth antennal segment but when more than twice as long as the siphunculi usually without but rarely bearing 1 or 2 rhinaria on the fourth antennal segment . . 3

3 (1) Processus terminalis 8–10 times as long as the base of the sixth antennal segment and 3–$3\frac{1}{2}$ times as long as the siphunculi. Secondary rhinaria distributed, III, 22–26; IV, 1 or 2. Body 6–$6\frac{1}{2}$ times as long as the siphunculi which are $1\frac{1}{10}$–$1\frac{1}{4}$ times as long as the cauda which bears 7–9 hairs. Ultimate rostral segment 90–100μ long and $\frac{7}{10}$–$\frac{4}{5}$ as long as the second segment of the hind tarsus. On *Spiraea*, Eastern North America **A. (A.) pseudodirhodum** (p. 67)

– Processus terminalis 2–$9\frac{1}{2}$ times as long as the base of the sixth antennal segment, but if more than twice as long as the siphunculi then the fourth antennal segment is without secondary rhinaria 4

4 (3) Secondary rhinaria distributed, III, 13–20; IV, usually 5–11, abnormally 2–4; V, 0–4. Processus terminalis 450–700μ long, $3\frac{1}{2}$–$4\frac{3}{4}$ times as long as the base of the sixth antennal segment and 1–$1\frac{2}{3}$ as long as the siphunculi.
Siphunculi $1\frac{1}{3}$ to twice as long as the cauda which bears 6–8 hairs, the distal 2–5 of which are short and capitate. Longest hairs on the eighth abdominal tergite only 8–18μ long. On *Rosa* and *Fragaria*, widespread
A. (Rhodobium) porosus (p. 79)

– Secondary rhinaria usually confined to the third antennal segment, but if the fourth segment bears 1 to 3 then the processus terminalis is 1·3–1·5 mm long and the siphunculi are about 1 mm long, and weakly clavate . . . 5

5 (4) Body $1\frac{2}{5}$ to twice as long as the siphunculi. Secondary rhinaria distributed, III, 19–27; IV, 0–3; V, 0.
Siphunculi 0·9–1·2 mm long, weakly calavate and $2\frac{3}{4}$–4 times as long as the cauda which bears 7–9 hairs. Processus terminalis 1·3–1·5 mm long and 7–9 times as long as the base of the sixth antennal segment. Ultimate rostral segment 100–130μ long, $\frac{3}{4}$–$\frac{9}{10}$ as long as the second segment of the hind tarsus and bearing only 2 accessory hairs. On *Amelanchier*, North America . . . . **A. (A.) macrosiphum** (p. 47)

– Body $2\frac{1}{5}$–$9\frac{1}{2}$ times as long as the siphunculi. Secondary rhinaria confined to the third antennal segment. 6

6 (5) Body $2\frac{1}{5}$–3 times as long as the siphunculi which are $2\frac{1}{2}$–$3\frac{1}{3}$ times as long as the cauda which bears 10–15 hairs.

Processus terminalis 0·9–1·3 mm long and $3\frac{1}{4}$–$4\frac{1}{4}$ times as long as the base of the sixth antennal segment. Third antennal segment bearing 10–21 rhinaria. First antennal segment bearing 12–18 hairs. Ultimate rostral segment 120–140μ long, $\frac{2}{3}$–$\frac{4}{5}$ as long as the second segment of the hind tarsus and bearing 7–9 accessory hairs. On Leguminosae, Malvaceae and sometimes other plants, Middle East . . . . . . ***A. (A.) gossypii*** (p. 41)

– Body $2\frac{4}{5}$–$9\frac{1}{2}$ times as long as the siphunculi but if $2\frac{4}{5}$–3 times then the siphunculi are only $1\frac{1}{2}$–$2\frac{1}{10}$ times as long as the cauda 7

7 (6) Siphunculi 0·8–1·1 mm long, and with a well developed apical flange with a diameter $1\frac{1}{2}$ to twice that of the attenuated sub-apical part. Body $3\frac{1}{3}$–$4\frac{1}{4}$ times as long as the siphunculi which are $2\frac{1}{3}$–3 times as long as the cauda which bears 7–11 hairs.

Antennal tubercles well developed with almost parallel inner margins. Processus terminalis $5\frac{3}{4}$–$7\frac{1}{2}$ times as long as the base of the sixth antennal segment which is 180–260μ long and $1\frac{1}{5}$–$1\frac{3}{5}$ as long as the ultimate rostral segment, which is about equal in length, 140–170μ ,to the second segment of the hind tarsi and bears 6–13 accessory hairs. Longest hair on 8th abdominal tergite 50–110μ long. On *Urtica*, Holarctic . . ***Microlophium*** (p. 84)

– Siphuncular flange less well developed. If siphunculi more than 0·8 mm, then siphunculi not more than $2\frac{1}{4}$ times as long as the cauda, processus terminalis only 3–5 times as long as the base of the sixth antennal segment, ultimate rostral segment 120–150μ long and only $\frac{3}{5}$–$\frac{9}{10}$ as long as the second segment of the hind tarsus and longest hairs on 8th abdominal tergites only 15–40μ long. 8

8 (7) All abdominal tergites bearing conspicuous capitate hairs, those on the third abdominal tergites 45–75μ long, and those on the 8th tergites 45–65μ long. Third antennal segment also bearing conspicuous capitate hairs, 18–40μ long.

Abdomen pigmented dorsally with well developed transverse bands or an almost solid patch. Body $5\frac{1}{4}$–$7\frac{1}{4}$ times as long as the siphunculi which are 250–340μ long, with a well developed flange, and are $1\frac{3}{4}$–$2\frac{1}{2}$ times as long as the cauda which bears 4–6 hairs. Ultimate rostral segment 100–120μ long, equal in length or up to $1\frac{1}{5}$ as long as the second segment of the hind tarsus. Third antennal segment bearing 6–11 rhinaria. Processus terminalis $4\frac{1}{4}$–$5\frac{1}{2}$ times as long as the base of the sixth antennal segment. On Gramineae, Holarctic *Cryptaphis* (p. 82). 9

– If the body hairs are capitate, then those on the middle abdominal tergites are shorter. Antennal hairs usually less conspicuous 10

9 (8) Siphunculi 11–$15\frac{1}{2}$ times as long as the longest hair on the third antennal segment and 2–$2\frac{1}{2}$ times as long as the cauda. Processus terminalis $4\frac{1}{3}$–$5\frac{1}{10}$ times as long as the base of the sixth antennal segment. On *Holcus* and other Gramineae, Europe . . . . . . ***Cryptaphis poae*** (p. 83)

– Siphunculi 5–$9\frac{1}{2}$ times as long as the longest hair on the third antennal segment and $1\frac{3}{4}$–$2\frac{1}{10}$ as long as the cauda. Processus terminalis 5–6 times as long as the base of the sixth antennal segment. On *Bromus*, Manitoba ***Cryptaphis bromi*** (p. 82)

10 (8) First tarsal segments bearing 5 hairs. Body 6–$9\frac{1}{2}$ times as long as the siphunculi which are $1\frac{1}{10}$–$1\frac{2}{3}$ as long as the cauda. Ultimate rostral segment $\frac{2}{3}$–$\frac{3}{5}$ as long as the second segment of the hind tarsus. Processus terminalis $3\frac{1}{2}$–5 times as long as the base of the sixth antennal segment. If processus terminalis $3\frac{1}{2}$–$4\frac{1}{4}$ times as long as the base of the sixth antennal segment, then the third antennal segment bears 45–70 rhinaria 11

– First tarsal segments bearing 3 hairs. If body more than 6 times as long as the siphunculi, then the ultimate rostral segment is more than $\frac{3}{5}$ as long as the second segment of the hind tarsi and if $\frac{3}{5}$–$\frac{3}{4}$ then the processus terminalis is rarely more than $3\frac{1}{2}$ times as long as the base of the sixth antennal segment, and when $3\frac{1}{2}$–$4\frac{1}{10}$ times as long the third antennal segment bears 15–30 rhinaria 12

11 (10) Third antennal segment bearing 45–70 rhinaria. Processus terminalis $3\frac{1}{2}$–4 times as long as the base of the sixth antennal segment. Body $7\frac{1}{2}$–$9\frac{1}{4}$ times as long as the siphunculi which are $1\frac{1}{5}$–$1\frac{2}{3}$ times as long as the cauda. On *Corydalis*, North America . . . . . . **A. (A.) *tutigula*** (p. 71)

– Third antennal segment bearing 4–12 rhinaria. Processus terminalis $4\frac{1}{3}$–5 times as long as the base of the sixth antennal segment. Body 6–$6\frac{1}{2}$ times as long as the siphunculi which are $1\frac{1}{10}$–$1\frac{1}{4}$ times as long as the cauda. On *Euphorbia*, Europe . . . . . . **A. (A.) *cyparissiae*** (p. 34)

12 (10) Processus terminalis 1·5–1·8 mm long, 5–$9\frac{1}{2}$ times as long as the base of the sixth antennal segment and 3–4 times as long as the siphunculi.

Body $3\frac{3}{4}$–$5\frac{1}{4}$ times as long as the siphunculi which are 350–600μ long. Ultimate rostral segment 105–120μ long and bearing 4–6 accessory hairs. Third antennal segment bearing 12–21 rhinaria. North America . . 13

– Processus terminalis 0·3–1·4 mm long but if more than 1·0 mm, then less than $2\frac{1}{3}$ times as long as the siphunculi 14

13 (12) Siphunculi $1\frac{1}{2}$–$2\frac{1}{3}$ times as long as the cauda which bears only 5 or 6 hairs. Ultimate rostral segment $\frac{9}{10}$ to almost equal in length to the second segment of the hind tarsus which is 120–135μ long. First antennal segments bearing 10–17 hairs. On *Aster* . . . . **A. (A.) *asterifoliae*** (p. 26)

– Siphunculi $1\frac{2}{5}$–$1\frac{3}{4}$ times as long as the cauda which bears 9–12 hairs. Ultimate rostral segment $\frac{2}{5}$–$\frac{3}{5}$ as long as the second segment of the hind tarsus which is 200–230μ long. First antennal segments bearing 6–8 hairs. On *Mertensia* . . . . **A. (A.) *niwanista*** (p. 50)

14 (12) Ultimate rostral segment 120–130μ long, equal to $1\frac{1}{10}$ as long as the second segment of the hind tarsus and bearing only 2 accessory hairs. Longest hairs on eighth abdominal tergite 10–15μ long.

Processus terminalis $4\frac{1}{2}$–$5\frac{1}{4}$ times as long as the base of the sixth antennal segment which is $1\frac{1}{4}$–$1\frac{1}{2}$ times as long as the ultimate rostral segment. Body 5–$6\frac{3}{4}$ times as long as the siphunculi which are $1\frac{3}{4}$–$2\frac{1}{5}$ as long as the cauda which bears 4–6 hairs, the apical pair being short and capitate. On *Trifolium*, Europe. . . . . . ***Subacyrthosiphon cryptobius*** (p. 84)

– Ultimate rostral segment usually with 4 or more accessory hairs, if with only 1–3 then the segment is less than $\frac{9}{10}$ as long as the second segment of the hind tarsi. Longest hairs on 8th tergite 17–60μ 15

15 (14) Ultimate rostral segment 120–140μ long, $\frac{3}{5}$–$\frac{7}{10}$ as long as the second segment of the hind tarsus and bearing 16–24 accessory hairs. Third antennal segment bearing 11–18 rhinaria. Processus terminalis $2\frac{4}{5}$–$4\frac{1}{2}$ times as long as the base of the sixth antennal segment. Body $4\frac{1}{2}$–6 times as long as the siphunculi which are $1\frac{1}{5}$–$1\frac{4}{5}$ times as long as the cauda which bears 7–10 hairs. On *Lactuca*, holarctic . . . . **A. (*Tlja*) *lactucae*** (p. 81)

– If the ultimate rostral segment bears more than 15 accessory hairs then it is at least $\frac{9}{10}$ as long as the second segment of the hind tarsus 16

16 (15) First antennal segments bearing 11–20 hairs. Base of the sixth antennal segment 240–390μ long and $1\frac{3}{5}$–$2\frac{2}{3}$ times as long as the ultimate rostral segment. Siphunculi 0·55–1·15 mm long and slender on the apical half.

Body $2\frac{3}{4}$–$5\frac{1}{2}$ times as long as the siphunculi. Third antennal segment bearing 5–29 rhinaria. Processus terminalis $2\frac{3}{4}$–$4\frac{1}{2}$ times as long as the base of the sixth antennal segment. Ultimate rostral segment 120–160μ long and $\frac{2}{3}$–$1\frac{9}{20}$ as long as the second segment of the hind tarsi and bears 5–10 accessory hairs. Cauda bearing 7–15 hairs. On Leguminosae, widespread (*A.* (*A.*) *pisum*) 17

– First antennal segments bearing 5–11 hairs, but if with 10 or 11 hairs then either the base of the sixth antennal segment or the siphunculi shorter . 19

17 (16) Ultimate rostral segment bearing 8–10 accessory hairs. Base of the sixth antennal segment, 250–280μ long, $1\frac{3}{5}$–$1\frac{9}{10}$ as long as the ultimate rostral segment, which is $\frac{4}{5}$–$1\frac{9}{20}$ as long as the second segment of the hind tarsus. Cauda bearing 12–16 hairs. On *Ononis*, Europe ***A. (A.) pisum ononis*** (p. 64)

– Ultimate rostral segment bearing 5–7 accessory hairs. Base of the sixth antennal segment 240–390μ long, $1\frac{3}{4}$–$2\frac{2}{3}$ as long as the ultimate rostral segment which is $\frac{2}{3}$–$1\frac{7}{20}$ as long as the second segment of the hind tarsi. Cauda bearing 7–15 hairs 18

18 (17) Siphunculi $1\frac{1}{10}$–$1\frac{2}{3}$ times as long as the cauda. Eighth abdominal tergite bearing 7–12 hairs. On herbaceous Leguminosae . ***A. (A.) p. pisum*** (p. 58)

– Siphunculi $1\frac{1}{2}$–$2\frac{1}{10}$ times as long as the cauda. Eighth abdominal tergite bearing 6–8 hairs. On *Sarothamnus* . . ***A. (A.) pisum spartii*** (p. 65)

19 (16) Eighth abdominal tergite bearing only 2 hairs. Ultimate rostral segment about $\frac{2}{3}$ as long as the second segment of the hind tarsus.

Processus terminalis 2–3 times as long as the base of the sixth antennal segment. On Gramineae, India . ***A. (Metopolophium) chandrani*** (p. 74)

– Eighth abdominal tergite usually bearing 4–9 hairs, if rarely with only 3 then the ultimate rostral segment is $\frac{4}{5}$ or more as long as the second segment of the hind tarsus 20

20 (19) Processus terminalis 0·9–1·2 mm long, 6–8 times as long as the base of the sixth antennal segment. Cauda bearing only 6 or 7 hairs. Ultimate rostral segment 110–160μ long, $1\frac{1}{20}$–$1\frac{1}{3}$ as long as the second segment of the hind tarsi and bearing 10–14 accessory hairs.

Body 3–$4\frac{1}{4}$ times as long as the siphunculi which are $1\frac{3}{4}$–$2\frac{1}{5}$ times as long as the cauda. Third antennal segment bearing 12–19 rhinaria. Longest hairs on the eighth abdominal tergite 20–35μ long On Compositae, South America and West Indies . . . . . ***A. (A.) bidenticola*** (p 31)

– Processus terminalis usually shorter but if not, then cauda bearing 8–11 hairs and Ultimate rostral segment $\frac{3}{5}$–$1\frac{1}{10}$ as long as the second segment of the hind tarsus 21

21 (20) Body $6\frac{1}{3}$–$9\frac{1}{2}$ times as long as the siphunculi. Third antennal segment bearing 4–12 rhinaria. Ultimate rostral segment $\frac{3}{4}$–$1\frac{1}{10}$ as long as the second segment of the hind tarsus.

Siphunculi $1\frac{1}{10}$–$1\frac{2}{5}$ as long as the cauda which bears 6–10 hairs. Processus terminalis 2–4 times as long as the base of the sixth antennal segment. Arctic and alpine 22

– Body $3\frac{1}{3}$–$6\frac{2}{3}$ as long as the siphunculi but if more than 6 times then the third antennal segment bearing 8–30 rhinaria and the ultimate rostral segment often less than $\frac{3}{4}$ as long as the second segment of the hind tarsus . . 24

22 (21) Third antennal segment bearing 11–12 rhinaria Processus terminalis 2–$2\frac{1}{4}$ times as long as the base of the sixth antennal segment, 1–$1\frac{1}{5}$ times as long as the siphunculi and $1\frac{1}{5}$–$1\frac{1}{3}$ as long as the cauda which bears 10 hairs Ultimate rostral segment $\frac{3}{4}$–$\frac{4}{5}$ as long as the second segment of the hind tarsus Body 9–$9\frac{1}{2}$ times as long as the siphunculi. On sand dunes, North Western Europe . . . . ***A. (A.) auctus*** (p. 30)

– Third antennal segment bearing 4–6 rhinaria. Processus terminalis $2\frac{1}{2}$–$4\frac{1}{4}$ times as long as the base of the sixth antennal segment, $1\frac{1}{5}$–$2\frac{1}{4}$ times as long as the siphunculi and $1\frac{1}{2}$–$2\frac{1}{4}$ times as long as the cauda, which bears 6–8 hairs. Ultimate rostral segment $\frac{4}{5}$–$1\frac{1}{10}$ as long as the second segment of the hind tarsus. Body $6\frac{1}{4}$–$7\frac{3}{4}$ times as long as the siphunculi. Alpine and arctic . 23

23 (22) Processus terminalis $3\frac{1}{2}$–4 times as long as the base of the sixth antennal segment. Siphunculi 3–$4\frac{1}{5}$ times as long as the ultimate rostral segment which is $\frac{4}{5}$–$\frac{9}{10}$ as long as the second segment of the hind tarsus. On *Vaccinium*, arctic and alpine . . . . **A. (A.) brachysiphon** (p. 32)

– Processus terminalis $2\frac{1}{2}$–$3\frac{1}{3}$ times as long as the base of the sixth antennal segment. Siphunculi 2–3 times as long as the ultimate rostral segment which is $\frac{9}{10}$–$1\frac{1}{10}$ as long as the second segment of the hind tarsus. On *Dryas*, arctic . . . . **A. (A.) brevicornis** (p. 32)

24 (21) Siphunculi 400–650μ long and $2\frac{1}{4}$–$3\frac{1}{5}$ times as long as the cauda which bears 6–8 hairs. Dorsum bearing transverse dark bands. Processus terminalis $3\frac{2}{3}$–5 times as long as the base of the sixth antennal segment. Third antennal segment bearing 30–55 rhinaria. Ultimate rostral segment $\frac{9}{10}$–$1\frac{1}{4}$ times as long as the second segment of the hind tarsus and bearing 8–12 accessory hairs.

Longest hair on eighth abdominal tergite 40–55μ. On *Primula*, widespread **A. (A.) primulae** (p. 66)

– Siphunculi $1\frac{1}{3}$–$2\frac{2}{3}$ as long as the cauda but if more than $2\frac{1}{5}$ then either the abdominal dorsum pale and the processus terminalis 5–$6\frac{1}{2}$ times as long as the base of the sixth antennal segment (*pelargonii* group) or the processus terminalis only $2\frac{3}{4}$–$3\frac{1}{3}$ times as long as the base of the sixth antennal segment or the cauda triangular without a basal constriction, the third antennal segment bearing only 14–18 rhinaria and the ultimate rostral segment $\frac{4}{5}$–$\frac{9}{10}$ as long as the second segment of the hind tarsus 25

25 (24) Siphunculi 320–430μ long and $2\frac{1}{5}$–$2\frac{2}{3}$ times as long as the cauda which bears only 5 or 6 hairs. Abdomen bearing conspicuous transverse dark dorsal bands. Processus terminalis $2\frac{3}{4}$–$3\frac{1}{3}$ times as long as the base of the sixth antennal segment.

Ultimate rostral segment $\frac{3}{4}$–$\frac{9}{10}$ as long as the second segments of the hind tarsi and bearing only 1 or 2 accessory hairs. On *Poa*, Europe **A. (Metopolophium) frisicum** (p. 78)

– Siphunculi $1\frac{1}{3}$–$2\frac{1}{3}$ times as long as the cauda but if more than $2\frac{1}{10}$ then the abdominal dorsum is pale and the processus terminalis is $3\frac{1}{3}$–$6\frac{1}{2}$ times as long as the base of the sixth antennal segment. 26

26 (25) Ultimate rostral segment 100–110μ long, about equal in length to the second segment of the hind tarsi and bearing 4–7 accessory hairs. Processus terminalis $2\frac{1}{5}$–$2\frac{4}{5}$ as long as the base of the sixth antennal segment. Abdominal dorsum bearing dark bands.

Body $5\frac{2}{3}$–$6\frac{2}{3}$ as long as the siphunculi which are $1\frac{1}{5}$–$2\frac{1}{10}$ times as long as the cauda, which bears 5–7 hairs. On *Deschampsia* and *Festuca*, Europe **A. (Metopolophium) tener** (p. 79)

– If the ultimate rostral segment is $\frac{9}{10}$–$1\frac{1}{10}$ as long as the second segment of the hind tarsus, then it is 120–190μ long, the processus terminalis is $3\frac{4}{5}$–$8\frac{1}{4}$ times as long as the base of the sixth antennal segment and the abdominal dorsum is pale. 27

27 (26) Abdomen bearing dark dorsal bands.

Ultimate rostral segment $\frac{3}{5}$–$\frac{9}{10}$ as long as the second segment of the hind tarsus. On *Rosa* and Gramineae, Europe 28

– Abdominal dorsum pale 30

28 (27) Dark dorsal abdominal bands well developed. Body $4\frac{1}{3}$–$6\frac{1}{3}$ times as long as

the siphunculi. Ultimate rostral segment bearing 5–9 accessory hairs. Third antennal segment bearing 7–26 rhinaria.

Processus terminalis $2\frac{3}{4}$–$4\frac{1}{2}$ times as long as the base of the sixth antennal segment. Cauda bearing 5–8 hairs (s.g. *Metopolophium* partim) . . 29

– Dark dorsal bands only weakly developed and present only in old specimens. Body $3\frac{2}{3}$–5 times as long as the siphunculi. Ultimate rostral segment bearing 7–11 accessory hairs. Third antennal segment bearing 4–31 rhinaria 30

29 (28) Ultimate rostral segment 100–115μ long, $\frac{7}{10}$–$\frac{9}{10}$ as long as the second segment of the hind tarsi (120–160μ). Siphunculi $1\frac{1}{2}$–$1\frac{9}{10}$ times as long as the cauda. On Gramineae, N.W. Europe . . ***A. (Metopolophium) festucae*** (p. 77)

– Ultimate rostral segment 120–130μ long, $\frac{4}{5}$–$\frac{9}{10}$ as long as the second segment of the hind tarsi. Siphunculi $1\frac{7}{10}$–$2\frac{1}{10}$ as long as the cauda. On *Rosa* and *Poa alpina*, alpine . . . . ***A. (Metopolophium) montanus*** (p. 79)

30 (27, 28) Ultimate rostral segment 120–150μ long, more than twice as long as its own basal width and bearing 5–8 accessory hairs, but only $\frac{3}{5}$–$\frac{17}{20}$ as long as the second segment of the hind tarsus which is 160–190μ long. Body $2\frac{1}{2}$–$3\frac{1}{2}$ times as long as the siphunculi.

Third antennal segment usually a little longer than the processus terminalis and bearing 5–13 rhinaria. Processus terminalis $2\frac{1}{2}$–$3\frac{1}{2}$ times as long as the base of the sixth antennal segment and the second segments of the hind tarsi. Siphunculi $1\frac{2}{3}$ to twice as long as the cauda which bears 8–11 hairs. Longest hairs on eighth abdominal tergite 30–40μ long. On *Chelidonium*, Europe & Korea . . ***A. (Lipporhinus) chelidonii*** (p. 72)

– When ultimate rostral segment $\frac{3}{5}$–$\frac{17}{20}$ as long as the second segment of the hind tarsus, it is 90–140μ long and is either less than $1\frac{3}{4}$ as long as its basal width, or if 120–140μ long and more than twice as long as its basal width, then the body is $3\frac{2}{5}$–5 times as long as the siphunculi . . 31

31 (30) Ultimate rostral segment 90–130μ long, $\frac{3}{5}$–$\frac{3}{4}$ as long as the second segment of the hind tarsus and less than $1\frac{3}{4}$ as long as its own basal diameter and bearing 4–7 accessory hairs. Processus terminalis $2\frac{2}{3}$–$4\frac{1}{5}$ times as long as the base of the sixth antennal segment. On *Rosa* and Gramineae (s.g. *Metopolophium* partim) 32

– Ultimate rostral segment $\frac{7}{10}$–$1\frac{1}{3}$ times as long as the second segment of the hind tarsus, when $\frac{7}{10}$–$\frac{4}{5}$ as long then more than $1\frac{4}{5}$ times as long as its own basal diameter 33

32 (31) Third antennal segment bearing 14–29 rhinaria extending over nearly the whole length of the segment. Body $4\frac{3}{4}$–$6\frac{2}{3}$ as long as the siphunculi which usually have brownish apices and are $2\frac{1}{3}$–$3\frac{1}{4}$ times as long as the second segment of the hind tarsi which are 150–190μ long. Siphunculi 3–$3\frac{1}{4}$ times as long as the second segments of the hind tarsi in medium or large aphids with the siphunculi 460–610μ long. Siphunculi 11–13 times as long as their minimum diameter. Cauda bearing 8–15 hairs. Longest hair on 8th abdominal tergite 25–45μ long. On *Rosa* and Gramineae, widespread ***A. (Metopolophium) dirhodum*** (p. 74)

– Third antennal segment bearing 7–18 but rarely more than 14 rhinaria extending over its basal $\frac{2}{3}$–$\frac{7}{8}$. Body $4\frac{1}{5}$–5 times as long as the siphunculi which are usually uniformly pale and $2\frac{4}{5}$–4 times as long as the second segments of the hind tarsi which are 125–155μ long. Siphunculi only $2\frac{4}{5}$–3 times as long as the second segments of the hind tarsi in small specimens with siphunculi 360–420μ long. Siphunculi 13–20 times as long as their minimum diameter. Cauda bearing 5–8 hairs. Longest hair

on 8th abdominal tergite 20–30μ long. On *Arrhenatherum*, Europe
A. (Metopolophium) albidus (p. 72)

33 (31) Processus terminalis 4 (but rarely less than 5)–$8\frac{1}{4}$ times as long as the base of the sixth antennal segment which is $\frac{9}{10}$–$1\frac{1}{10}$ as long as the ultimate rostral segment. Third antennal segment bearing 12 (but rarely less than 17)–31 rhinaria. Ultimate rostral segment $\frac{17}{20}$–$1\frac{1}{3}$ times as long as the second segment of the hind tarsus and bearing 7 (but rarely less than 10)–18 accessory hairs. On Geraniaceae and herbaceous Rosaceae
A. pelargonii/rubi complex (pp. 52 & 67)

– Processus terminalis 3–5 times as long as the base of the sixth antennal segment which is at least as long as but usually $1\frac{1}{10}$–$1\frac{2}{3}$ as long as the ultimate rostral segment. Third antennal segment bearing 4–26 (but rarely more than 16) rhinaria. Ultimate rostral segment $\frac{7}{10}$–$1\frac{1}{10}$ but rarely more than $\frac{9}{10}$, as long as the second segment of the hind tarsus and bearing 6–11 accessory hairs. On *Rosa*, Leguminosae, Compositae and Gramineae . . . 34

34 (33) Ultimate rostral segment $\frac{9}{10}$–$1\frac{1}{10}$ as long as the second segment of the hind tarsus.

Body $3\frac{1}{2}$–$4\frac{1}{4}$ times as long as the siphunculi which are $1\frac{2}{3}$ to twice as long as the cauda, which bears 6–8 hairs. Third antennal segment bearing 7–12 rhinaria. On *Cytisus* . . . . **A. (A.) parvus** (p. 51)

– Ultimate rostral segment $\frac{7}{10}$–$\frac{9}{10}$ as long as the second segment of the hind tarsus 35

35 (34) Siphunculi $2\frac{1}{2}$–3 times as long as the second segment of the hind tarsus. Processus terminalis 3–$3\frac{1}{2}$ times as long as the base of the sixth antennal segment which is $1\frac{1}{2}$–$1\frac{2}{3}$ as long as the ultimate rostral segment which bears 8–10 accessory hairs.

Third antennal segment bearing 11–16 rhinaria. Body $4\frac{1}{2}$–5 times as long as the siphunculi which are $1\frac{1}{2}$ to twice as long as the cauda, which bears 9 or 10 hairs. On *Sonchus*, Pakistan . . . **A. (A.) ghanii** (p. 38)

– Siphunculi 3–$4\frac{1}{4}$ times as long as the second segment of the hind tarsus. Processus terminalis $3\frac{1}{5}$–$5\frac{2}{3}$ as long as the base of the sixth antennal segment which is 1–$1\frac{1}{2}$ times as long as the ultimate rostral segment . . . 36

36 (35) Cauda 240–270μ long, triangular without a basal constriction and bearing 6 or 7 hairs. Siphunculi 2–$2\frac{1}{4}$ times as long as the cauda and 14–16 times as long as their own middle diameter. Hairs on the seventh and eighth abdominal tergites arising from transverse dark bands about as dark as the lateral abdominal sclerites.

Body 4–5 times as long as the siphunculi. Third antennal segment bearing 15–17 rhinaria and usually a little shorter than the processus terminalis which is $3\frac{1}{2}$–4 times as long as the base of the sixth antennal segment. Ultimate rostral segment 120–145μ long, twice as long as its own basal width, $\frac{4}{5}$–$\frac{9}{10}$ as long as the second segment of the hind tarsus and bearing 5–7 accessory hairs. Longest hairs on the eighth abdominal tergite 35–45μ, on third abdominal tergite 12–15μ. On *Astragalus*, Pakistan
A. astragali (p. 27)

– Cauda with a basal constriction, and at least half as long as the siphunculi in the species normally occurring on Leguminosae. When the siphunculi are more than twice as long as the cauda then they are also 16–21 times as long as their own middle diameter and the seventh and eighth abdominal tergites are pale 37

37 (36) Siphunculi tapering from base to apex, 8–13 times as long as their middle diameter which is $1\frac{1}{2}$ to twice that of the hind tibiae.

Body $3\frac{1}{3}$–$4\frac{1}{4}$ times as long as the siphunculi which are $1\frac{1}{2}$ to twice as long as the cauda which bears 8–13 hairs. Siphunculi 3½–4½ times as long as the second segment of the hind tarsus. Third antennal segment bearing 6–13 rhinaria. On *Caragana, Colutea, Coronella emerus.* Europe and North America . . . . **A. (A.) caraganae** (p. 35)

– Siphunculi more slender, 15–21 times as long as their middle diameter and ⁹⁄₁₀–1¼ times as thick as the middle diameter of the hind tibiae, or if only 9–13 times as long as their middle diameter then they are 1–1⅖ as thick as the middle diameter of the hind tibiae 37

38 (37) Siphunculi 1⅓–1⅔ as long as the cauda which bears 6–9 hairs, 9–13 times as long as their middle diameter which is 1–1⅖ as thick as the middle diameter of the hind tibiae. Third antennal segment bearing 4–10 rhinaria. Body 4–4¼ times as long as the siphunculi, which are 3–3½ times as long as the the second segment of the hind tarsi. On *Lotus*, Europe **A. (A.) loti** (p. 46)

– Siphunculi 1¾–2⅓ times as long as the cauda and 16–21 times as long as their own middle diameter which ⁹⁄₁₀–1¼ times as thick as the middle diameter of the hind tibiae. Third antennal segment bearing 10–26 rhinaria. Body 3⅔–5 times as long as the siphunculi which are 3–4 times as long as the second segment of the hind tarsi 39

39 (38) Lateral sclerites of abdominal segments 2–4 with a small dark area anterior to the tubercle and with the remainder of the sclerite much paler. Third antennal segment bearing 10–16 rhinaria. Processus terminalis 3⅖–4⅕ times as long as the base of the sixth antennal segment. Ultimate rostral segment bearing 6–8 accessory hairs. On Compositae and more rarely other herbaceous dicotyledons. Yemen, North and East Africa **A. (A.) bidentis** (p. 31)

– Lateral abdominal tubercles more uniformly pigmented, the area anterior to the tubercle only a little darker than the remainder of the sclerite. Third antennal segment bearing 11–26 rhinaria. Processus terminalis 3⅘–5 times as long as the base of the sixth antennal segment. Ultimate rostral segment bearing 8–11 accessory hairs. On *Rosa* and *Poa alpina*, alpine **A. (Metopolophium) alpinus** (p. 73)

THE SPECIES OF *ACYRTHOSIPHON*

Acyrthosiphon (A.) asterifoliae (Strom, 1934)

(Text-fig. 1)

Macrosiphum asterifoliae Strom, 1934 : 619–620.
Acyrthosiphon asterifoliae (Strom) Pepper, 1965 : 183, 202.

SPECIMENS STUDIED. U.S.A.: Penn., State College, *Aster* sp., 17.viii.1962, 5 apterae, 2 alatae (*J. O. Pepper*), B.M. 1966–306; Wis., Milwaukee, *Aster* sp., 15.ix. 1934, 1 apt., 1 al. (*L. G. Strom*), B.M. 1964–655.

HOST PLANTS. *Aster* sp. or spp. (Compositae).

DISTRIBUTION. U.S.A., Pennsylvania & Wisconsin.

BIOLOGY. According to Pepper (1965 : 183) it lives on the lower leaves and falls off readily when disturbed.

NOTES. Resembles *Pleotrichophorus* Börner, 1930, but lacks the fan-shaped hairs characterizing that genus.

***Acyrthosiphon (A.) astragali* sp. n.**

(Text-fig. 2)

Apterae viviparae: described from 6 specimens with body length $2\frac{1}{5}$–$2\frac{2}{3}$ mm. Macerated specimens with distal apices of antennal segments III–V, apical half of the base of antennal VI, distal apices of femora, tibiae, siphunculi and spiracular plates dusky to dark. Antennal segments I, II and the processus terminalis sometimes dusky, remainder of insect pale. Antennal tubercles moderately developed and with a weakly developed median tubercle. As the inner side of the antennal tubercles are slightly scabrous, the general appearance of the front of the head resembles that often found in the subgenus *Metopolophium*. Antennae a little longer than the body, which is $3\frac{1}{5}$ to $3\frac{1}{2}$ times as long as the siphunculi. Processus terminalis $3\frac{2}{5}$–$4\frac{1}{10}$ times as long as the base of the sixth antennal segment. Third antennal segment bearing 1 or 2 rhinaria near its base and hairs up to 11–13μ long, that is about $\frac{1}{3}$ as long as the basal diameter of the segment. First antennal segments bearing 7–9 hairs. Posterior dorsal cephalic hairs 16–17μ long, about half as long as the basal diameter of the third antennal segment. Ultimate rostral segment reaching to the hind coxae, 130–145μ long, $\frac{4}{5}$–$\frac{9}{10}$ as long as the second segment of the hind tarsi and bearing 6 or 7 accessory hairs. First tarsal segments bearing 3 hairs. Longest hairs on (posterior margin of) hind femur 22–27μ long. Dorsal abdominal hairs 11–14μ long on the anterior tergites but 38–48μ long on the eighth abdominal tergite, which bears 4 to 6 hairs. Sub-genital plate bearing 3–6 hairs on the anterior half and a row of 7–8 hairs along the posterior margin. Siphunculi evidently imbricated over their entire length and $2\frac{1}{10}$–$2\frac{3}{5}$ as long as the cauda. The cauda is more triangular and less constricted on the basal half than in most other *Acyrthosiphon* and bears 7 or 8 pointed hairs.

Alatae viviparae: described from two specimens with body length $2\frac{1}{4}$–$2\frac{3}{5}$ mm. Head and thorax dark, antennae dark except for the very base of the third segment and the basal half of the sixth segment. The distal one third of the femora and the very apices of the tibiae are also dark. Lateral abdominal sclerites on segments 2 to 4 dusky to dark, with sometimes a small central imbricated area even darker. Body $4\frac{1}{4}$–$4\frac{3}{5}$ as long as the siphunculi. Third

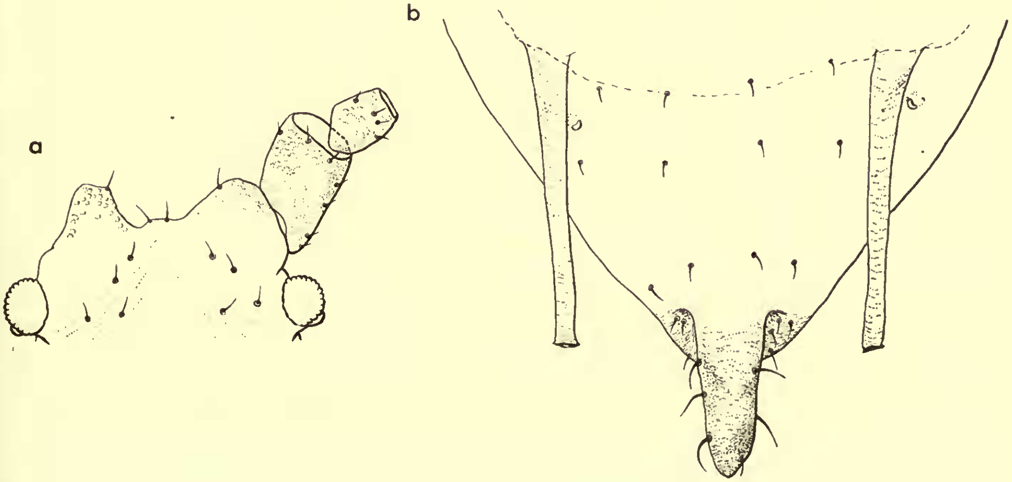

FIG. 1. *Acyrthosiphon asterifoliae*, aptera, a, head; b, apex of abdomen. × 80.

antennal segment bearing 15–17 rhinaria extending over most of its length. Fourth antennal segment without rhinaria. Media of the fore wing twice branched in 3 wings and only once branched in the other. In the specimen with the once branched media, the cauda bears only 6 hairs. This caudal chaetotaxy is asymmetrical and looks abnormal. Apparently the most distal lateral hair is missing from the side where the media of the forewing is only once branched. In this specimen the sub-genital plate bears 5 hairs on the anterior half and a row of 9 along the posterior margin. The other alata bears 12 hairs on the anterior half of the sub-genital plate and 9 along the posterior margin. The specimen shows no other ovipariform features: the hind tibiae of both alatae being typical for viviparae of *Acyrthosiphon*. The lateral abdominal sclerites sometimes bear very small tubercles, smaller even than the hair bases.

Table 1: Measurements of Acyrthosiphon astragali sp. n. in mm.

	Body length	siphunculi	cauda	Antennal segments				ultimate rostral segment	second segment of hind tarsus	Rhinaria on antennal segments		No. of hairs on		
				III	IV	V	VI			III	IV	ultimate rostral segment	eighth abdominal tergite	cauda
1.	2.22	.67	.28	.63	.54	.52	.17+.63	.13	.15	1	0	6	6	8
		.68		.61	.51	.51	.19+.65		.16	1	0			
2.	c2.4	.63	.28	.58	.49	.49	.16+.61	.13	.16	1	0	-	4	8
		.63		.58	.50	.51	.17+.63		.17	1	0			
3.	2.44	.72	.28	.61	.56	.52	.19+.70	.14	.17	1	0	6	6	7
		.71		.63	.52	.51	.19+.72		.18	1	0			
4.	c2.2	.75	.35	.73	.61	.57	.18+.73	.14	.17	2	0	7	5	7
		.75		.72	.59	.59	.18 -		-	1	0			
5.	c2.2	.65	.31	.59	.51	.51	.17+.61	.14	.16	1	0	5	5	8
		.65		.63	.50	.51	.16+.62		.15	1	0			
6.	2.28	.52	.24	.66	.51	.58	.18+ -	.13	.16	17	0	6	5	6
		.52		.66	-	-	-		.16	15	-			
7.	2.53	.55	.26	.73	.59	.61	.19+.73	.14	.16	16	1	-	5	7
		.55		.73	-	-	-		.16	15	-			

1 (type) - 5, apterae viviparae, 6 & 7 alatae viviparae, Pakistan, Madyar,

Astragalus sp., 3.i.1963, C.I.B.C.

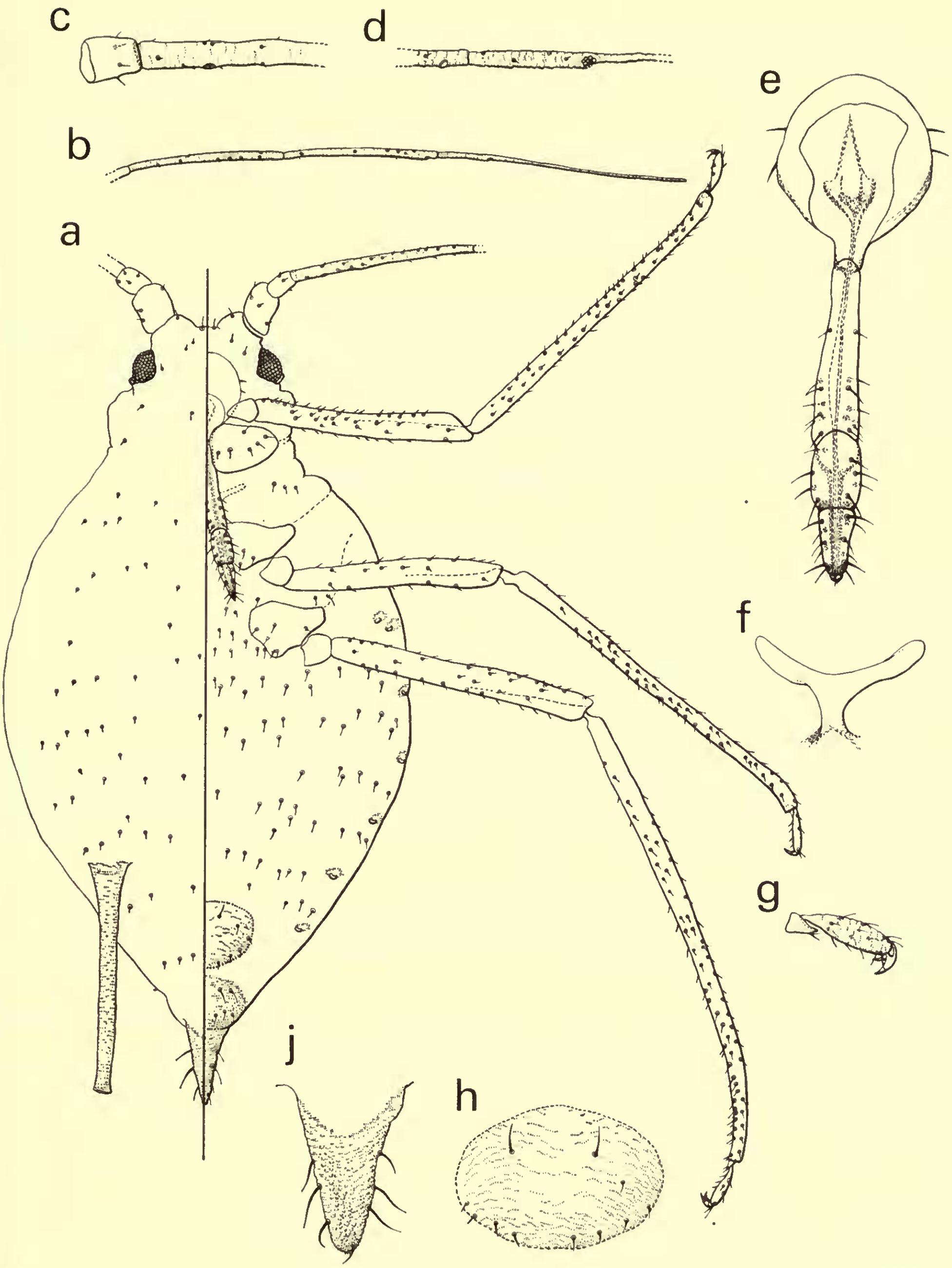

FIG. 2. *Acyrthosiphon astragali*, aptera, a, body; b, antennal segments IV–VI; c, antennal segment II and base III; d, apex of antennal V and base VI; e, rostrum; f, mid-thoracic furca; g, hind tarsus; h, sub-genital plate; j, cauda. a & b ×40, c-j ×80.

Specimens studied. Holotype aptera vivipara, Pakistan: Madyar, *Astragalus* sp., 3.i.1963, Commonwealth Institute of Biological Control, Aphid Reg. 317/1963.

Paratypes, 4 apterae and 2 alatae viviparae with the same collection data as the holotype.

Other specimens, one aptera vivipara and one alatoid nymph, Pakistan: Alamgang, 17.ii.1963, C.I.B.C.

Host plant. *Astragalus* sp. (Leguminosae).

Distribution. Pakistan.

Notes. The triangular cauda without basal constriction (Text-fig. 2 j) separates *astragali* from the otherwise similar *A. ilka* and *A. bidentis*. *A. kondoi*, which also has an almost unconstricted cauda, differs in that the longest hairs on the eighth abdominal tergite are only 15–20μ long in *kondoi* and are 35–45μ long in *astragali*. The processus terminalis is $3\frac{1}{3}$–$4\frac{1}{5}$ times as long as the base of the sixth antennal segment in *astragali* and $4\frac{3}{4}$–6 times as long in *kondoi*.

Acyrthosiphon (A.) auctus (Walker, 1849)

Aphis aucta Walker, 1849 : xxxiii ; 1852 : 1017.
Acyrthosiphon silenicola Hille Ris Lambers, 1955 : 4–7.
Acyrthosiphon shawi Stroyan, 1957 : 313–316.
Acyrthosiphon aucta (Walker) Heie, 1958 : 214–218.
Acyrthosiphon auctus (Walker); Hille Ris Lambers, 1959: 271; Prior & Stroyan, 1960 : 272; Heie, 1961 : 87; 1964 : 224–225; Doncaster, 1961 : 32–34.

Specimens studied. Denmark: Thyboren, *Honkenya peploides*, 22.vi.1957, 1 aptera (*O. Heie*). England: 3 oviparae, Walker collection slide nos. 113 & 115 (see Doncaster, 1961 : 32–34 & 115). Scotland: Aberdeenshire, Frazerburgh, St. Coombs, *Cakile maritima*, 22.viii.1955, 1 apt. (*M. W. Shaw* coll.), H. L. G. Stroyan leg., paratype of *A. shawi*, B.M. 1957–153.

Host plants. *Honkenya peploides* and also recorded from *Stellaria media*, *Silene maritima* (Caryophyllaceae), *Cakile maritima* and *Capsella bursapastoris* (Cruciferae).

Distribution. Northern England (Newcastle), Scotland, Denmark, Finland, Germany, Iceland & Sweden (Ossiannilsson 1961 : 232; 1969*b* : 54).

Biology. 'Obviously sandy biotypes as dunes are preferred.' (Heie, 1961 : 78).

Notes. Authors using the name *Myzus auctus* (Wlk.) were referring to *Myzus certus* (Wlk.) (=*Myzus caryophylacearum* H.R.L.).

Acyrthosiphon (A.) aurlandicus Heikinheimo, 1966

Acyrthosiphon aurlandicus Heikinheimo, 1966 : 388–391.

Host plant. Unknown.

Distribution. Norway.

Notes. Included in the key from the original description only.

Acyrthosiphon (A.) bidenticola Smith, 1960

Acyrthosiphon bidenticola Smith, 1960 : 157–158; Smith, Smith, Martorell & Perez-Escolor, 1964 : 17–18.

SPECIMENS STUDIED. BRAZIL: Sao Paulo, Camoinas, water trap, 10–12.iii.1967, 1 alata; May/June, 1968, 2 al. (*C. L. Costa*); PUERTO RICO: Maricao Forest, 10.iii. 1955, 1 aptera, 1 al., Cayey, *Bidens pilosa*, 19.iv.1960, 2 apt. (*C. F. Smith*), B.M. 1960–693; VENEZUELA: Maracay, A.R., *Helianthus annuus*, 24.ix.1964, 2 apt., 1 al. (*M. Cermeli*).

HOST PLANTS. *Bidens pilosa*, *Helianthus annuus* (Helenieae), *Erechtites valerianaefolia* (Senecioneae), all Compositae.

DISTRIBUTION. Puerto Rico, Venezuela, Brazil, Cuba (Müller, 1968 : 439).

Acyrthosiphon (A.) bidentis Eastop, 1953

Acyrthosiphon bidentis Eastop, 1953 : 201–202; 1958 : 19–20.

SPECIMENS STUDIED. MOROCCO: High Atlas, S.W. Imlil El Haj, 'beating bushes', 28.iv.1961, 1 alata; Arend Valley, 'under stones', 29.iv.1961, 1 al. (*P. N. Lawrence*); KENYA: Muguga, *Bidens pilosa*, 1.xi.1952, 1 aptera (holotype), B.M. 1955–756, 1 aptera (paratype); *Sonchus* sp., 11.ix.1953, 6 apt., 3 first instar larvae; 26.xi.1952, 1 al., *Linum grandiflorum*, 22.vii.1953, 16 apt., 4 first instar larvae; *Arachis hypogea*, 13.x.1953, 15 apt., 4 al., 8 first instar larvae; *Torylis africana*, 10.viii.1953, 2 apt.; *Papaver nudicaule*, 8.vii.1953, 1 al., 8.viii.1953, 5 apt.; trap, June 1953, 1 al. (*V. F. E*); 1 vagrant alata, 7.vii.1953 (*B. E. Eastop*); Fort Hall, *Bidens pilosa*, 24.vii. 1952, 1 al. (*F. L. M. Sheffield*); YEMEN: San'a District, February 1938, 1 al. (*H. Scott & E. B. Britton*).

HOST PLANTS. *Bidens pilosa*, *Sonchus* sp. (Compositae), *Linum grandiflorum* (Linaceae), *Arachis hypogea* (Leguminosae), *Torylis africana* (Umbelliferae), *Papaver nudicaule* (Papaveraceae).

DISTRIBUTION. Morocco, Kenya, Yemen.

BIOLOGY. Usually living on the stalks of the inflorescence. Apparently less specific to host species but more specific to the feeding site on the host than many other *Acyrthosiphon*.

NOTES. Very similar to and possibly a synonym of the Southern Russian and Middle Eastern *A. ilka* Mdw. (see p. 44). The single available aptera of *A. ilka* has its siphunculi 17 times as long as their middle diameter and its first antennal segments bear 9 hairs. The siphunculi of *A. bidentis* are usually more slender, 18–22 times as long as their middle diameter in the apterae and the first antennal segments bear 5 to 7 or rarely 8 hairs. *A. astragali* sp. n. (p. 27) also resembles these two species but has a more triangular cauda without a basal constriction.

Acyrthosiphon (A.) brachysiphon Hille Ris Lambers, 1952

Acyrthosiphon brachysiphon Hille Ris Lambers, 1952 : 6—8; 1955 : 4; Heie, 1964 : 225–226; Shaposhnikov, 1964 : 603.

SPECIMENS STUDIED. GREENLAND: Sarqaq, *Vaccinium uliginosum*, 26.vii.1949, 2 apterae (*Chr. Vibe* coll.), D. Hille Ris Lambers leg., B.M. 1963–531.

HOST PLANTS. *Vaccinium uliginosum* (Ericaceae).

DISTRIBUTION. Greenland, Iceland (Prior & Stroyan, 1960 : 271), Sweden (Ossiannilsson, 1959 : 482), Switzerland (Meier, 1958 : 292), Canada, Baffin Is., (Richards, 1963 : 462).

BIOLOGY. According to the original description there are only 3 generations a year in the Arctic, fundatrices in July and apterous males and oviparae in August.

Acyrthosiphon (A.) brevicaudatus Takahashi, 1965

Acyrthosiphon pisi ssp. *brevicaudatus* Takahashi, 1965 : 20–21.

HOST PLANTS. *Pisum* sp., *Trifolium* sp. (Leguminosae).

DISTRIBUTION. Japan, Korea.

NOTES. According to the original description, differing from *pisi* in having a shorter cauda only $\frac{3}{5}$–$\frac{2}{3}$ as long as the siphunculi and only 9 hairs on the first antennal segments.

Acyrthosiphon (A.) brevicornis Hille Ris Lambers, 1960

Acyrthosiphon brevicornis Hille Ris Lambers, 1960 : 1–7.

SPECIMENS STUDIED. SWEDEN: T. Lpm., Abisko, *Dryas* sp., 24.vii.1955, 3 apterae (*F. Ossiannilsson*), B.M. 1956–428; CANADA: Southampton Is., Coral Harbour, *Dryas integrifolia*, 15. VIII. 1959, 1 apt. (*W. R. Richards*), B.M. 1963–621.

HOST PLANTS. *Dryas integrifolia, D. octopetala* (Rosaceae).

DISTRIBUTION. Greenland, Sweden (Ossiannilsson, 1959 : 482); Canada, Southampton Is. (Richards, 1963*c* : 462).

NOTES. The similarity to *A. calvulus* is discussed by Heikinheimo (1968 : 86–88).

Acyrthosiphon (A.) calvulus Ossiannilsson, 1958

Acyrthosiphon calvulus Ossiannilsson, 1958 : 66–68; Heikinheimo, 1968 : 86–88; Pettersson 1968 : 188–189.

HOST PLANT. *Poa arctica* (Gramineae).

DISTRIBUTION. Spitzbergen.

NOTES. Similar to *A. brevicornis*, q.v.

Acyrthosiphon (A.) caraganae (Cholodkovsky, 1907)

Siphonophora pisi (Ktlb.) Bogdanov, 1897 : 25, nec Kaltenbach, 1843, teste Mordwilko, 1914 : 152.
Siphonophora ulmariae (Schrank) Cholodkovsky, 1898 & 1902, nec Schrank, 1801, partim, teste Mordwilko, 1914 : 52.
Siphonophora sp., Mordwilko, 1901 : 297.
Macrosiphum ulmariae (Schrank) Schouteden, 1906 : 240, partim, nec Schrank, 1801.
Siphonophora caraganae Cholodkovsky, 1907 : 87–95.
Macrosiphum caraganae (Cholodkovsky) Cholodkovsky, 1909 : 4–5, 10; Opamis, 1928 : 392–393.
Acyrthosiphon caraganae (Chol.) Mordwilko, 1914 : 152–168; Hille Ris Lambers, 1947 : 222–225; Stroyan, 1950 : 91–92; Meier, 1955 : 292–295; Rupais, 1969 : 264–265.
Acyrthosiphon caraganae ssp. *occidentale* Hille Ris Lambers, 1947 : 225.
Metopolophium caraganae (Chol.) Börner, 1952 : 155.
Metopolophium occidentale (H.R.L.) Börner, 1952 : 155–156.
Acyrthosiphon emeri Hille Ris Lambers m.s., in Stroyan, 1955 : 290.

SPECIMENS STUDIED. CZECHOSLOVAKIA: Prague, *Caragana arborescens*, 2.vi.1964, 7 apterae, 1 alata (*J. Holman, P. Stary, V.F.E.*). ENGLAND: Berks, Reading, *Colutea orientalis*, 8.iv.1961, 4 fundatrices; 3.v.1948, 8 apt. (? second generation); 11.v.1949, 5 apt., 7 al.; 28.v.1966, 2 apt., 3 al.; 2.vi.1955, 5 apt.; 10.vi.1950, 15 apt.; 3.vii.1955, 4 apt., 3 al.; 20.ix.1948, 1 ovipara, 1 apterous ♂. Surrey, Kew, *Colutea arborescens*, 28.iv.1961, 2 apt.; 2–12.v.1961, 12 apt., 2 first instar larvae; 1.vi.1961, 12 apt., 4 al., 28 first instar larvae; 8–12.vi.1961, 6 apt., 7 al.; 17.vi.1963, 1 apt., 1 al.; 5.vi.1967, 3 apt., al., 3 first instar larvae; 18.vii.1963, 5 apt., 13.vii.1963, 2 apt., July 1965, 9 apt., 2 first instar larvae, 7.vii.1967, 4 apt., 1 al; 13–16.viii.1962, 4 apt.; 27.ix.1966, 11 apt.; 24.x.1963, 8 oviparae; October 1964, 2 apterae viviparae, 6 oviparae, 5 apterous ♂♂; 1.xi.1963, 1 apt. ♂. London, Chelsea Physic Gardens, *Colutea* sp., July 1955, 2 apt.; *C. orientalis*, 12.x.1955, 6 apt. viviparae, 1 ovipara. Cambridge, Univ. Bot. Gdn, *Coronilla emerus*, 10.vi.1952, 49 apt., 2 al., 7 first instar larvae; Somerset, Merriot, ? *Colutea* sp., 9.ix.1950, 2 apt., 3 first instar larvae (*V.F.E.*). HUNGARY: Baloton föred, *Colutea arborescens*, 31.v.1965, 5 apt., 3 al., 1 first instar larva (*P. Andrasfavy*). NETHERLANDS: Wageningen arboretum, *Caragana* sp., 21.v.1930, 4 apt. (*D. Hille Ris Lambers*), B.M. 1934–70; *Caragana arborescens*, 26.vi.1952, 6 apt. 2 al.; *C. frutex*, 26.vi.1952, 9 apt. (*D.H.R.L. & V.F.E.*). CANADA: Alberta, Waterton National Park, *Caragana* sp., 1 apt., 3 al. (*G. F. Knowlton*). Manitoba, Winnipeg, *Caragana* sp., 9.vi.1961, 1 apt., *Caragana* sp. in glasshouse, 25.x.1961, 1 al. vivip., 1 ovipara; 31.x.1961, 1 al. ♂ (*A. G. Robinson*).

HOST PLANTS. Woody Papilionaceae, *Anthyllis hermanniae* (Meier, 1958 : 295), *Caragana arborescens*, *C. frutex*, *C. pygmaea* (Meier, 1958 : 295), *C. spinosa* (Szelegiewicz, 1963 : 128), *Colutea arborescens*, *C. media* (Meier, 1958 : 295), *C. orientalis*, *Coronilla emerus*, *Hippocrepis comosa* (Meier, 1958 : 295), all Leguminosae.

DISTRIBUTION. Denmark (Heie, 1961 : 87), England, Finland, Germany, Hungary (Szelegiewicz, 1968 : 88), Netherlands, Norway (Ossiannilsson, 1959 : 55), Poland (Szelegiewicz, 1958 : 83), Crimea (Holman, 1961 : 118), Moscow, Leningrad, Latvia (Rupais, 1961 : 128), Sweden (Wahlgren, 1951 : 69), Switzerland (Meier, 1958 : 292), Mongolia (Szelegiewicz, 1963 : 128), Canada (Richards, 1963 : 254).

BIOLOGY. The fundatrices are adult by early April in the Thames valley and alatae occur from the second week in May to early July. Ossiannilsson (1959 : 482) recorded alatae in Sweden from 30.vi. to 22.vii, but Meier (1959 : 294) found alatae in Switzerland in May, June, August and November on different host plants. Males are apterous in England and the Netherlands and alate in Russia, Switzerland and Eastern Canada, which led Hille Ris Lambers (1947 : 225) to regard the Western European specimens as belonging to a distinct subspecies *occidentale*. As some other aphids also tend to produce apterous males in maritime climates and alate males in continental climates (Eastop, 1954 : 84–86), the different male morphs may be environmentally induced. Chromosomes: 2n = 10 (Robinson & Chen, 1969 : 512).

Acyrthosiphon (A.) catharinae Nevsky, 1928

Acyrthosiphon catharinae Nevsky, 1928 : 185–186, 1929 : 78–81; Mordwilko, 1932 : 240; Hille Ris Lambers, 1966 : 116; Narzikulov & Umarov, 1969 : 188–189.

HOST PLANTS. *Rosa damascena, kokanica, maracandica, webbiana* (Rosaceae).

DISTRIBUTION. Central Asia.

NOTES. Hille Ris Lambers (1953 : 63) had the spring forms of *A.* (*Metopolophium*) *alpinus* H.R.L. When found, *A. catharinae* should be recognizable as, according to the original description, the siphunculi are more than half as long as the body and 3 to 5 times as long as the cauda. The processus terminalis is 3½–5 times as long as the base of the sixth antennal segment and the third antennal segment of the alata bears 10 to 12 rhinaria.

Acyrthosiphon (A.) cyparissiae (Koch) s. lat.

A. cyparissiae exists in two colour forms; specimens with black head, antennae and extremities of appendages are *cyparissiae* s. str. and those with a pale head, antennae and only the very apices of the appendages dark are the form *propinquum*.

Acyrthosiphon (A.) cyparissiae (Koch, 1855) s. str.

Siphonophora cyparissiae Koch, 1855 : 174–175; Passerini, 1863 : 134; 1871 : 294; Ferrari, 1872 : 212; Macchiati, 1883 : 220, 275; del Guercio, 1900 : 164.

Acyrthosiphon cyparissiae (Koch) Mordwilko, 1914 : 188–192; Nevsky, 1929 : 81–82; Hille Ris Lambers, 1947 : 225–229.

Macrosiphum sp., van der Goot, 1915 : 87, teste Hille Ris Lambers, 1947 : 226.

Acyrthosiphon (*Mirotarsus*) *cyparissiae* (Koch) Börner, 1939 : 83; Tuatay & Remaudière, 1965 : 269.

Mirotarsus cyparissiae (Koch) Börner, 1952 : 153.

SPECIMENS STUDIED. FRANCE: Drôme, Susse la Rousse, *Euphorbia cyparissias*, 6.iv.1965, 4 apterae, 6 alatae (*F. Leclant*). NETHERLANDS: Wageningen, *E. esula*, 22.ix.1934, 2 apt. viviparae, 2 oviparae; *E. cyparissias*, August 1939, 1 apt. 2 al. (*D. Hille Ris Lambers*); Grebbe, *E. esula*, 17.vi.1954, 30 apt., 1 al. (*D.H.R.L. & J.P. Doncaster*). YUGOSLAVIA: Doboj, 18.ix.1963, 8 apt. (*N. Tanasijevic*); Wurzen Pass, *Euphorbia* ?, 10.viii.1966, 1 apt. (*V.F.E.*).

Acyrthosiphon (A.) cyparissiae f. ***propinquum*** Mordwilko, 1914

Acyrthosiphon cyparissiae ssp. *propinquum* Mordwilko, 1914 : 193–196.
Acyrthosiphon cyparissiae var. *propinquum* Mordwilko, Hille Ris Lambers, 1947 : 226–227.
Mirotarsus cyparissiae ssp. *propinquua* (Mordwilko) Börner, 1952 : 53.

SPECIMENS STUDIED. NETHERLANDS, Lith, *Euphorbia esula*, September 1929, 2 apt. (*D. Hille Ris Lambers*). YUGOSLAVIA: Doboj, 18.ix.1963, 8 apt. (*N. Tanasijevic*).

The form *propinquum* is more common in warmer situations and times of year. Both mixed colonies and specimens intermediate between the two forms occur, for instance the sample of 16 apterae from Doboj in September contained 8 dark *cyparissiae* s.str. and 8 other specimens, 6 of these were pale *propinquum* but 2 had the head and appendages a little darker.

HOST PLANTS. *Euphorbia cyparissias, E. esula, E. seguierana* (=*gerardiana*), Euphorbiaceae.

DISTRIBUTION. Bulgaria (Tashev, 1964 : 183), Czechoslovakia, France, Germany, Hungary, Italy, Netherlands, Poland, Switzerland, Crimea (Holman, 1961 : 118), Bessarabia, European Russia and central Asia, Turkey.

BIOLOGY. Living on the upper sides of higher leaves. Sexuales in the last week of September in the Netherlands (Hille Ris Lambers, 1947 : 228).

NOTES. Because the first tarsal segments bear 5–7 hairs where most other members of *Acyrthosiphon* bear only 3 hairs, Börner, 1939, proposed a new subgenus *Mirotarsus* for *cyparissiae* and used it as a full genus in 1952. Hille Ris Lambers, 1947 : 229, pointed out that *A. cyparissiae* is similar to other *Euphorbia*-feeding species which have only 3 hairs on the first tarsal segments, and did not accept *Mirotarsus* as even subgenerically distinct. There are a few other *Acyrthosiphon* species with five hairs on the first tarsal segments belonging to different species-groups. British records of *cyparissiae* apply to other species. *A. cyparissiae* is one of a number of *Euphorbia*-feeding aphids which appear to be widespread in Continental Europe, the host plants of which occur in Britain although the aphids have never been found here. Del Guercio (1913 : 94) described a variety *cucurbitae* from sugar, cucumbers and melons in Italy. It is unlikely that a variety of *cyparissiae* would live on this range of host plants. *A. vasilijevi* was described from *Cucurbita* (p. 71).

Acyrthosiphon (A.) cyparissiae turkestanicum Nevsky

HOST PLANT. *Euphorbia virgata.*

DISTRIBUTION. Kazakstan.

NOTES. Listed from *Euphorbia virgata* in Kazakstan by Nevsky, 1951 : 47 and by Narzikulov & Umarov, 1969 : 178. A formal description has not been seen.

Acyrthosiphon (A.) dauricum Szelegiewicz, 1963

Acyrthosiphon dauricum Szelegiewicz, 1963 : 129–131; 1964 : 214.

HOST PLANT. Possibly *Saussurea salicifolia* (Compositae) but see Szelegiewicz, 1964 : 214.

DISTRIBUTION. Mongolia.

Acyrthosiphon (A.) emeljanovi Mordwilko, 1914

Acyrthosiphon emeljanovi Mordwilko, 1914 : 171–173; 1915 : 11.

HOST PLANT. Unknown.

DISTRIBUTION. Eastern Siberia.

NOTES. Described from one aptera, with incomplete antennae. The dark distal halves of the siphunculi should assist recognition when it is refound. The proportions of body, siphunculi, cauda and antennae are reminiscent of small specimens of the *pisum* group but the thick cauda bearing 14 hairs should distinguish it. Mordwilko's account (1914) of *Acyrthosiphon* is arranged systematically and *emeljanovi* is placed between *caraganae* and *gossypii*. Similar to *genistae*.

Acyrthosiphon (A.) ericetorum Hille Ris Lambers, 1959

Acyrthosiphon ericetorum Hille Ris Lambers, 1959 : 271–273.

SPECIMENS STUDIED. NETHERLANDS: Oirschot, *Genista anglica*, 9.x.1952, 4 oviparae (*D. Hille Ris Lambers & L. Verhoeven*), B.M. 1963–531. (cotypes).

HOST PLANTS. *Genista anglica* (Leguminosae).

DISTRIBUTION. Netherlands.

NOTES. Described from sexuales only but included in the key to apterae viviparae as the oviparae of *Acyrthosiphon* are similar to the viviparae in many respects.

Acyrthosiphon (A.) euphorbiae euphorbiae Börner, 1940

Acyrthosiphon euphorbiae Börner, 1940 : 4; Hille Ris Lambers, 1947 : 229–231; Narzikulov & Umarov, 1969 : 175–176.

HOST PLANTS. *Euphorbia esula*, *E. palustrae* (original description), *E. platyphylos* (Tuatay & Remaudière, 1965 : 269).

DISTRIBUTION. Czechoslovakia (Pintera, 1957 : 513), Germany (original description), France (Remaudière, 1954 : 235), Sardinia, Turkey, (Tuatay & Remaudière, 1965 : 269), Bulgaria (Tashev, 1964 : 182), Hungary (Szelegiewicz, 1968 : 89). The specimens recorded from Bulgaria (Tashev, 1961 : 158) on *Euphorbia platyphyllos* were later (Tashev, 1962 : 419–422) described as a new species, *A. thracicus*.

NOTES. There is doubt about both the host plant range and geographical distribution of *A. euphorbiae*. According to Tashev, 1962 : 421, there is yet another Southern European member of this group, undescribed but listed as *A. euphorbinus* Hille Ris Lambers.

Acyrthosiphon (A.) euphorbiae neerlandicum Hille Ris Lambers, 1947

Acyrthosiphon euphorbiae ssp. *neerlandicum* Hille Ris Lambers, 1947 : 231.

SPECIMENS STUDIED. NETHERLANDS: Grebbe, *Euphorbia esula*, 8.vii.1961, 4 apterae (*D. Hille Ris Lambers*), B.M. 1963–531. NORWAY: Oslo bot. trädg., *E. polychroma*, 25.vii.1960, 2 apt. (*F. Ossiannilsson*).

BIOLOGY. Living in small colonies on the upper sides of the leaves (Hille Ris Lambers, 1947 : 230).

NOTES. Two Norwegian specimens are somewhat intermediate between the German material of *euphorbiae* and the Dutch specimens of *neerlandicum*.

Acyrthosiphon (A.) evodiae (Takahashi, 1929)

Macrosiphon evodiae Takahashi, 1929 : 92–93; 1931 : 60; Shinji, 1941 : 835.
Acyrthosiphon evodiae (Takahashi) Tao, 1963 : 190.

HOST PLANT. *Evodia triphylla* (Rutaceae).

DISTRIBUTION. Taiwan.

NOTES. When refound, it should be easily recognized. The siphunculi are described as being brown on the basal half, black on the distal half and $\frac{2}{7}$ as long as the body but only $1\frac{1}{5}$–$1\frac{1}{3}$ as long as the elongate yellow cauda, which bears 14 hairs. The antennae and legs are black and the processus terminalis is 4 times as long as the base of the sixth antennal segment.

Acyrthosiphon (A.) fragariaevescae Nevsky, 1951

Acyrthosiphon fragariaevescae Nevsky, 1951 : 47–48.
Acyrthosiphon vescae Nevsky, Narzikulov & Umarov, 1969 : 172.

HOST PLANT. *Fragaria vesca* (Rosaceae).

DISTRIBUTION. Kazakhstan.

NOTES. Much of the description fits a small member of the *pelargonii* group but the base of the sixth antennal segment is 210–220μ long, longer than any known member of that group.

Acyrthosiphon (A.) genistae Mordwilko, 1914

Acyrthosiphon genistae Mordwilko, 1914 : 144–147; 1928 : 191; Shaposhnikov, 1964 : 603.
Acyrthosiphon spartii ssp. *genistae* Mordwilko, Börner, 1952 : 153, 257.

HOST PLANT. *Genista tinctoria* (Leguminosae).

DISTRIBUTION. European Russia.

NOTES. Regarded as a synonym of *pisum* by Meier (1958 : 308) but it seems that while *pisum* feeds on *Genista* in Switzerland, a distinct species with dark siphunculi and fewer hairs on the first antennal segments lives on *Genista* in Russia (Shaposhnikov, 1964 : 603). *A. emeljanovi* Mdw. described from a single damaged aptera from Eastern Siberia is similar.

Acyrthosiphon (A.) ghanii sp. n.

(Text-fig. 3)

Apterae viviparae. Described from 7 specimens with body length 2–2$\frac{2}{5}$ mm. Macerated specimens mostly pale. The distal apices of antennal segments III, IV and V, the area around the primary rhinarium and the distal part of the processus terminalis of VI, the very apices of the tibiae and the tarsi are dusky or dark. The very apices of the femora are also sometimes dusky. The lateral abdominal sclerites of segments 2–5 are dusky, those of segments 2–4 are circular and that on 5 constituting the crescent-shaped ante-siphuncular sclerite. Antennal tubercles only weakly developed for an *Acyrthosiphon*. Antennae about equal in length to the body or a little shorter. Body 4–4$\frac{3}{5}$ as long as the siphunculi. Processus terminalis 2$\frac{1}{2}$–3$\frac{1}{2}$ times as long as the base of the sixth antennal segment. Third antennal segment bearing 4–11 medium-sized rhinaria extending in a row over the distal $\frac{1}{3}$–$\frac{9}{10}$. First antennal segments bearing 6–9 hairs. Longest hairs on third antennal segment 14–18μ long, from nearly $\frac{1}{2}$ to $\frac{2}{3}$ as long as the basal diameter of the segment. Posterior dorsal cephalic hairs similar to the hairs on the third antennal segment. Ultimate rostral segment reaching to or just past the mid coxae, 120–140μ long, $\frac{2}{3}$–$\frac{4}{5}$ as long as the second segment of the hind tarsi and bearing 9–11 accessory hairs. First tarsal segments bearing 3 hairs. The longest hairs on the (posterior margin of) hind femur are 22–28μ long. Dorsal abdominal hairs of the anterior tergites are 13–15μ long and the 4 to 6 hairs on the eighth tergite are up to 26 to 33μ long. Sub-genital plate bearing 2–7 hairs on the anterior half and a row of 9–13 along the posterior margin. Siphunculi imbricated over their whole length, 1$\frac{3}{4}$ to twice as long as the cauda, which bears 8–10 long, fine-pointed hairs.

Alatae viviparae. Described from 2 specimens with body length 2–2$\frac{1}{5}$ mm. Head, thorax, antennal segments I, II, III except for the very base, distal parts of IV and V, distal half of the base of VI and the processus terminalis dark. Lateral abdominal sclerites, including the ante-siphuncular sclerite, dusky. Lateral abdominal sclerites 2–4 with an evidently darker imbricated central area. Antennae a little longer than the body, the processus terminalis 3–3$\frac{1}{2}$ times as long as the base of the sixth antennal segment. Third antennal segment bearing 11–16 rhinaria, IV without rhinaria. Longest hair on the third antennal segment 15μ, $\frac{3}{5}$ as long as the basal diameter of the segment. Ultimate rostral segment 120–130μ long, $\frac{7}{10}$–$\frac{3}{4}$ as long as the second segment of the hind tarsus and bearing about 9 accessory hairs. First tarsal segments bearing 3 hairs, the lateral hairs (31μ long) about twice as long as the 'sense peg' (15μ). Wing venation normal for *Acyrthosiphon*, media of the fore wing twice branched and the hind wing with two oblique veins. Eighth abdominal tergite bearing 4 or 5 hairs about 31μ long. Cauda bearing 9 or 10 long, fine-pointed hairs.

Specimens studied. Holotype aptera vivipara, Pakistan: Mingora, *Sonchus oleraceus*, 9.iii.1963 (*M. A. Ghani*), aphid reg. 35/1964.

Paratypes, 6 apterae viviparae and two alatae viviparae with the same data as the holotype.

Host plant. *Sonchus oleraceus* (Compositae).

Distribution. Pakistan.

Table 2: Measurements of Acyrthosiphon ghanii sp. n. in mm.

	Body length	siphunculi	cauda	Antennal segments				ultimate rostral segment	second segment of hind tarsus	rhinaria on third antennal segment	No. of hairs on		
				III	IV	V	VI				ultimate rostral segment	eighth abdominal tergite	cauda
1.	2.13	.50	.28	.56	.37	.35	.18+.61	.13	.18	6	10	5	10
		.48		.56	.38	.34	.20+.59		.18	8			
2.	2.37	.56	.30	.66	.43	.40	.21+.65	.14	.19	11	9	5	?8
		.54		.67	.43	.40	.20+.69		.18	8			
3.	2.14	.46	.26	.51	.31	.30	.18+.49	.12	.16	4	9	6	9
		.47		.52	.30	.30	.19+.49		.17	4			
4.	2.01	.49	.29	.55	.33	.31	.19+.64	.13	.18	6	11	4	10
		.50		.56	.35	.36	.20+.60		-	6			
5.	2.11	.49	.27	.57	.35	.36	.21+.60	.12	.18	6	10	5	9
		.49		.56	.34	.38	.20+.63		-	4			
6.	2.16	.44	.26	.66	.46	.36	-	.13	.18	11	?9	5	9
		.44		.60	.44	.38	.20+.64		.18	15			
7.	2.05	.45	.27	.62	.44	.43	.20+.68	.12	-	16	?8	4	10
		.46		.64	.46	.42	.20+.68		.18	15			

1 (type) - 5, apterae viviparae, 6 & 7 alatae viviparae, Pakistan, Mingora,

Sonchus oleraceus, 9.ii.1963, M.A. Ghani

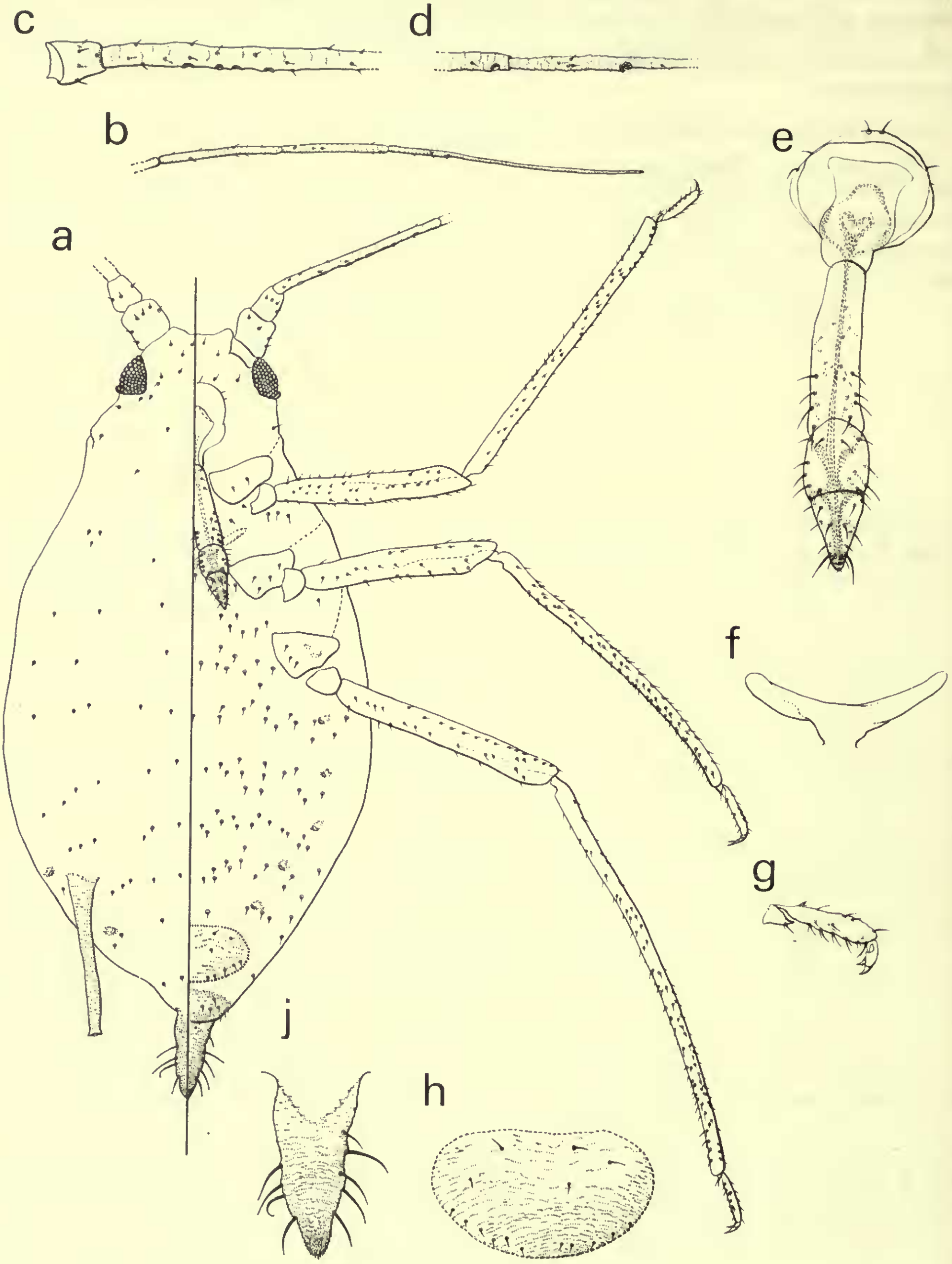

FIG. 3. *Acyrthosiphon ghanii*, aptera, a, body; b, antennal segments IV–VI; c, antennal segment II and base III; d, apex of antennal V and base VI; e, rostrum; f, mid-thoracic furca; g, hind tarsus, h, sub-genital plate; j, cauda. a–& b ×40, c–j ×80.

Acyrthosiphon (A.) gossypii Mordwilko, 1914

(Text-fig. 4)

Acyrthosiphon gossypii ssp. *gossypii* Mordwilko, 1914 : 173–178, addenda 7–8.
Acyrthosiphon gossypii ssp. *paczoskii* Mordwilko, 1914 : 178–180, addenda 8.
Acyrthosiphon dubium Mordwilko, 1914 : 180–181; 1928 : 192.
?*Acyrthosiphon skrjabini* Mordwilko, 1914 : 181–183; 1928 : 192; Narzukulov & Umarov, 1969 : 174–175.
Acyrthosiphon gossypii Mordwilko, Nevsky, 1929 : 83–85; Szelegiewicz, 1963 : 57; Swirski, 1963 : 21; Narzukulov & Umarov, 1969 : 181–186.
?*Macrocaudus phaseoli* Shinji, 1930 : 79–80; 1941 : 791–792.
?*Acyrthosiphon gossypicola* Shinji, 1936 : 148.
Tenuisiphon gossypii (Mordwilko) Mordwilko, 1948 : 215.
?*Tenuisiphon skrjabini* (Mordwilko) Mordwilko, 1948 : 215.
Acyrthosiphon (*Tenuisiphon*) *gossypii* Mordwilko; Shaposhnikov, 1964 : 603.
Acyrthosiphon sesbaniae Kanakaraj David, 1956*a* : 7–9.
Acyrthosiphon sp. Kanakaraj David, 1956*b* : 105.

SPECIMENS STUDIED. EGYPT: Giza, *Vigna unguiculata*, 27.vii.1944, 1 alata (*E. E. Chamberlain* coll.), W. Cottier leg.; Cairo, *Vicia faba*, April 1964, 1 al. (*E. A. El-Kady*); Avou Zaaval, *Vigna* ? *sinensis*, 5.vii.1965, Min. Agric., 3 apt. IRAN: Shiraz, Faza, cotton, 22.xi.1960; 2 apt. viviparae, 1 al. vivip., 3 oviparae, 2 al. ♂♂ (*E. S. Brown*). IRAQ: Baghdad, Karradab, *Vigna sinensis*, i.x.1920, 1 apt.; no colln. data, 1 apt., 1 al. (*A. A. Hussein*); Abu-Ghraib, *Vicia faba*, 8.xii.1962, 9 apt., 1 al.; *Phaseolus mungo*, 15.x.1962, 3 apt., Al Doori. TURKEY: Nazilli, cotton, 2.viii.1967, 2 apt., F.A.O. ADEN: Giat, Abyan, *Vigna* ? *sinensis*, 4.xi.1959, 2 apt., 1 al. (*J. H. Proctor*). SUDAN: Darmali, *Vigna* ? *sinensis*, 22.xi.1918, 5 apt. (*M. W. Bedford*); Nuri, *Vigna catjung*, 21.i.1939, 6 apt. Gureir, 'Egyptian beans', 6.ii.1939, 8 apt., *Vicia faba*, 6.ii.1939, 4 apt., *Dolichos lablab*, 7.iii.1939, 2 apt. (*J. W. Cowland*); Khartoum, 'fasulia bean' (? *Phaseolus* sp.), 31.iv.1934, 1 apt., 5 al. (*H. W. Bedford*); *Vicia faba*, 1959, 4 apt., 4 al. (*A. Khalifa*). INDIA: without further locality, *Sesbania grandiflora*, no date, 3 apt. (*Krishnamurti*). SIKKIM: Mramsha, *Peganum harmala*, 23.iii.1920, 5 apt. (one parasitized) 1 al. (*H. Stevens*).

HOST PLANTS. *Gossypium* sp., *Malva neglecta* (Malvaceae), *Dolichos lablab*, *Phaseolus mungo*, *Sesbania grandiflora*, *Vicia faba*, *Vigna catjung*, *V. sinensis*, *V. ungiuculata* (Leguminosae), *Lepidium perfoliata* (Cruciferae), *Perganum harmala*, (Zygophyllaceae).

DISTRIBUTION. Turkey, India, Sikkim, Israel, Egypt, Sudan, Algeria (Remaudière 1958 : 149), Turkestan, Iraq (Szelegiewicz, 1963 : 57), ? Japan & Korea.

NOTES. As specimens from *Gossypium* tend to have a relatively longer cauda than specimens from Leguminosae, *sesbaniae* may be at least subspecifically distinct. No positive transfer records between Leguminosae and Malvaceae are known but Kanakaraj David (1956) could not transfer specimens from *Sesbania grandiflora* to *S. speciosa*, *Medicago sativa* or *Vigna catjung*. The aphid may exist in a number of populations with individual host plant preferences.

Acyrthosiphon gossypicola is not included in either Shinji's (1941) book on Japanese

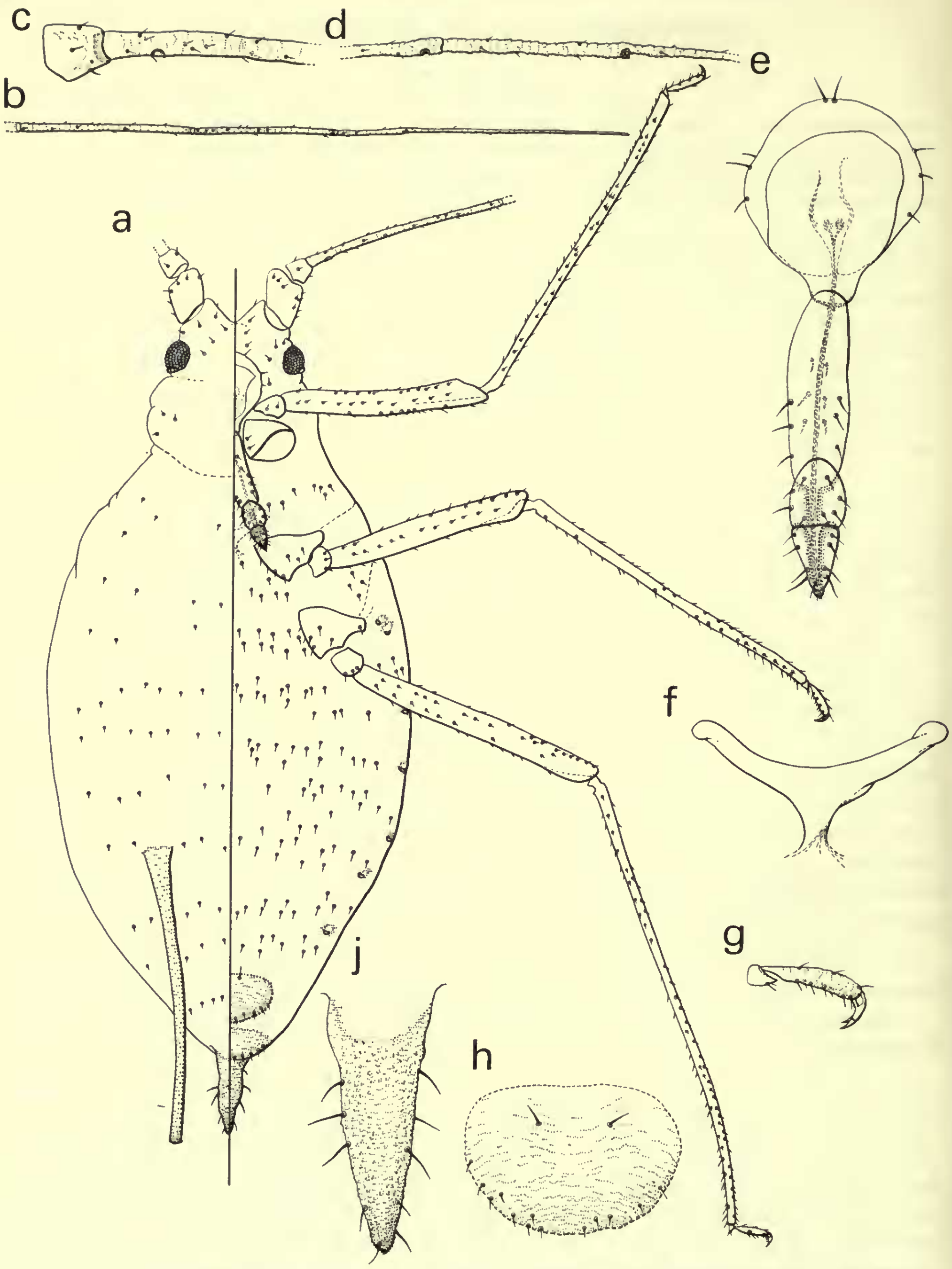

FIG. 4. *Acyrthosiphon gossypii*, aptera, a, body; b, antennal, segments IV–VI; c, antennal segment II and base III; d, apex of antennal V and base VI; e, rostrum; f, mid-thoracic furca; g, hind tarsus; h, sub-genital plate; j, cauda. a & b, ×40, c–j ×80.

aphids or in Paik's (1965) book on Korean aphids. It may be a synonym of *A. gossypii* Mordwilko. Dr M. Miyazaki has kindly provided the following English translation of the original description:—

> '*Acyrthosiphon gossypicola* Shinji, n. sp. This species closely resembles *Acyrth. pisi* in various characters but differs therefrom by the following points:—
>
> (1) The aptera of this species is reddish brown in life, whereas *pisi* is green or pale green in life. The colouration is lost in the specimens preserved in alcohol.
>
> (2) The aptera of either species has 2 rhinaria on the 3rd antennal segment, but in the alatae the number and location of the rhinaria are different: i.e. in this species 7–9 rhinaria are distributed on the basal half of the third antennal segment, whereas in *pisi* 10–18 rhinaria are distributed on the basal $\frac{3}{4}$ to the whole length of that segment.
>
> (3) In this species the length of the 3rd–6th antennal segments is in the proportions of 6: 4: 3, whereas in *pisi* these segments are about equal in length or in the proportions of 20: 18: 17.

HOST PLANT. *Gossypium herbaceum* L.

TYPE LOCALITY. Moppo, Korea.

Macrocaudus phaseoli Shinji, 1930, was described from *Phaseolus mungo* var. *subtrilobata*, in Japan. Although Shinji (1941 : 792–796) described what appears to be a *Macrosiphum* as *Macrocaudus clematii*, his original description of *phaseoli*, the type-species of *Macrocaudus* Shinji, 1930, appears to be of an *Acyrthosiphon*. According to the original description, *phaseoli* could be easily recognized when refound, as the aptera has a body length of 2·4 mm, the siphunculi and cauda are about equal in length, about one quarter as long as the body, the base of the sixth antennal segment is 280μ long and the processus terminalis is 4 times as long as the base. The illustration in the original description does not show the long antennal hairs figured in the 1941 : 791 illustration. The photomicrograph (1941 : 791) is of a specimen with only a single siphunculus. *Macrocaudus phaseoli* cannot be *Macrosiphum euphorbiae* without its siphuncular apex as the base of the sixth antennal segment is too long for *euphorbiae* and most other *Macrosiphum* species. The photomicrograph of *phaseoli* suggests that the cauda may be only $\frac{1}{6}$–$\frac{1}{5}$ as long as the body. As the siphunculi of *Acyrthosiphon gossypii* are fragile and are often broken in specimens received for identification it is possible that *Macrocaudus phaseoli* was described from a damaged aptera of *Acyrthosiphon gossypii*. *Phaseolus* is not a usual host for *A. pisum* but it is for *A. gossypii*. Dr M. Miyazaki kindly provided a photo-copy of the original description of *Macrocaudus*.

Acyrthosiphon (A.) hissarica Umarov, 1966

Acyrthosiphon hissarica Umarov, 1966 : 87–88; Narzikulov, 1968 : 20.
Acyrthosiphon (*Metopolophium*) *hissarica* Umarov; Narzikulov & Umarov, 1969 : 163–164.

HOST PLANT. *Cicer soongoricus* (Leguminosae).

DISTRIBUTION. Tadzhikistan.

NOTES. Probably belonging to concept of *Acyrthosiphon* s. str. in the sense of Hille Ris Lambers, 1947.

Acyrthosiphon (A.) ignotus Mordwilko, 1914

(Text-fig. 5)

Acyrthosiphon ignotum Mordwilko, 1914 : 147–149; 1928 : 191; Shaposhnikov, 1964 : 603; Rupais, 1969 : 263.
Metopolophium ignotum (Mordwilko) Börner, 1952 : 56.
Acyrthosiphon spiraeae Rupais, 1961 : 128–129, teste Rupais, 1969 : 358.

SPECIMENS STUDIED. GERMANY: Göttingen Park, *Spiraea vanhoutteni*, 1.vii.1968, 24 apterae (*H. G. W. Gleiss*). NETHERLANDS: Bennekom, *Spiraea thunbergii*, 20.viii.1966, 1 apt. (*D. Hille Ris Lambers & V.F.E.*). SWEDEN: Vrm. Arvika, *S. salicifolia*, 10.vii.1954, 2 apt.; Upl. Stockholm, Berg. tradg., *Sibiraea laevigata*, 19.vii.1958, 6 apt. (*F. Ossiannilsson*).

HOST PLANTS. *Sibiraea laevigata, Spiraea alba, S.* x *arguta, S. bella, S. chamaedrifolia, S. cinerea, S. hypericifolia, S. latifolia, S. media, S. nipponica, S. obovata* x *semperflorens, S. trichocarpa, S.* x *vanhoutteri* (Rosaceae).

DISTRIBUTION. Denmark, Germany (Müller, 1961 : 69), Netherlands, Norway, Sweden (Ossiannilsson, 1969 : 56), U.S.S.R. (Leningrad), Latvia, Mongolia (Szelegiewicz, 1963 : 131).

NOTES. The aphid recorded as *ignotus* from *Sophora alopecuroides* (Leguminosae) in Kazakhstan by Nevsky (1951 : 47) is described as *Acyrthosiphon* (*Metopolophium*) *sophorae* Narzikulov & Umarov, 1969.

Acyrthosiphon (A.) ilka Mordwilko, 1914

Acyrthosiphon ilka Mordwilko, 1914 : 149–152; 1929 : 49.
Aulacorthum ilka (Mordwilko) Börner, 1952 : 155.
Acyrthosiphon (*Metopolophium*) *ilka* Mordwilko; Narzikulov & Umarov, 1969 : 166–169.

SPECIMEN STUDIED. IRAN: Lalekar, 3,100 m.a.m.s.l., *Papaver somniferum*, 26.vi.1955, 1 aptera (*G. Remaudière*).

HOST PLANTS. *Papaver nudicaule, P. somniferum, Glaucium* sp. (Papaveraceae).

DISTRIBUTION. France, Greece, Turkey (Tuatay & Remaudière, 1965 : 269), Southern Siberia, Oblast, Zabaykalsk.

NOTES. The siphunculi in the original description (aptera of body length 2·7 mm) are figured as being 12–14 times as long as their middle diameter. An aptera (body length 2·5 mm) kindly presented by Dr Remaudière from Iran has the siphunculi 17 times as long as their middle diameter. *A. bidentis* (page 31) described from East Africa has the siphunculi of large apterae (body length 2·6–2·8 mm) 18–22 times as long as their middle diameter. Small East African apterae (body length 1·5–1·6 mm) have the siphunculi only 13–15 times as long as their middle diameter. East African, Yemeni and Moroccan *bidentis* bear 5–8 hairs on the first antennal segments while the single specimen of *ilka* from Iran bears 9 hairs on each first antennal segment. The taxonomic status of *bidentis* and *ilka* is unlikely to be resolved until more material from different places, times of year and host plants is available.

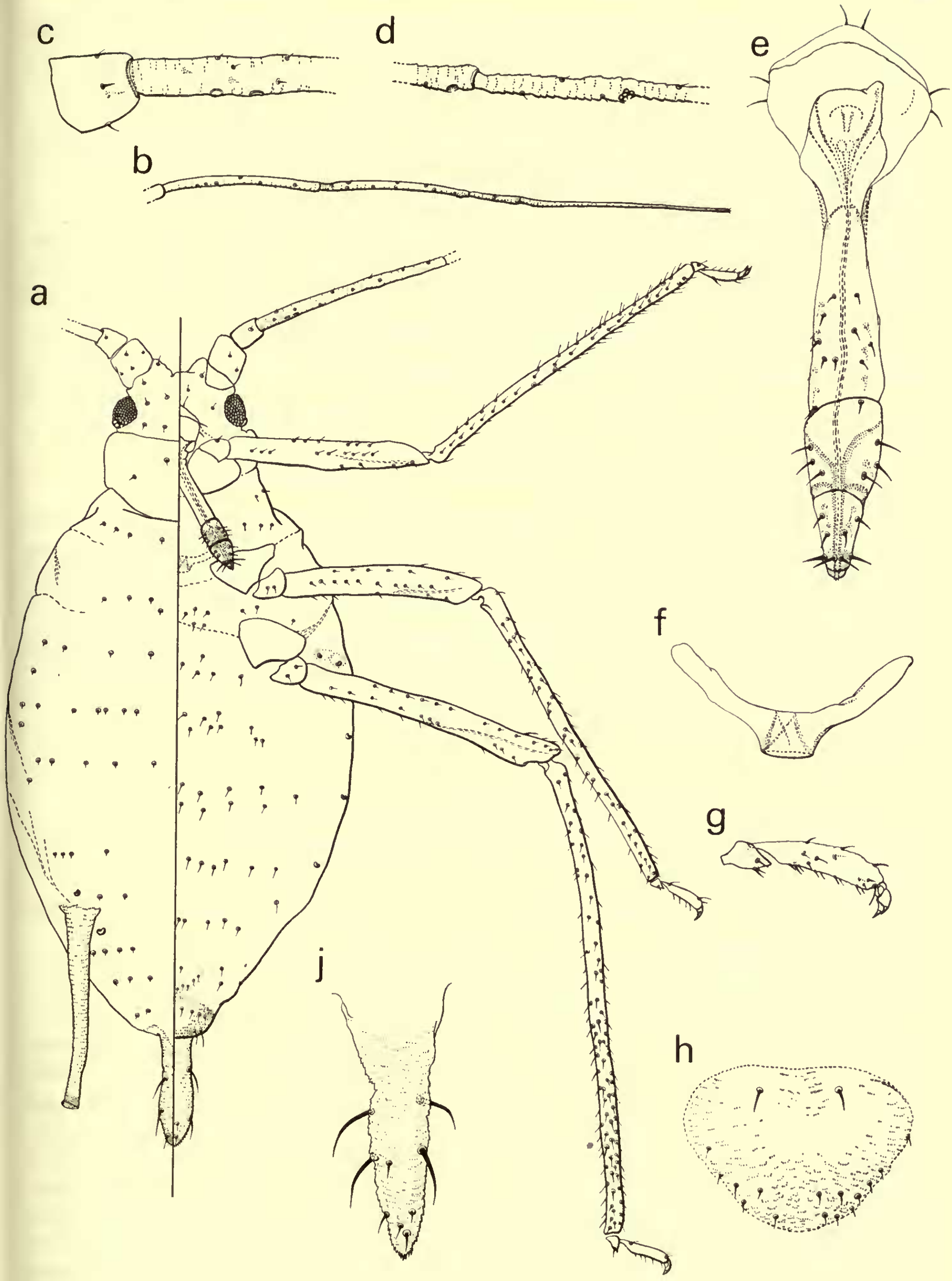

FIG. 5. *Acyrthosiphon ignotus*, aptera, a, body; b, antennal segments IV—VI; c, antennal segment II & base III; d, apex of antennal V and base of VI; e, rostrum; f, mid-thoracic furca; g, hind tarsus; h, sub-genital plate; j, cauda. a & b, ×55, c–j ×110.

Acyrthosiphon (A.) knechteli (Börner, 1950)

Metopolophium knechteli Börner, 1950 : 13; 1952 : 576.
Acyrthosiphon knechteli (Börner) Meier, 1958 : 292; Shaposhnikov, 1964 : 603.

SPECIMEN STUDIED. SWEDEN: Vstm., Medäker, Näverkärret, *Vaccinium uliginosum*, 4.vii.1954, 1 apt. (*F. Ossiannilsson*).

HOST PLANT. *Vaccinium uliginosum* (Ericaceae).

DISTRIBUTION. Germany, Poland (Szelegiewicz, 1965 : 39), Sweden, Switzerland.

Acyrthosiphon (A.) kondoi Shinji, 1929

Acyrthosiphon kondoi Shinji, 1938 : 65; Takahashi, 1965 : 19–20.

SPECIMEN STUDIED. KOREA: Suwon, clover, 10.vi.1959, 1 apt. (*W. H. Paik*).

HOST PLANTS. *Medicago sativa, Trifolium* sp. (Leguminosae).

DISTRIBUTION. Japan, Korea.

NOTES. Some at least of the Oriental records of *A. pisum* are based on *Aulacorthum solani* (Kltb.). Tao, 1963 : 179, had probably not seen genuine *kondoi* when he placed it as a synonym of *Aulacorthum solani*. Takahashi, 1965 : 19–20, redescribes *kondoi* as a valid species of *Acyrthosiphon*. *A. kondoi* is similar to *A. astragali* sp. n. (p. 27) but the eighth abdominal tergite of *astragali* bears hairs 35–45μ long while those on the eighth tergite of *kondoi* are only 15–20μ long. The processus terminalis of *kondoi* is $4\frac{3}{4}$–6 times as long as the base of the sixth antennal segment and only $3\frac{1}{3}$–$4\frac{1}{5}$ times as long in *astragali*.

Acyrthosiphon (A.) loti (Theobald, 1913)

Macrosiphum loti Theobald, 1913*a* : 384; 1913*b* : 139–140; 1926 : 133–135.
Acyrthosiphon loti (Theobald) Mordwilko, 1914 : 185–188; Hille Ris Lambers, 1947 : 231–233; Meier, 1958 : 269–300.
Acyrthosiphon geranicola Hille Ris Lambers, 1935 : 114–115 partim, teste Hille Ris Lambers, 1947 : 231.
Acyrthosiphon anthyllidis Börner, 1950 : 13, teste Meier, 1958 : 296.
Metopolophium gracilipes Börner, 1950 : 13, teste Hille Ris Lambers, 1966 : 103.
Acyrthosiphon loti ssp. *anthyllidis* Börner; Remaudière, 1959 : 37.

SPECIMENS STUDIED. CHANNEL IS.: Guernsey, 15.v.1966, 2 al. (*R. H. LePelley*); Vazon Bay, 3.vi.1951, 1 apt., *Lotus augustifolius*, 6.vi.1951, 1 apt., 1 al.; Sark, *Lotus* sp., 14.vi.1951, 2 al. (*B. E. Eastop*). ENGLAND: Surrey, Kew Gdns, *Lotus corniculatus*, 24.ix.1960, 1 apt.; 3.x.1962, 1 apt.; *L. hispidus*, 24.ix.1960, 4 apt.; 3.x.1962, 1 apt.; Oxon., Chalgrove, *L. corniculatus*, 29.v.1949, 4 apt. (*V.F.E.*); Suffolk, Walberswick, *L. corniculatus*, 20.vi.1951, 4 apt., 1 al. (*J. P. Doncaster*); Cumberland, Gt. Salkeld, *L. corniculatus*, 14.vi.1912, 1 apt., 1 al. (both labelled type) (*F. V. Theobald*), B.M. 1930–204. NETHERLANDS: Wageningen, *Lotus* sp., 26.vi.1952, 8 apt., 12., 4 first instar larvae (*D. Hille Ris Lambers & V.F.E.*). SCOTLAND:

Banffshire, Ballindalloch, *L. corniculatus*, 2.vi.1954, 9 apt., 2 al. (*G. D. Morrison*); Sutherland, Bettyhill, *L. corniculatus*, 13.vii.1961, 7 apt.; Ben Hope, *L. corniculatus*, 13.vi.1965, 7 apt.; Edinburgh, trap, 2.vii.1943, 1 al. (*J. P. Doncaster*).

HOST PLANTS. *Anthyllis vulneria, Astragalus alpinus, Dorycnium herbaceum, Hippocrepis comosa, Lathyrus* sp., *Lotus corniculatus, L. hispidus, L. uliginosus, Medicago sativa, Phaca frigida* (Leguminosae). See Meier, 1958 : 300, Ossiannilsson, 1959 : 482 and Tuatay & Remaudière, 1965 : 269, for host plant records.

DISTRIBUTION. Austria, Denmark, England, France, Germany, Netherlands, Norway (Tambs-Lyche, 1968 : 5), Poland (Szelegiewicz, 1966 : 450), Sweden, Switzerland and Turkey (Tuatay & Remaudière, 1964 : 269). See Heie, 1961 : 87.

BIOLOGY. Apterous ♂♂ are described from the Netherlands and alate ♂♂ from Switzerland by Meier, 1958 : 299–300, a similar situation to that with *A. caraganae* (see p. 34).

Acyrthosiphon (A.) macrosiphum (Wilson, 1912)

(Text-fig. 6)

Illinoia macrosiphum Wilson, 1912 : 155–156.
Adactynus macrosiphum (Wilson) Hottes, 1934 : 7–8.
Macrosiphum macrosiphum (Wilson) Gillette & Palmer, 1934 : 188; Hottes, 1949 : 45–47; Palmer, 1952 : 314–315.
Acyrthosiphum macrosiphum (Wilson) Leonard. 1968 : 264.

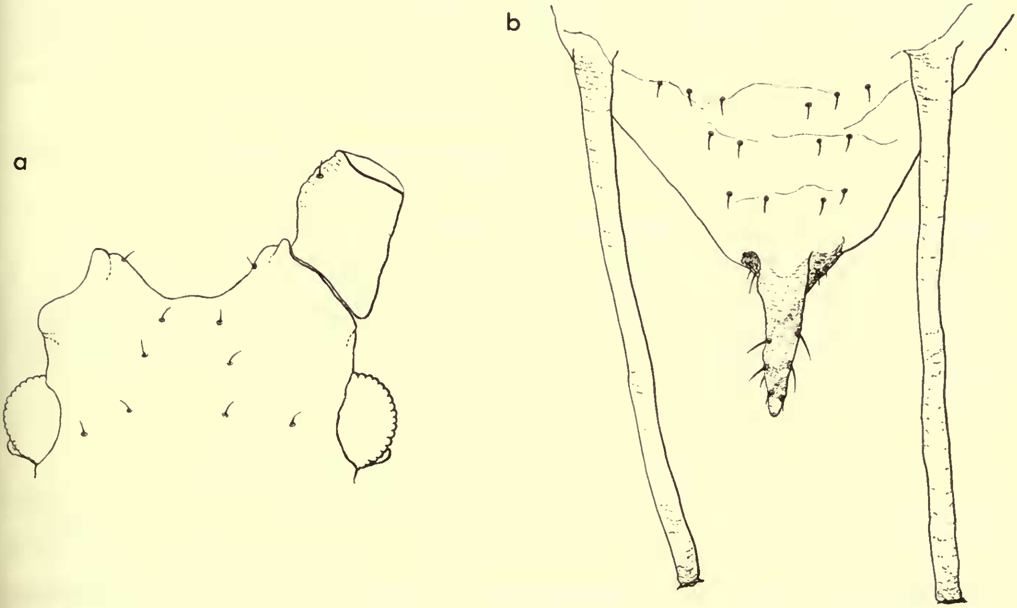

FIG. 6. *Acyrthosiphon macrosiphum*, aptera, a, head; b, apex of abdomen. a × 110, b × 55.

SPECIMENS STUDIED. U.S.A., California, Big Bearlake, *Amelanchier alnifolia*, 21.vii.1940, 3 apt., 1 al. (*R. C. Dickson*); Colorado, Mesa, *Amelanchier* sp., 30.vi.1932, 2 apt., 1 al. (*F. C. Hottes*); Grand Mesa, *A. alnifolia*, 14.ix.1956, 1 apt. vivipara, 2 oviparae, 1 al. ♂ (*F.C.H. & D. Hille Ris Lambers*).

HOST PLANTS. *Amelanchier alnifolia* (Rosaceae). *Sambucus canadensis* (Caprifoliaceae) has also been listed as a host but specimens have not been seen from that plant.

DISTRIBUTION. U.S.A., California, Colorado, Oregon, Utah.

BIOLOGY. Oviparae were found on *Amelanchier* and 'what we supposed to be the (alate) males of this species were collected on wild rose bushes under *Amelanchier alnifolia*', Wilson (1912 : 156).

Acyrthosiphon (A.) moltshanovi Nevsky, 1928

Acyrthosiphon moltshanovi Mordwilko, 1914 : 183–185.
Acyrthosiphon (*Melopolophium*) *moltshanovi* Mordwilko; Narzikulov & Umarov, 1969 : 171.

SPECIMENS STUDIED. INDIA: Keylong, lettuce, 2.ix.1968, 1 apt., 1 larva (*S.S.S. & Khon* coll.), ex S. Kanakaraj David colln, in D. Hille Ris Lambers' collection. PAKISTAN: Bahrain, *Euphorbia helioscopia*, 17.iii.1963, 1 apt., C.I.B.C.

HOST PLANTS. Not known to Mordwilko, 1914 : 183, and the normal host is still uncertain. Some plants in the genera *Lactuca*, *Sonchus* and *Euphorbia* with shiny leaves are often confused and during the dry season in the tropics aphids may exist in small colonies on plants only distantly related to their normal hosts.

DISTRIBUTION. Tadzhikistan, Pakistan, India.

Acyrthosiphon (A.) mordwilkoi Nevsky, 1928

Acyrthosiphon mordwilkoi Nevsky, 1928 : 186; 1929 : 85–86; Narzukulov & Umarov, 1969 : 171.

HOST PLANT. *Linum usitatissimum* (Linaceae).

DISTRIBUTION. Central Asia, Mt. Aslanbob, 2,000 m.a.m.s.l.

NOTES. According to the original description, the siphunculi are about 13 times as long as their middle diameter and 1⅔ to twice as long as the cauda. The processus terminalis is about 4½ times as long as the base of the sixth antennal segment and a little longer than the third antennal segment and the siphunculi.

Acyrthosiphon (A.) navozovi Mordwilko, 1914

Acyrthosiphon navozovi Mordwilko, 1914 : 196–198, 1915 : 11.
Hottesina navozovi (Mordwilko) Börner, 1952 : 151.

HOST PLANT. Described from a single alata collected on an undetermined member of the Umbelliferae.

Distribution. Oblast.

Notes. Suspected of being one of the species with dark appendages that are associated with Umbelliferae and regarded as a distinct genus, *Hottesina* Börner, 1950, by Börner, 1950 : 13. See *A. nigripes* (p. 49).

Acyrthosiphon* (*A.*) *nigripes nigripes Hille Ris Lambers, 1935

Acyrthosiphon nigripes Hille Ris Lambers, 1935 : 57; 1947 : 246–247.
Hottesina superba Börner, 1950 : 13.
Hottesina nigripes (Hille Ris Lambers) Börner, 1952 : 151.

Specimen studied. Switzerland: San Salvatore, *Laserpitium siler* 28.ix.1957, 1 aptera (*W. Meier* coll.), D. Hille Ris Lambers leg.

Host plant. *Laserpitium siler* (Umbelliferae).

Distribution. Hungary (Szelegiewicz, 1966 : 189), Italy, Switzerland.

Biology. According to the original description, it lives on the upper sides of the leaves of its host.

Notes. *A. nigripes* is unusual in that the fourth antennal segment of the adults is longer than the third antennal segment and than the processus terminalis. According to Szelegiewicz (1967 : 443–444) Pintera found an aphid on *Seseli leucospermum* which he identified with *Hottesina superba.* Because of this Szelegiewicz (1966 : 189) disputed Börner's (1952 : 151) contention that *superba* was a synonym of *nigripes*, and recorded *A. nigripes* from *Peucedanum.* Szelegiewicz (1968 : 89) concludes that there are three species or subspecies involved as indicated below, and says (1967 : 443–444) that Pintera is preparing an account of one which lives on *Seseli.*

Acyrthosiphon* (*A.*) *nigripes blattnyi Pintera, 1968

Acyrthosiphon superbum (Börner) Pintera, 1957 : 380–383 nec Börner, 1950; Szelegiewicz, 1966 : 189; 1967 : 443–444; 1968 : 89.
Acyrthosiphon nigripes f. *blattnyi* Pintera *in* Szelegiewicz, 1968 : 89.

Host plants. *Seseli austriaca, S. leucospermum* (Umbelliferae).

Distribution. Hungary.

Acyrthosiphon* (*A.*) *nigripes peucedani Szelegiewicz, 1967

Acyrthosiphon nigripes Hille Ris Lambers, Szelegiewicz, 1966 : 189 nec Hille Ris Lambers, 1935.
Acyrthosiphon nigripes ssp. *peucedani* Sezlegiewicz, 1967 : 442–443.

Host plant. *Peucedanum officinale* (Umbelliferae).

Distribution. Hungary.

NOTES. Presumably described from alatiform apterae as the four specimens are said to bear 11–16 very small rhinaria on the distal one third of the third antennal segment.

Acyrthosiphon (A.) niwanista (Hottes, 1933) **comb. n.**

Adactynus niwanista Hottes, 1933 : 16–17.
Macrosiphum niwanistum (Hottes) Gillette & Palmer, 1934 : 191; Hottes, 1948 : 29–30; Palmer, 1952 : 318–319.

SPECIMENS STUDIED. U.S.A., Colorado, Skyway, *Mertensia sibirica*, 4.viii.1932, 5 apterous paratypes (*F. C. Hottes*); Rocky Mtn Ntl Park, *Mertensia* sp., 24.viii.1940, 2 apt. viviparae, 1 ovipara, 1 alata vivipara (*G. F. Knowlton*). Grand Mesa, *Mertensia* sp., 17.ix.1956, 2 oviparae, 1 apterous ♂ (*F.C.H. & D. Hille Ris Lambers*).

HOST PLANTS. *Mertensia sibirica* (Boraginaceae), and also recorded from *Polygonatum commutatum* (Hottes, 1948 : 30), *Smilacina* sp. (Palmer, 1952 : 319) (Liliaceae).

DISTRIBUTION. Colorado.

BIOLOGY. The oviparae and apterous males from *Mertensia* in September and October and the apterae viviparae on *Mertensia* in early August preclude host plant alternation as alate males are required for host plant alternation in the Aphidinae.

NOTES. Although it seems unlikely that an aphid would live only on one genus of Boraginaceae and two genera of Liliaceae unless host plant alternation is involved, unusual discontinuous host plant specificity does occur (Stroyan, 1964 : 39–40; Shaw, 1958 : 232). *Macrosiphum mertensiae* Gillette & Palmer (1933 : 361) from *Mertensia* and *Macrosiphum yagasogae* Hottes (1948 : 34–37), from *Polygonatum commutatum* are very similar to one another according to Hottes, 1948 : 36. It would be interesting to know whether *Mertensia* and *Polygonatum* have any unusual constituents in common.

Acyrthosiphon (A.) norvegicum Mordwilko, 1914

Acyrthosiphon norvegicum Mordwilko, 1914 : 143: 144; 1915 : 11.

HOST PLANT. Unknown.

DISTRIBUTION. Norway.

NOTES. The original description fits *A. pisum* better than any other aphid currently known from Norway, but the processus terminalis is said to be only $2\frac{1}{2}$–$2\frac{3}{5}$ as long as the base of the sixth antennal segment. The siphunculi are too long for a member of the *euphorbiae* group, which also occurs in Norway and has a long base to the sixth antennal segment.

Acyrthosiphon (A.) orientalis Mordwilko, 1914

Acyrthosiphon orientale Mordwilko, 1914 : 141–243; 1915 : 10.

HOST PLANT. Unknown.

DISTRIBUTION. Eastern Siberia.

NOTES. According to the original description the length of the body of the aptera is 4½–5 mm (alata 3–3⅗ mm), siphunculi of apterae 1½ mm (alata 1 mm), cauda of aptera 0·95 mm (al. 0·65 mm). The distal antennal segments are not described but the proportions of body, siphunculi and cauda are sufficiently unusual to assist identification when the species is refound. The proportions are suggestive of a large specimen of *A. pisum* with an exceptionally long cauda.

Acyrthosiphon (A.) pamiricum Nevsky, 1929

Acyrthosiphon pamiricum Nevsky, 1929 : 86; Narzikulov & Umarov, 1969 : 174.

HOST PLANTS. Gramineae.

DISTRIBUTION. Pamir.

NOTES. If, as some of the description suggests, *pamiricum* comes in the subgenus *Metopolophium*, then it differs from most other species of *Metopolophium* by the processus terminalis being 5½–6 times as long as the base of the sixth antennal segment and by the siphunculi being 2½–2¾ as long as the cauda. The proportions are similar to those of *soldatovi* (see p. 69).

Acyrthosiphon (A.) papaverinum Nevsky

Acyrthosiphon papaverinum Nevsky, Pek, 1957 : 176, 180; Narzukulov, 1966 : 577; Narzikulov & Umarov, 1969 : 186.

HOST PLANTS. *Papaver somniferum* (Papaveraceae).

DISTRIBUTION. Kirghiz.

NOTES. Apparently not formally described.

Acyrthosiphon (A.) parvus Borner, 1950

Acyrthosiphon parvus Börner, 1950; Meier, 1958 : 300–302.

SPECIMENS STUDIED. CZECHOSLOVAKIA: Prague, *Cytisus capitatus*, 2.vi.1964, 1 aptera, 12 alatae (*P. Stary & V.F.E.*).

HOST PLANTS. *Cytisus austriacus* (Szelegiewicz, 1968 : 89), *C. capitatus*, *C. pilosus*, *C. rhodopeus*, *Sarothamnus scoparius* (Leguminosae).

DISTRIBUTION. Austria, Bulgaria (Tashev, 1961 : 158), Czechoslovakia, Hungary (Szelegiewicz, 1968 : 89), Poland (Szelegiewicz, 1966 : 450), Switzerland.

BIOLOGY. Meier, 1958 : 301 describes fundatrices from *Sarothamnus* in mid-May and Austrian oviparae from Börner's collection, so it seems that *parvus* overwinters as eggs on both *Cytisus* and *Sarothamnus*.

Acyrthosiphon (A.) pelargonii (Kaltenbach, 1843)

This is the complex known as the *Acyrthosiphon malvae* (Mosley) group, since Walker, 1848 : 429, regarded *Aphis pelargonii* Kaltenbach, 1843, as a synonym of *Aphis malvae* Mosley, 1841. This synonymy was accepted on the 'first reviser' principle by Hille Ris Lambers, 1947 : 233–246, and by most subsequent British authors. Stroyan, 1964 : 50–54, summarizes the existing (unsatisfactory) state of knowledge of this group and the following data is arranged according to his system. As *Acyrthosiphon pelargonii* is not known for certain to feed on *Malva*, as the original description of *Aphis malvae* fits *Myzus persicae* better than *Acyrthosiphon*, as *Myzus persicae* is the common aphid on *Malva* in the Thames valley, and as *pelargonii* is a well known and appropriate name for the aphid, it is used here and *malvae* is regarded as a synonym of *Myzus persicae* (Sulzer). Records of *Myzus pelargonii* (Kltb.) usually apply to *Aulacorthum solani* (Kltb.) (see p. 88). It is convenient to recognize the following eight subspecies of *pelargonii* although the real situation is almost certainly more complex.

agrimoniae Börner, 1940, on *Agrimonia*, ♂♂ apterous.
borealis Hille Ris Lambers, 1952, on *Potentilla* in the wild and on *Acaena* and other cultivated Rosaceae, ♂♂ apterous.
geranii Kaltenbach, 1862, on *Geranium* and *Erodium*, ♂♂ apterous.
pelargonii Kaltenbach, 1843, on *Pelargonium* and *Erodium*, without sexuales.
poterii Prior & Stroyan, 1964, on *Poterium*, ♂♂ apterous or alate.
potha Börner, 1950, on *Alchemilla*, sexuales unknown but probably existing.
rogersii Theobald, 1913, on *Fragaria*, ♂♂ apterous or alate.
zerozalphum Knowlton, 1935, on *Erodium*, sexuales unknown, Western North America.
rubi Narzikulov, 1957, on *Rubus* in the Himalayas is similar to the *pelargonii* group (see p. 67).

Acyrthosiphon (A.) p. pelargonii (Kaltenbach, 1843)

?*Aphis malvae* Mosley, 1841 : 684.
Aphis pelargonii Kaltenbach, 1843 : 21–22.
Aphis urticae Schrank, Walker, 1848 : 427, partim.
Aphis malvae Mosley; Walker, 1848 : 429, ? nec Mosley, 1841.
?*Aphis conjuncta* Walker, 1848 : 2220 (see Doncaster, 1961 : 46).
Siphonophora malvae (Mosley) Passerini, 1863 : 137, partim; Buckton, 136, ? nec Mosley, 1841.
Siphonophora pelargonii (Kaltenbach) Henrich, 1910 : 25.
Macrosiphum pelargonii (Kaltenbach) Davis, 1912 : 285–286; Theobald, 1926 : 124–126, partim; Börner, 1932 : 628; Palmer, 1952 : 319–320.
?*Myzus erigeroniella* Theobald, 1926 : 354.
Macrosiphum cornelli Patch, 1926 : 334.
Macrosiphum bosqi Blanchard, 1932 : 21–23; 1939 : 959–960.
Aulacorthum pelargonii (Kaltenbach) Hille Ris Lambers, 1933 : 175; Börner, 1952 : 154; Essig, 1953 : 112.

Acyrthosiphon malvae (Mosley) Hille Ris Lambers, 1947 : 233–238.
Aulacorthum malvae (Mosley) Cottier, 1953 : 238–240, ? nec Mosley, 1841.
Acyrthosiphon pelargonii (Kaltenbach) Eastop, 1958 : 20; 1966 : 424–425; Müller & Schöll, 1958 : 394–395.

SPECIMENS STUDIED. ENGLAND: London, Southgate, *Pelargonium* sp., 2.vi.1847, 3 apterae, 2 alatae (*F. Walker*) slide 616; 8.vi.1847, 2 apt., 1 al. (*F. Walker*) slide 619. South Kensington, *Pelargonium* sp., 20.vi.1963, 38 apt., 25 al. (*A. J. Orian*). Surrey, Kew Gdns, glasshouse, 'Geranium', 5.ii.1937, 5 apt. (*E. O. Essig*). Berks, Wokingham, *Pelargonium* sp., 3 apt., 4 al. (*F. Baranyovits*). Oxford, 5.i.1953, 2 al. Lincs., Spalding, *Pelargonium hederaceum*, 18.iv.1945, 4 apt., 6 al. (*J. P. Doncaster*). NETHERLANDS: Wageningen, *Pelargonium* sp., March 1933, 2 apt. (*D. Hille Ris Lambers*). NEW SOUTH WALES: 1960/1961, 2 al. (*R. D. Hughes*). AUSTRALIAN CAPITAL TERRITORY: Canberra, yellow trap, 12.x.1959, 1 al.; 5–11.xi.1959, 3 al. (*V.F.E.*); August/October 1960, 1 al.; 1961, 1 al. (*R. D. Hughes*). TASMANIA: Grove, colour trap, 30.xii.1960, 1 al.; 6.x.1961, 2 al.; 26.iiii.1962, 1 al.; 23.iv.1962, 1 al.; 21–30.xii.1962, 2 al., *Erodium moschatum*, 30.x.1961, 5 apt. New Town, colour trap, 29.vii.1960, 1 al.; 16.ix.1960, 1 al.; 9.xi.1960, 1 al.; 15–17.viii.1962, 2 al.; 2–29.x.1961, 4 al.; 12–26.xi.1962, 2 al.; Triabunna, *Erodium moschatum*, 2.xi.1961, 8 apt., 2 al. (*E. J. Martyn*). VICTORIA: Melbourne, Brighton beach, 'flying', 28.vi.1959, 1 al., Carlton, yellow traps, 23–25.iii.1959, 3 al.; 26.iv.1959, 2 al.; 18.v.1959, 1 al. (*V.F.E.*). HAWAII: Pokahuloa, 'grass sweepings', 7.v.1948, 1 al. (*F. A. Bianchi*). NEW ZEALAND: Okahune, N.I., 1 al. (*T. R. Harris*), no date, collected prior to 1952. Lincoln, yellow traps, 28.x.–22.xi.1959, 10 al. (*K. P. Lamb*); 29.v.1963, 1 al. (*A. D. Lowe*). U.S.A.: Colorado, Fort Collins, 'Geranium', 23.v.1917, 2 apt., 1 al. (*F. C. Bragg*). New York, Ithaca, *Pelargonium* sp., 24.x.1925, 3 apt. (*E. M. Patch* leg.) (apparently part of the series from which *cornelli* was described).

HOST PLANTS. *Erodium moschatum, Pelargonium domesticum, P. hederaceum, P. odoratissimum* (Geraniaceae).

DISTRIBUTION. Widely distributed by commerce, see Heie, 1960 : 88. Austria, Denmark, England, Netherlands, Poland, Sweden, Switzerland, South Africa (Müller & Schöll, 1959 : 394), Australia, New Zealand, Hawaii, Argentina (as *bosqui* Blanchard, 1932), Peru (Essig, 1953 : 112), Colorado, New York.

BIOLOGY. Apparently completely anholocyclic, the sexuales being unknown. When *pelargonii* lives in the open as in Australia, alatae mostly occur in yellow traps in October and November, and with a smaller peak of activity in March and April. This is typical of many aphids in South Eastern Australia (Hughes *et al.*, 1965 : 830).

NOTES. See Stroyan, 1964 : 50–54 and Müller and Scholl, 1958 : 394–39, 412, for comparisons with other members of the complex. Despite the collection data for *erigeroniella* Theobald, the body 2·55 mm long, the siphunculi 572 & 582μ long, the cauda 317μ long, longest hairs on 8th abdominal tergite 40μ long, the short base of the sixth antennal segment (126 & 127μ), the 10 and 11 hairs on the first antennal segments, the ultimate rostral segment 154μ long, $1\frac{1}{10}$ as long as the second segment of the hind tarsus and bearing 13 accessory hairs suggest *pelargonii* s. str.

Acyrthosiphon (A.) pelargonii agrimoniae (Borner, 1940)

Aulacorthum agrimoniae Börner, 1940 : 4.
Acyrthosiphon malvae ssp. *agrimoniella* (Cockerell) Hille Ris Lambers, 1947 : 238–241, nec Cockerell, 1903.
Aulacorthum agrimoniellum (Cockerell) Börner, 1952 : 154–155, nec Cockerell, 1903.
Acyrthosiphon malvae ssp. *agrimoniae* (Börner) Stroyan, 1964 : 50–51.

SPECIMENS STUDIED. NETHERLANDS: Wageningen, *Agrimonia eupatorium*, 30.ix.1930, 3 apterae (*D. Hille Ris Lambers*), B.M. 1954–417; S. Limberg, Gulpen, *Agrimonia* sp., June 1952, 6 apt., 1 al. (*D.H.R.L. & V.F.E.*), B.M. 1955–363.

HOST PLANTS. *Agrimonia eupatorium, A. odorata* (Rosaceae).

DISTRIBUTION. Denmark (Heie, 1961 : 88), England, Germany, Poland (Szelegiewicz, 1964 : 250), Sweden (Wahlgren, 1951 : 71), Turkey (Tuatay & Remaudière, 1965 : 269).

BIOLOGY. Transfers from *Agrimonia* to *Fragaria*; males apterous (Hille Ris Lambers, 1947 : 237).

NOTES. Types in the Deutsches Ent. Inst. 39/87, 39/88, teste Stroyan, 1964 : 51.

Acyrthosiphon (A.) pelargonii borealis Hille Ris Lambers, 1952

Acyrthosiphon pelargonii (Ktlb.) Thomas & Jacob, 1940 : 149, partim, nec Kaltenbach, 1843, teste Stroyan, 1964 : 53.
Acyrthosiphon boreale Hille Ris Lambers, 1952 : 5–6; 1955 : 3–4.
Acyrthosiphon malvae ssp. *borealis* H. R. L.; Stroyan, 1964 : 51–53.
?*Acyrthosiphon malvae* ssp. *potha* (Börner); Ossiannilsson, 1959 : 485 partim.

SPECIMENS STUDIED. ENGLAND: Surrey, Kew Gdns, *Acaena anserinifolia*, 30.v.1967, one specimen, winged on the left side and wingless on the right; *A. macrostemon*, 2.v.1966, 2 apt.; *A. myriophyla*, 30.v.1967, 17 apt., 4 al.; *A. novaezealandica*, 27.ix.1960, 1 apterous ovipariform vivipara; *Potentilla alpestris*, 1.v.1961, 2 apt., 2 al.; *P. blaschkeana*, 30.v.1967, 2 apt., 1 al.; *P. collina*, 30.v.1967, 11 apt.; *P. ornithopoidis*, 24.ix.1960, 1 apt.; *P. recta*, 3.x.1962, 1 apt., 30.v.1967, 3 apt.; *P. villosa*, 30.v.1967, 1 apt. (*V.F.E.*). GREENLAND: Julianahaab, 17.vii.1949, 2 apt. (*Chr. Vibe* coll.), D. Hille Ris Lambers leg., B.M. 1963–531. SCOTLAND: Angus, Glen Doll Lodge, *Potentilla anglica*, 28.v.1959, 2 al.; Sutherland, Stoer-Lochinver Rd., *P. erecta*, 8.vii.1961, 1 apt. (*J. P. Doncaster*). SWEDEN: Upl. Gamla, Upsala, *P. argentea*, 13.viii.1953, 2 apt. (*F. Ossiannilsson*). U.S.A.: Michigan, Midland, *Potentilla* sp., 31.v.1961, 2 apt., 3 al. (*J. O. Pepper*); Pennsylvania, State College, The Rock, *P. recta*, 18.vi.1963, 3 apt., 1 al. (*J. O. Pepper*). CANADA: Quebec, Payne Bay, vagrant alata, 11.viii.1958 (*J. Mason* coll.), W. R. Richards leg.

HOST PLANTS. *Acaena anserinifolia, A. macrostemum, A. myriophyla, A. novaezealandica, Potentilla anglica, P. anserina, P. artica, P. argentea, P. aurea, P. blaschkeana, P. collina, P. crantzii* (=*alpestris*), *P. ornothopioides, P. puberula, P. recta, P.* ? *sterilis, P. villosa* (Rosaceae), *Epilobium latifolium* (Onagraceae), Richards, 1963 : 463. See also the note on the recorded host plants of the ssp. *potha* on p. 56.

Distribution. England, Finland, Greenland, Iceland, Hungary (Szelegiewicz, 1968 : 89), Scotland, Sweden (Ossiannilsson, 1959 : 56), Switzerland, ? Wales (Stroyan, 1964 : 51), Quebec, Baffin Is., (Richards, 1963 : 462–463).

Biology. Apterous ♂♂ (Stroyan, 1964 : 51–52). Alatae viviparae have only been collected in May in Britain.

Notes. Differs from most other members of the complex in that the processus terminalis is only $4\frac{3}{4}$–$5\frac{2}{3}$ as long as the base of the sixth antennal segment while the ultimate rostral segment is 1–$1\frac{1}{8}$ as long as the second segment of the hind tarsus and bears only 6–8 accessory hairs. It is possible that the American specimens belong to the ssp. *zerozalphum* Knowlton.

Acyrthosiphon (A.) pelargonii geranii (Kaltenbach, 1862)

?*Aphis urticae* Schrank; Kaltenbach, 1843 : 13, partim nec Schrank, 1801.
?*Aphis sodalis* Walker, 1848 : 429 (see Doncaster, 1961 : 123).
Siphonophora pelargonii (Kltb.) Koch, 1855 : 193 nec Kaltenbach, 1843.
Aphis geranii Kaltenbach, 1862 : 16–17; 1874 : 81–82.
Siphonophora malvae (Mosley) Passerini 1863 : 137 partim, ? nec Mosley 1841.
?*Nectarophora geranii* Oestlund, 1887 : 80.
Macrosiphon pelargonii (Ktlb.) Börner, 1932 : 628, partim.
Acyrthosiphon geranicola Hille Ris Lambers, 1935 : 114–115 partim, apterae only.
Acyrthosiphon malvae ssp. *geranii* (Kltb.) Hille Ris Lambers, 1947 : 241–243.
Aulacorthum geranii (Kltb.) Börner, 1952 : 154; Holman, 1961 : 118.

Specimens studied. Channel Is.: Guernsey, St. Peterport, *Geranium robertianum*, 9.vi.1951, 7 apt. (*B. E. Eastop*); Vazon Bay, *G. robertianum*, 21.vii.1955, 3 apt. (*C. A. Prevost*). England: Devon, nr. Loddiswell, *G. robertianum*, 23.vi.1959, 2 apt. (*C.A.P.*); Shaldon, *G. robertianum*, 6.vi.1965, 4 apt., 4 al. (*V.F.E.*); Somerset, Bath, *G. robertianum*, 8.viii.1934, 3 apt. (*D. Hille Ris Lambers*). Berks, Reading, *G. pyrenaicum*, 20.v.1950, 3 apt.; *G. pratense*, 30.vi.1950, 8 apt.; *G. sanguinearum*, 30.vi.1950, 3 apt.; Surrey, Kew Gdns, *Erodium cheilanthifolium*, 27.ix.1960, 4 apt.; Hants, Headley, *Geranium robertianum*, 29.v.1950, 7 apt., 2 al. (*V.F.E.*). Essex, Thundersley, *G. robertianum*, 4.vii.1955, 5 apt.; Herts, Harpenden, *G. sanguinearum*, 8.v.1944, 12 apt.; 4.vi.1944, 6 al.; Derbyshire, Middleton-by-Youlgreave, *G. robertianum* 20.vi.1946, 1 apt.; Elton, *G. lucidum*, 20.vi.1946, 1 apt.; Cumberland, Boot, *G. robertianum*, 26.vi.1953, 4 apt., 2 al. (*J. P. Doncaster*). France: Brittany, La Trinité sur Mer, *Erodium cicutarium* var. *dunense*, 31.vii.–7.viii.1968, 16 apt., 1 alatoid nymph. Germany: Wildberg (Black Forest), *G. robertianum*, 27.vii.1969, 8 apt., 2 alatoid nymphs (*V.F.E.*). Netherlands: Limberg, Gulpen, *Geranium robertianum*, 27.vi.1952, 2 apt. (*D.H.R.L. & V.F.E.*). Scotland: Sutherland, Traligill Burn, *G. robertianum*, 10.vii.1961, 6 apt., 2 al. (*J.P.D.*); Kincardine, Maryculter, *G. robertianum*, 20.x.1951, 9 apt. (*G. D. Morison*). Wales: Anglesey, Llanddona, *G. robertianum*, 19.–29.v.1961, 9 apt., 14 al. (*V.F.E.*).

Host plants. *Erodium cicutarium*, *E. trichomanifolium*, *Geranium dissectum*, *G. lucidum*, *G. molle*, *G. pratense*, *G. pyrenaicum*, *G. robertianum*, *G. sanguineum* (Geraniaceae).

DISTRIBUTION. Crimea (Holman, 1961 : 118), Denmark, England, Finland, Hungary, Netherlands, Poland, Sweden, Scotland, Wales.

BIOLOGY. Heie, 1961 : 89, records an ovipara collected on December 24th in Denmark. The males are apterous according to Hille Ris Lambers, 1947 : 243; alatae viviparae occur in late May and early June in Southern England and Wales and in late June and early July, in Northern England and Scotland.

NOTES. American records are based on the ssp. *zerozalphum* which may have a wider host range than *geranii* in Europe although some of the American records may be based on other sub species. The 'specimens studied' indicate that *geranii* has a more Western distribution than most of the other sub species, which is another reason for suspecting that *zerozalphum*, well-known in California, Washington and Utah, is not merely a synonym of *geranii*. The American *zerozalphum* may be an as yet undetected Mediterranean variant of *geranii*.

Acyrthosiphon (A.) pelargonii poterii Prior & Stroyan, 1964

Acyrthosiphon malvae ssp. *poterii* Prior & Stroyan, 1964; Stroyan, 1964 : 53.

SPECIMENS STUDIED. ENGLAND: Derbyshire, Toddington, *Poterium sanguisorba*, 22.vi.1959, 1 aptera (holotype), 3 apterous paratypes; 15.vi.1963, 5 apt., 1 al. paratypes; 7.x.1959, 1 apt. ♂ paratype; 19.x.1959, 6 paratype oviparae (ex. culture) (*R. N. B. Prior*), B.M. 1970–18. Glos., Cirencester, Chesterton, *P. sanguisorba*, 9.v.1945, 1 apt. (*H. K. Airy Shaw*).

HOST PLANTS. *Poterium minor*, *P. sanguisorba* (Rosaceae).

DISTRIBUTION. England, Czechoslovakia (Holman, 1965 : 281), Hungary (Szelegiewicz, 1968 : 89).

BIOLOGY. The males may be either apterous or alate although the latter are known only from one population according to the original description in which the results of cross-breeding and host transfer experiments are also given.

Acyrthosiphon (A.) pelargonii potha (Börner, 1950)

Metopolophium potha Börner, 1950 : 13; 1952 : 156.
Acyrthosiphon malvae ssp. *potha* (Börner), Ossiannilsson, 1959 : 485 partim; Stroyan, 1964 : 53–54.

SPECIMENS STUDIED. ENGLAND: London, Chelsea Physic Gdns, *Alchemilla pyrenaica*, 31.v.1960, 1 apt.; Surrey, Kew Gdns, *Alchemilla* sp., 30.v.1967, 1 apt., *A. subcrenata*, 30.v.1967, 3 apt., 2 al. (*V.F.E.*). Cumberland, Wasdale, Pier's Gill, *A. alpina*, 30.viii.1962, 1 apt. SCOTLAND: Perthshire, foot of Ben Lawers, *A. alpina*, 23.vi.1959, 2 apt. (*J. P. Doncaster*). SWEDEN: Med., Selanger, *A. vulgaris*, 23.vii.1954, 1 apt. (*F. Ossiannilsson*).

HOST PLANTS. *Alchemilla alpina*, *A. pyrenaica*, *A. subcrenata*, *A. vulgaris* (Rosaceae).

DISTRIBUTION. Austria, England, Sweden.

NOTES. Types in the Deutsches Ent. Inst., 40/35, 40/36, 40/39, teste Stroyan, 1964 : 53. The names *agrimoniae*, *boreale* and *potha* are much confused in literature because of the poor state of taxonomic knowledge in the group. Records of *potha* from *Comarum palustre*, *Dryas* sp., *Geum rivale*, *Potentilla norvegicum* and *P. reptans* may well apply to *boreale* and from *Agrimonia* to *agrimoniae*.

Acyrthosiphon (A.) pelargonii rogersii (Theobald, 1913)

Macrosiphum rogersii Theobald, 1913 : 126; 1926 : 139–141.
Acyrthŏsiphon or *Aulacorthum rogersii* (Theobald) Hille Ris Lambers, 1933 : 171.
Acyrthosiphon (?) *rogersii* (Theobald) Massee, 1935 : 174.
Acyrthosiphon malvae ssp. *rogersii* (Theobald) Hille Ris Lambers, 1947 : 243–246; Heie, 1961 : 89.
Aulacorthum rogersii (Theobald) Börner, 1952 : 155.

SPECIMENS STUDIED. DENMARK: Jutland, Island of Mors, *Fragaria* sp., 29.v.1958, 1 aptera (*O. Heie*). ENGLAND: London, Southgate, 'strawberry' 19.v.1847, 1 apt., 2 alatae, 4 alatoid nymphs (*F. Walker*) 362. 28.v.1847, 3 apt., 2 al., 2 al. nymphs (*F. Walker*) 550. Hounslow, strawberry, May, 1912, 1 imm. paratype and one other immature specimen B.M. 1930–204. Kent, East Malling, strawberry 'Royal Sovereign' under glass, 6.iv.1935, 2 apt. (*A. M. Massee*); strawberry, 21.iv.1943, 6 apt. (*G. H. L. Dicker*), June 1938, 3 apt., 1 al. nymph (*A.M.M.*), 3.xi.1952, *Fragaria* sp. (in culture), 3 al. ♂♂ (*G.H.L.D.*); West Malling, 'seedling strawberry', 19.vi.1923, 2 apt. (*A.M.M.*). Sussex, Fernhurst, *Fragaria* sp., 26.iv.1965, 2 apt., 2 al., (*F. Baranyovits*). SCOTLAND: Aberdeen, strawberry, 9.vii.1949, 2 apt., 3 al. (*G. D. Morrison*).

HOST PLANTS. *Fragaria vesca* x *viridis* and other cultivars (Rosaceae).

DISTRIBUTION. Denmark, England, Finland, Germany, Norway, Poland (Szelegiewicz, 1965 : 39), Scotland, Sweden.

BIOLOGY. Males apterous, sexuales recorded in October for both Denmark (Heie, 1961 : 89) and Sweden (Ossiannilsson, 1959 : 485).

NOTES. The adults Theobald described are not in his collection and were not there when Hille Ris Lambers (1947 : 246) examined the collection.

Acyrthosiphon (A.) pelargonii zerozalphum (Knowlton, 1935)

Macrosiphum zerozalphum Knowlton, 1936 : 194; 1936 : 213; Palmer, 1952 : 333.

SPECIMENS STUDIED. U.S.A.: California, San Fernando, *Erodium moschatum*, 5.iii.1942, 3 apterae, 4 alatae (*R. C. Dickson*). Berkeley, 23.iii.1964, 1 vagrant alata; Temicula, *Erodium* sp., 30.iii.1964, 2 al.; Mirama, *Erodium* sp., 30.iii.1964, 5 apt.; Pala, *Erodium* sp., 30.iii.1964, 6 apt., 2 al., 2 al. nymphs (*R.C.D., O. Heie & V.F.E.*). Utah, Dewey, *Erodium cicutarium*, 28.iv.1927, 3 apterous paratypes

(*G. F. Knowlton*), B.M. 1954–703, Kanab, *E. cicutarium*, 17.iv.1958, 3 apt.; Marriott, *E. cicutarium*, 3.v.1938, 3 apt., 2 al. (*G.F.K.*), St George, 'filaree', 18.v.1944, 1 apt. (*G.F.K.*), *E. cicutarium*, 16.iv.1958, 2 apt., 2 al.; Santa Clara, *E. cicutarium*, 16–17.iv.1958, 20 apt., 2 al., (*G.F.K.*). Virgin, 'sweeps', 17.iv.1958, 7 apt.; Washington Co., *E. cicutarium*, 16.iv.1958, 2 apt. (*G.F.K.*), Willard, 'tunnels of *Pemphredon* wasp', 10.ix.1965, 1 apt. (*G.F.K.*). Washington, Union Gap, *E. cicutarium*, 24.iv. 1946, 1 apt. (*G.F.K.*).

Host plants. *Erodium cicutarium*, *E. moschatum* (Geraniaceae).

Distribution. U.S.A., California, Utah, Washington.

Biology. All our Californian specimens were collected in March and all our specimens from Utah and Washington in April and May; it seems to be conspicuous early in the year.

Acyrthosiphon (A.) pisum (Harris, 1776)

(Text-fig. 7)

Another species evidently existing as a complex of populations with different biologies and ranges of morphological variation. Almost any two populations may be separated from one another morphologically but only specimens from *Ononis* are both morphologically separable from all other populations and apparently homogeneous enough to be practically recognizable as a distinct subspecies. Specimens from other shrubs such as *Sarothamnus* and *Spartium* are often regarded as constituting a subspecies because they cannot be transferred to herbaceous Leguminosae. This system has been adopted here despite the objections that the material from shrubs is probably not homogeneous and is no more different from specimens from peas than they are from populations from other herbaceous legumes. That two populations from *Sarothamnus* cannot be transferred to peas does not prove that they are subspecifically identical. Some populations may feed and reproduce in the spring and early summer on plants on which they cannot overwinter. Temperature may affect host plant range as well as morphology, as both are the results of physiological activity. Negative results from host plant transference experiments alone are unsatisfactory indicators of taxa. The following three subspecies are accepted here:—

ononis Koch, 1855, on *Ononis*.

pisum Harris 1776, on herbaceous Leguminosae and probably occasionally on shrubs in the early summer. Certainly heterogeneous.

spartii Koch, 1855, on *Cytisus*, *Sarothamnus* & *Spartium*. Probably heterogeneous.

Acyrthosiphon (A.) p. pisum (Harris, 1776)

Aphis pisum Harris, 1776 : 66–67.
Aphis onobrychis Boyer de Fonscolombe, 1841 : 169.
Aphis lathryi Mosley, 1841 : 684; Walker, 1852 : 966.

Aphis pisi Kaltenbach, 1843 : 23–24.
Aphis ulmariae Schrank Walker, 1843 : 421, nec Schrank, 1801.
Aphis basalis Walker, 1848 : 2220.
Siphonophora pisi (Kaltenbach) Koch, 1855 : 190–191; Buckton, 1876 : 134–135; Mordwilko, 1907 : 214, 215; 1909 : 103.
Siphonophora ulmariae (Schrank) partim, Passerini 1863 : 136; Macchiati, 1883 : 231; del Guercio, 1900 : 165; Schouteden, 1900 : 116.
Siphonophora corydalis Oestlund, 1886 : 25.
Nectarophora pisi (Kaltenbach) Oestlund 1887 : 82; Sanderson, 1900 : 14–25; 1901 : 169–186; Essig, 1910 : 336.
Nectarophora destructor Johnson, 1900 : 56–60.
Macrosiphum ulmariae (Schrank) Schouteden, 1901 : 115, partim.
Nectarophora pisi var. *destructor* Johnson, Sanderson, 1901 : 31.
Macrosiphum trifolii Pergande, 1904 : 21.
Macrosiphum pisi (Kaltenbach) Sanborn, 1904 : 79. Chittenden, 1909 : 1–10; Patch, 1911 : 81; Gillette, 1911 : 384; 1927 : 348; Theobald, 1913*a* : 380; 1913*b* : 134; 1926 : 127–133; Davis, 1915 : 1–67; Smith, L. B., 1916 : 32–63; van der Goot, 1917 : 15–17; Drastich, 1927 : 348–351; Harrington, 1945 : 12–22; Palmer, 1952 : 320.
Macrosiphon trifolii Theobald, 1913*a* : 384; 1913*b* : 189.
Acyrthosiphon pisi pisi (Kaltenbach) Mordwilko, 1914 : 83–136.
Acyrthosiphon pisi destructor (Johnson) Mordwilko, 1914 : 136–138.
Acyrthosiphon pisi turanicum Mordwilko, 1914 : 139–140.
Acyrthosiphon pisi ussuriensis Mordwilko, 1914 : 140–141.
?*Acyrthosiphon norvegicum* Mordwilko, 1914 : 143–144.
Macrosiphum theobaldi Davis, 1915 : 4.
?*Macrosiphum* (*Acyrthosiphon*) *genistae* (Mordwilko) Theobald, 1917 : 80 nec Mordwilko, 1914.
Macchiatiella trifolii Del Guercio, 1917 : 210–211.
Macrosiphon onobrychis (Boyer de Fonscolombe) Wilson & Vickery, 1918 : 118; Behlen, 1934 : 48–51.
Illinoia pisi (Kaltenbach) Fluke, 1925 : 612; Campbell, 1926 : 861–881.
Acyrthosiphon pisi (Kaltenbach) Nevsky, 1929 : 86–88; Judenko, 1930 : 163.
Anuraphis (*Macchiatiella*) *trifolii* (Del Guercio) Del Guercio, 1931 : 392–394.
Anuraphis (*Macchiatiella*) *promedicaginis* Del Guercio, 1931 : 495.
Adacytnus pisi (Kaltenbach) Hottes, 1933 : 19.
Acyrthosiphon onobrychidis (Boyer de Fonscolombe) Hille Ris Lambers, 1933 : 171; Knechtel & Manolache, 1940 : 12–16; Essig, 1953 : 110–112.
Acyrthosiphon onobrychis (Boyer de Fonscolombe) Silvestri, 1939 : 524–525; Börner, 1952 : 151–153, partim.
Acyrthosiphon pisum (Harris) Hille Ris Lambers, 1947 : 247–254; Meier, 1957 : 89–92; 1958 : 304–308; 1964 : 1–41; Cartier, 1957 : 37–41; 1959 : 293–294; 1963*a* : 205–213; 1963*b* : 558–560; Heie, 1961 : 89–90; Müller, 1962 : 129–136; Markkula, 1963 : 1–30; Lowe & Taylor, 1964 : 287–295; Sutherland, 1969 : 1385–1410; Wegorek & Hejner, 1969 : 61–75; Narzikulov & Umarov, 1969 : 178–181.
Acyrthosiphon pisum destructor (Johnson) Hille Ris Lambers, 1947 : 254.
Acyrthosiphon destructor (Johnson) Börner, 1952 : 152.
Acyrthosiphon onobrychis ssp. *galeagae* Börner, 1952 : 53.

SPECIMENS STUDIED. AUSTRIA: Carinthia, Ossiach, *Vicia cracca*, 13.viii.1966, 1 aptera; *Vicia* sp., 24.vii.1967, 1 apt.; Hochostewitz, *Medicago* sp., 9.viii.1966, 1 apt. (*V.F.E.*). BULGARIA: Burgas, 9.vi.1964, 1 apt., 2 first instar larvae (*A. Pintera*). CYPRUS: Nicosia, *Lathyrus* sp., 21.v.1937, 3 apt., 1 alata (*H. M. Morris*); Kolochoria, lucerne, 19.iv.1956, 1 apt.; Vatili, lucerne, 19.iv.1956, 1 apt., 1 al.

(*G. P. Georghiou*); Deftera, *Cicer arietinum*, 5.vi.1956 (*S. Pieris*); Amurosios, 23.iv.1956, 1 al., (*G.P.G.*); Lyssi, 24.iv.1965, 7 al. (*H. G. Walker*). CZECHOSLOVAKIA: Vestenice, *Trifolium* sp., 30.v.1964, 3 apt., 1 al. (*J. Holman, P. Stary, V.F.E.*). DENMARK: Lyngby, trap, 5–11,vii.1958, 7 al.; Jutland, Spangberg, 26.vii–1.viii.1958, 2 al. (*O. Heie*). EGYPT: Gezira, *Genista* sp., 6.iv.1924, 6 apt.; Giza, peas, 4.ii.1924, 1 al. (*W. J. Hall*); Cairo, *Vicia faba*, April 1964, 1 al. (*E. A. El-Kady*). ENGLAND: numerous specimens including London, Southgate, 'sweet pea' 2.v.1847, 1 al. & 5 alatoid nymphs (*F. Walker*) 1013; 1.vi.1847, 1 apt., 2 al., 1 alatoid nymph (*F. Walker*) 1014; Pimlico, *Lathyrus pratensis*, 18.iv.1961, 1 apt.; Chelsea, *Pisum* sp., 25.ix.1920, 1 al. & 3 larvae (*W. D. Laing*); Kent, Mereworth, *Vicia faba* (culture), 12.ix.1962, 4 apt., 2 al. (*H. J. B. Lowe*); Downe, *Vicia faba*, 26.vi.1967, 1 apt. (*H. C. Dale*); Berks, Reading, *Trifolium* sp., 5.vi.1949, 1 al., 1 alatoid nymph; Surrey, Esher, 'sweet pea', 10.vii.1922, 1 apt. (*W. E. China*); Kew, *Colutea arborescens*, 12.v.1961, 2 apt.; *Trifolium* sp., October 1969, 2 ovipariform apterae viviparae; Kew Gdns, *Lathyrus latifolius*, 3.x.1962, 1 apt. vivipara, 1 ovipara; *L. roseus*, 24.ix.1960, 3 apt. viviparae, 1 ovipariform vivipara; *Lens nigricans*, 24.ix.1960, 1 apt., 1 al.; *Lotus corniculatus*, 24.ix.1960, 2 apt.; 3.x.1962, 3 apt.; *L. hispidus*, 24.ix.1960, 1 apt.; *L. requienii*, 5.x.1962, 3 apt.; *Medicago carstiensis*, 24.ix.1960, 6 apt.; *M. lupulina*, 24.ix.1960, 2 apt.; *Melilotus officinalis*, 24.ix.1960, 1 slightly ovipariform aptera vivipara; *Onobrychis vicaefolia*, 24.ix.1960, 4 apt.; *Trigonella foenum-graecum*, 24.ix.1960, 1 apt.; *Trifolium hybridum*, 24.ix.1960, 1 apt., 1 al.; *T. pannonicum*, 24.ix.1960, 1 apt., 1 al. (*V.F.E.*); Ham, *Melilotus* sp., 28.v.1966, 3 apt., 2 al. (*L. A. Mound*); Sussex, nr Lewes, *Lathyrus* ? *aphaca*, September 1920, 4 apt. (*K. G. Blair*); Glos., Laurence Weston, clover, 22.vii.1924, 3 apt., 2 al. (*J. V. Pearman*); Hants., Sherfield English, *Vicia hirsuta*, 4.viii.1963, 1 apt. (*K. M. Harris*); Oxon., Oxford, *Vicia faba*, 6.vi.1930, 6 apt. (*R. C. Woodward*); Bucks, Farnham Royal, lucerne, 6.vii.1927, 3 apt., I.B. Ent.; Waddesdon, *Medicago lupulina*, 9.viii.1964, 2 apt., 1 al.; 28.viii.1966, 1 apt. (*V.F.E.*); Herts, Harpenden, *Medicago lupulina*, 26.ix.1949, 2 apt. vivip., 2 immature ? oviparae; lucerne, 24.x.1966, 4 apt. vivip., 4 oviparae; 31.x.1966, 2 apt. vivip., 4 oviparae; 7.xi.1966, 2 apt. vivip., 5 oviparae, 1 al. vivip. (*J. Cockbain*), B.M. 1966–617. *Trifolium* sp., 30.x.1942, 4 ovip., 22.ii.1943 (? in culture) 2 fundatrices; *Vicia faba*, 2.x.1941, 4 alatiform apterae viviparae (*C. Potter*); 2.iv.1943, 1 alatiform aptera, 3 al. (*J. P. Doncaster*); 1.vii.1947, 3 apt. (*V.F.E.*); Sawbridgeworth, garden peas, 3.vii.1944, 9 al. (*W. J. Hall*), B.M. 1954–624; Cambs., Teversham, *Lathyrus pratensis*, 15.x.1950, 3 oviparae, 1 apterous ♂; Cambridge, *L. pratensis*, 15.x.1950, 1 ovipara (*V.F.E.*); *Vicia sativa*, 19.v.1951, 1 apt.; Bourn, *Trifolium repens*, 8.vii.1952, 1 apt., 2 al. (*B. E. Eastop*). Cumberland, Skirwith, *Lathyrus nissolia*, 16.vi.1926, 1 apt., 1 al. (*H. Britten*). FINLAND: Tikkurila, *Vicia faba*, 1.vi.1963, 17 apt., 16 al., 1 first instar larva (*M. Markkula*). FRANCE: Bouches-du-Rhone, 1–17.vii.1960, 1 apt. (*B. M. Goodings*); Brittany, La Trinité sur Mer, sweeping behind sand dunes, 24.vii.–5.viii.1968, 8 apt. (*V.F.E.*). GERMANY: Rostock, 1964, numerous apterae and alatae from cultures on *Lotus uliginosus*, *Medicago sativa*, *Pisum sativum* and *Trifolium pratense* (*F. P. Müller*). ISRAEL: Dagania, *Trifolium* sp., 4.iv.1934, 1 al.; Rehoboth, lucerne, 20.i.1936, 1 apt., 2 al., (*E. Rivnay*). Jerusalem, *Lathyrus odoratus*, 30.v.1946, 2 al., (*E. Swirski*). ITALY: Portici, *Medicago sativa*, 1.iii.1934, 2 apt., 2 al., (*F. Silvestri*). MADEIRA: 1847–48, 1 al. (*T. V. Wollaston*), B.M. 1855–7. MOROCCO: High Atlas, Asni, 3,500–5,000′, 20–30.iv.1961, 1 apt., 2 al.; Middle Atlas, Ifrane, 15.v.1961, 1 al., (*P. N. Lawrence*). NORWAY: Fana, trapped, 18.vi.1954, 1 al.; Vollebekk, As, 14.vii.1954, 1 al. (*H. Tambs-Lyche*). PORTUGAL: Algarve, Lagos, yellow legume, June 1963, 4 apt. (*E. R. Speyer*). SCOTLAND: Lanark, pea, 7.viii.1849, 3 apt., 1 al. (*F. Walker*) 1016. Argyllshire, July 1922, 1 al. (*A. Cuthbertson*). SPAIN: Talavena, 22.v.1969, 1 al. (*F. Baranyovits*). SWITZERLAND: *Medicago sativa*, 5 apt., 4 al.; *Pisum sativum*, 7 apt.; *Trifolium pratense*, 8 apt., 4 al.; *Vicia faba*, 12 apt. (*W. Meier*). TURKEY: Ankara, *Medicago sativa*, 19.vi.1962, 4 apt. WALES: Berthymaen, 16.vi.1933, 3 al. (*W. Maldwyn Davies*): Anglesey, Llandonna, 6–8.vi.1962, 6 apt. (*V.F.E.*). Mont., Welshpool, Sept. 1965, 1 al. (*G. A. Smith*). YUGOSLAVIA: Many specimens including, from *Medicago sativa*, Cacak, 25.iv.1960, 3 apt., 1 al.; Skoplje, 26.vi.1962, 3 apt., 1 al., 23–24.ix.1964, 2 apt., Smedederevo, 20.vii.1962, 6 apt., 2 al.; Batajnica, 18.x.1961, 5 apt. vivip., 1 al. vivip., 3 oviparae; Nanske Banja, 9.x.1962, 8 al.; Prokuplje, 10.x.1964, 2 apt., 1 al.; Ljubicevo, 3.xi.1962, 12 oviparae, 4 apterous ♂♂, 3 al. ♂♂; Pozar-Ljubiceva, 3.xi.1961, 6 ovip., 6 apt. ♂♂, 3 al. ♂♂; Arandjelovac, 11.xi.1964, 2 ovip.; Metkovic, 17.xi.1964, 2 ovip.; Uljma-Vrsac, 27.xi.1964, 3 ovip. (*N. Tanasijevic*); from *Medicago* ? *sativa*, Lescepri Bledu, 1.viii.1967, 1 apt. (*V.F.E.*); from *Trifolium pratense*, Pozareva, 19.vii.1962, 3 apt 2 al.; Satornja, 9.vii.1964, 1 apt.; Pohorje, 19.viii.1962, 5 apt. (*N. Tanasijevic*); Wurzen Pass, *T.* ? *pratense*, 10.viii.1966, 1 apt. (*V.F.E.*).

ETHIOPIA: Dire Dawa, 'horse beans', June 1967, 1 apt. KENYA: Nairobi, *Vicia faba*, 31.xii.1951, 2 apt. (*R. Le Pelley*). Muguga, *Lathyrus* sp., 4.xi.1953, 7 apt., 1 al.; 2.x.1954, 2 apt., 1 al.; *Pisum* sp., 9.ii.1953, 7 apt., 5 al., 8 first instar larvae; trapped,

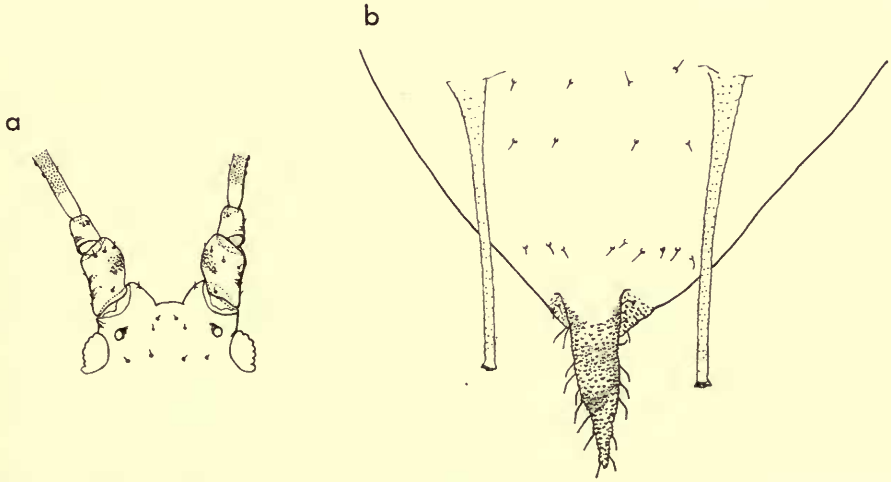

FIG. 7. *Acyrthosiphon pisum*, a, head of alata; b, apex of abdomen of aptera. × 45.

July 1953, 2 al. ♂♂; June 1954, 2 al. vivip., 1 al. ♂. Njoro, 'indigenous vetch', 5.xii.1953, 1 apt., 1 al. (*V.F.E.*). Kisii, coffee, 26.viii.1953, 4 apt., 4 al. (*R. Le Pelley*). RHODESIA: Salisbury, 17.vii.1941, 1 al., 24.vii.1958, 1 al., Sept. 1958, 2 al., 9.x.1958, 1 al. (*C. E. Taylor*); 'from lucerne, bred on peas', 12.i.1958, 6 apt., 1 al.; *Pisum sativum*, 12.iii.1958, 5 apt.; 'sweet pea', 28.x.1958, 2 apt., Fed. Min. Agr. St. SOUTH AFRICA: Transvaal, Nelspruit, trap, 25.v.–2.vi.1962, 1 al. (*R. E. Schwarz*). SUDAN: Khartoum, *Medicago sativa*, 1 apt.; 28.iii.1911, 1 al. (*R. Cottam*). TANZANIA: Arusha, *Vicia faba*, August 1926, 2 apt. (*A. H. Ritchie*). UGANDA: Kigezi, *Pisum* sp., 15.ii.1964, 1 apt., 1 al. (*S. Byakika*). YEMEN: San'a, c. 7,900', 18.ix.1937, 5 apt. (*C. Rathjens*); San'a district, Febr. 1938, 6 apt.; lucerne, 1.ii.1938, 1 apt. (*H. Scott & E. B. Britton*); Febr. 1938, 5 apt. (*E.B.B.*). ZAMBIA: Lusaka, lucerne, 4.x.1963, 2 apt., 2 al., Mt. Makula Res. Stn.

INDIA: Poona, 19.ii.1906, 1 apt., 1 al.; Bombay, *Lathyrus odorata*, 21.ii.1959, 4 apt. (*V.F.E.*); Pantnagar, *Pisum sativum*, 19.xii.1966, 3 apt.; *Vicia faba*, 9.ii.1967, 2 immature; 8.i.–12.i.1967, 1 apt., 2 al., Agric. Univ. U.P.; Jabalpur, Soybean, 16.iii.1968, 2 al., J.H. Agric. Univ.; Patna, 1964, 2 al., Central Potato Research Stn; Jaipur, Rajasthan, pea, 27.iii.1964, 2 apt., 1 al (*B. K. Srivastrava*). Sikkim, Mramcha, 26.iii.1920, 1 al. (*H. Stevens*). West Bengal, pea, 20.iii.1956, 1 apt., 1 al., State Agric. Rest. Inst. NEPAL: Godavari, pea, 5.iv.1966, 2 apt., 4 alatoid nymphs; 'wheat', 5.iv.1966, 1 apt., 1 al., 4 al. nymphs (*G. P. Kafle*); Shreemahal, yellow trap, March 1966, 1 al., May 1966, 1 al. (*K. C. Sharma*). PAKISTAN: Rawalpindi, *Pisum sativum*, 26.ii.1960, 1 apt., 1 al. (*M. A. Ghani*); 4.v.1967, 7 apt., 2 al. (*C.I.B.C.*); *Lathyrus* sp., 21.iii.1961, 3 apt.; Balakot, *Lathyrus odoratus*, 15.v.1963 (*M. A. Ghani*). HAWAII: Kaula Is., trap. 24.xii.1959, 1 al. (*J. L. Gressitt*).

U.S.A.: numerous specimens including Arizona, Yuma alfalfa, 7.–14.iii.1958, 9 apt., 1 al. vivip., 1 al.♂ (*V. Roth & D. M. Tuttle*); sticky board, Dec. 1959, 1 al. vivip. (*D.M.T. & D. Muse*). Arkansas, Madison Co., locust, 3.v.1965, 2 al., 1 larva (*H. Rolston*). California, Half Moon Bay, *Pisum sativum*, 4.vii.1936, 1 apt., 2 al. (*R. C. Dickson*); Blythe, alfalfa, 2.iv.1964, 2 apt., 2 al. (*R.C.D. & V.F.E.*); Colorado, Sulphur Springs, 25.vi.1937, 2 al. (*G. F. Knowlton*); Georgia, Tifton, peas, 27.iv.1964, 1 al. (*R. Davis*); Idaho, Woodruff Co., alfalfa, 24.x.1958, 2 apt., 4 al., Franklin, 26.x.1959, 2 apt., 1 al. vivip., 1 al. ♂ (*G. F. Knowlton*); Kansas, Manhattan, alfalfa, 2.iv.1921, 1 apt., 3 al. (*G. A. Dean*); Minnesota, St. Paul, peas in glasshouse, 8.ii.1961, 8 apt. (*E. A. Elkady*); Nevada, 22 apterae reared on *Vicia faba* in California, Oct. 1968, by *D. L. McLean*, originating from Reno, Nev.; New York, Rochester, *Lathyrus latifolius*, 2.viii.1963, 9 apt. (*M. D. Leonard*); Yonkers, 12 apt., 18 al. reared on *V. faba* in California by *D. L. McLean*, October 1968 but originating from Yonkers; Oregon, Corvallis, 14 apt., 5 al. reared on *V. faba*, in California, October 1968 by *D. L. McLean* but originating from Corvallis; South Dakota, Brookings, suction trap, 28.ix.1966, 1 al. (*J. T. Medler*); Texas, Denton, suction trap, 25.iv.1966 (*J. T. Medler*); Utah, Santa Barbara, alfalfa, 16.iv.1962, 7 apt., 2 al.; Plane City, alfalfa, 9.v.1938, 1 apt., 3 al.; Garfield, 22.v.1953, 2 al.; St. George, 17.iv.1958, 2 al.; Ogden, 2.vi.1956, 2 al., 11.vi.1958, 2 apt., 2 al., 19.vi.1962, 1 al.; Fielding, alfalfa, 26.x.1959, 1 apt., 2 al. vivip., 1 al.♂; Magna, alfalfa, 28.ix.1955, 1 apt., 3 al.; 8.xi.

1956, 1 apt. ♂; Corinne, 23.x.1962, 1 al. ♂; Paradise, 22.x.1962, 1 apt. ♂ (*G. F. Knowlton*); Washington, Prosser, bean, 14.vii.1955, 4 al. (*R. S. Robertson*); Wyoming, Goshen Co., clover, 9.vi.1949, 2 al.; Lone Tree, 10.vii.1956, 1 al. (*F.G.K.*). CANADA: Manitoba, Oakville, 25.vii.1962, 1 al.; Roland, *Melilotus alba*, 31.vii.1962, 1 apt.; Winnipeg, *Lathyrus odoratus*, 13.x.1963, 1 ovipara; *Medicago sativa*, 9.xi.1962, 2 apt. ♂♂ (*A. G. Robinson*); Quebec, St. Jean, artificial diet, 17.x.1966, 6 apt. vivip., 4 ovip., 2 apt. ♂♂ (*J. J. Cartier*).

HOST PLANTS. *Astragalus alpinus, Caragana arborescens, Glycine soya, Hippocrepis comosa, Lathyrus ? aphaca, L. latifolius, L. nissolia, L. odoratus, L. pratensis, L. roseus, Lens nigricans, Lotus corniculatus, L. hispidus, L. requienii, L. tenuifolius, L. uliginosus, Medicago carstiensis, M. falcata, M. lupulina, M. satica, Melilotus officinalis, Onobrychis vicaefolia, Pisum sativum, Trifolium arvense, T. hybridum, T. dubium, T. medium, T. pannonicum, T. pratense, T. repens, Trigonella foenum-graecum, Vicia cracca, V. faba, V. hirsuta, V. sinensis* (Leguminosae). and *Capsella bursa-pastoris* (Cruciferae). Records from Leguminous shrubs and trees such as *Genista nigricans, G. tinctoria, Ononis* ssp., *Robinia pseudacacia, Sarothamnus scoparius* and *Spartium junceum* probably often but not always apply to other subspecies.

DISTRIBUTION. Albania (Szelegiewicz, 1963 : 816), Austria, Azores, Canary Is., Crimea (Holman, 1961 : 118), Denmark, England, Faroes, Finland (Heie & Heikinheimo, 1964 : 124), Hungary, Iceland, Irak, Israel, Lebanon, Norway (Tambs-Lyche, 1968 : 6), Poland, Rumania, Sweden, Switzerland, Yugoslavia, European Russia to 67 degrees N (Shaposnikov, 1964 : 603), Eritrea, Kenya, South Africa, Tanzania, Yemen, India, Mongolia (Szelegiewicz, 1963 : 131), Central Asia (Nevsky, 1929 : 88), Japan (Takahashi, 1965 : 20), Szechuan, Taiwan (Tao, 1963 : 190), Peru (Essig, 1953 : 112), U.S.A., Canada to about 50 degrees N. Commonwealth Institute of Entomology map A23 (1952) gives the European and American distribution but the Australian record was based on a mis-identification and some of the Asiatic records are suspect.

BIOLOGY. Hibernation as eggs on biennial and perennial Leguminosae. Alatae viviparae occur in early summer, less frequently in mid and late summer and again in the autumn. Both apterous and alate males are produced in the autumn and in warm climates alate males are sometimes produced in the spring, presumably induced by the medium length day in populations that have over-wintered parthenogenetically. *A. pisum* does not thrive at high temperatures. Most of the records from India are between December and May while in Western Europe they are mostly between May and November. Auclair, 1957 : 32–33; 1958 : 330–337; 1959 : 279–286; 1962 : 134–140; 1963 : 439–490; 1965 : 855–875; 1964 : 241–249; Auclair & Cartier, 1960 : 13–16; 1960 : 315–326; 1963 : 1068–1069; Auclair & Maltais, 1950 : 175–176; 1961 : 740–743; Auclair, Maltais & Cartier, 1957 : 457–464; Cartier, 1957 : 37–41; 1963 : 205–213; 1965 : 65–73; 1966 : 378–380; Cartier & Auclair, 1964 : 1240–1243; Fröhlich, 1963 : 55–68; Halfhill, 1967 : 298–299; Kenten, 1955 : 599–624; Lowe & Taylor, 1964 : 287–295; Markkula, 1963 : 1–30; Markkula &

Laurema, 1967 : 77–80; Skotland & Hagedorn, 1955 : 665–666; Sutherland, 1967 : 387–389 & 1969 : 1385–1410, have studied the biology of *A. pisum* experimentally. Barker, 1952 : 162–164; Cook, 1963 : 1–48; Forsythe & Gyrisco, 1963 : 104–107; B. Johnson, 1959 : 367–377; McLean & Kinsey, 1967 : 400–406; 1968 : 730–739 and 1969 : 987–994; and Strong, 1968 : 463–475 have made observations on the biology of *A. pisum.* Host plant resistance has been investigated by Auclair, 1959 : 279–286; 1958*a* : 7–17; Auclair, Maltais & Cartier, 1957 : 456–464; Cartier, 1959 : 293–294; Harrington, 1941 : 461–466; 1945 : 12–22; Harrington, Searls, Brink & Eisenhart, 1943 : 369–387; Maltais, 1937 : 40–45; 1951 : 29–33; Maltais & Auclair, 1957 : 365–370; Ortman, Sorenson, Painter, Harvey & Hackerott, 1960 : 881–887; Searls, 1932 : 46–49; 1933 : 613–619.

Natural enemies and biological control have been investigated by Dunn, 1951 : 21–23; Fluke, 1929 : 1–47; Hagen & Schlingen, 1960 : 5–6; Freeman, 1938 : 2–3; Knowlton, Smith & Harmston, 1938 : 71–80; Mackauer & Finlayson, 1967 : 1051–1082; Mimeur, 1934 : 45; Sharma & Subba Rao, 1959 : 181–188; Drastich & Rozsypal, 1929 : 345–364 and MacLeod, 1953 : 503–505 studied the fungus diseases to which *A. pisum* is susceptible. Maxwell & Painter, 1962*a* : 57–62 & 1962*b* : 229–233 give an account of the honeydew.

NOTES. This aphid was long known as *pisi* Kltb. but there is no advantage in rejecting *pisum* Harris because of its long disuse, as *pisi* was also described as *onobrychis* B. de F. and *lathyri* Mosley, which also antedate *pisi*.

There is an enormous amount of literature concerning *A. pisi*, mostly under the name *Macrosiphum pisi*. The aphid exists as a complex of morphologically and biologically distinct populations variously termed biotypes or races. Since each fertilized egg gives rise to a distinct population which may not breed true for all characters, there is little chance of producing a useful nomenclatural system for these populations, particularly since a new system would be required each year for the sexually reproducing populations at least. There is no point in giving names to taxa unless individuals are recognizable when the taxon is next encountered. Cytogenetics have been investigated by Suomalainen, 1933 : 583–594 and Pagliai, 1965 : 235. Müller, 1962 : 228–239 and Markkula, 1963 : 1–30 conclude that red colouration is caused by a single dominant factor. Chromosome $2n=8$ (Colling, 1955 : 208; Sun & Robinson, 1966 : 651).

Cartier, 1957 : 37–41; 1959 : 293–294; 1963a : 205–213; 1963b : 558–560; Harrington, 1945 : 12–22; Hinz, 1963 : 173–176; Lowe & Taylor, 1964 : 287–295; Müller, 1957 : 93–99; 1962 : 129–136; Sohi & Swenson, 1964 : 9–14; Sutherland, 1969 : 1385–1410; Wegorek & Hejna, 1969 : 61–75 have given accounts of biological races of *A. pisum.*

Acyrthosiphon (A.) pisum ononis (Koch, 1855)

Siphonophora ononis Koch, 1855 : 175–176; Ferrari, 1872 : 212; Macchaiati, 1883 : 230; Del Guercio, 1900 : 162.

Macrosiphon ononis (Koch) Schouteden, 1906 : 239.

Acyrthosiphon pisum (Harris) Hille Ris Lambers, 1947 : 247–254, partim.

Acyrthosiphon onobrychis (B. de Fonsc.) Börner, 1952 : 151–153, partim.
Acyrthosiphon (A.) *pisum* ssp. *ononis* (Koch) Meier, 1957 : 90–92; 1958 : 308–311; Ossiannilsson, 1959 : 487; Stroyan, 1964 : 54–55.

Specimens studied. England: Kent, Tankerton, *Ononis spinosa*, 7.viii.1948, 2 apterae (*L. E. Carey*); Surrey, Kew Gdns, *O. spinosa*, 3.x.1962, 1 ovipara, 2 apterous ♂♂ (*V.F.E.*); Lincoln, *O. spinosa*, August 1965; 5 apt., 3 first instar larvae (*L. A. Mound*). France: Brittany, La Trinité sur Mer, *O. spinosa*, 2.viii.1968, 6 apt. (*V.F.E.*). Wales: Anglesey, Llandona, *O. repens*, 30.v.1961, 2 apt., 1 al., 1 first instar larva (*V.F.E.*).

Host plants. *Ononis spinosa* and sometimes *O. repens*. Meier (1958 : 310) quotes F. P. Müller as saying that specimens can be transferred experimentally to *Medicago sativa*, *Melilotus officinalis*, *Trifolium pratense* and *Pisum sativum*. It is not certain that these experiments were done with the ssp. *ononis*; *pisum* s.str. will sometimes colonize shrubs.

Distribution. Belgium, Denmark (Heie, 1961 : 90), England, Germany, Hungary, Italy, Netherlands, Poland (Szelegiewicz, 1962 : 169), Sweden, Switzerland, Wales.

Biology. Apterous males are produced in October (Meier, 1958 : 309).

Acyrthosiphon (A.) pisum spartii (Koch, 1855)

Siphonophora spartii Koch, 1855 : 172–173.
?*Macrosiphum* (*Acyrthosiphon*) *genistae* (Mordwilko) Theobald, 1917 : 80 nec Mordwilko, 1914 : 144–147.
?*Acyrthosiphon genistae* Mordwilko; Gomez-Menor 1963 : 44–48 nec Mordwilko, 1914 : 144–147.
Acyrthosiphon spartii (Koch) Börner, 1952 : 153.
?*Acyrthosiphon spartii* ssp. *nigricantis* Börner, 1952 : 153–257.

Specimens studied. Egypt: Giza, *Robinia pseudacacia*, 25.v.1924, 5 apterae; *Spartium junceum*, 3.vi.1924, 1 alata (*W. J. Hall*). England: London, Southgate, broom, 3.vii.1847, 3 apt. (*F. Walker*), 1015; Middx., Moor Park, *Cytisus* sp., 17.vii.1958, 11 apt., 15.vii.1962, 2 apt.; Berks, Midgham, *Sarothamnus scoparius*, 15.v.1948, 4 apt.; Reading, *S. scoparius*, 25.vi.1950, 4 apt.; Surrey, Kew, *Cytisus* sp., 25.vi.1961, 3 apt.; Send, *Cytisus ? andreanus*, 15.vii.1963, 2 apt. (*D. J. Williams*). Luxembourg: Esche sur Sûr, *Sarothamnus* sp., 29.vii.1966, 10 apt. (*V.F.E.*). Madeira: Carcin, *Cytisus* sp., 20.vi.1929, 1 apt., 4 al. (*J. Balfour Browne*). Netherlands: Bennekom, *S. scoparius*, 15.vi.1954, 22 apt., 3 al. (*D. Hille Ris Lambers & J. P. Doncaster*). Scotland: Aberdeen, *S. scoparius*, 5.x.1927, 7 apt. (*E. V. Laing*). Tasmania: *Cytisus monspessulanus*, 19.v.1960, 19 apt., 5 first instar larvae (*R. D. Hughes*); Bellerive, *Cassia* sp., 2.v.1964, 34 apt., 5 al. vivip., 1 apt. ♂, 5 first instar larvae; Grove, colour trap, 8.ii.1963, 1 al.; New Town, colour trap, 16.i.1961, 1 al.; 6.ii.1963, 1 al., 29.x.1962, 1 al.; 27.xi.1961, 1 al.; 6–13.xii.1961, 2 al.; 18.xii.1963, 5 al. (*E. J. Martyn*).

HOST PLANTS. *Cassia* sp., *Cytisus* sp., *Sarothamnus monspessulanus*, *S. scoparius*, *Spartium junceum*, and perhaps also *Genista* spp., *Robinia pseudacacia* and *Spartocytisus nubigens*.

DISTRIBUTION. Canary Is., Denmark, (Heie, 1961 : 90), England, Egypt, Germany, Latvia (Rupais, 1965 : 27), Luxembourg, Madeira, Netherlands, Scotland, Sweden, Tasmania.

BIOLOGY. Smith (1966*a* : 255–267) says that most eggs had hatched by 27.iii. 1956 and 28.ii.1957 at Silwood Park, Berks and that only a few of the second generation but many of the third generation were alate. Sexuales were produced from the end of September and oviposition continued well into November. He also gives details of the natural enemies. Smith (1966*b* : 213–214) discusses host selection.

NOTES. It is not certain that all the specimens listed above are really *spartii* as *pisum* s.str. will probably live on the young growth of some shrubs under some conditions. Similarly *spartii* may not be homogeneous but only a name given to those populations of *pisum* which prefer living on shrubs rather than on herbs.

Acyrthosiphon (A.) primulae (Theobald, 1913)

?*Siphonophora malvae* (Mosley) Passerini, 1863 : 137 partim, nec Mosley, 1841.
Macrosiphum primulae Theobald, 1913 : 91.
Myzus primulae (Theobald) Theobald, 1926 : 338–341.
Acyrthosiphon primulae (Theobald) Eastop, 1951 : 108; Stroyan, 1952 : 256.
Dysaulacothum primulae (Theobald) Börner, 1952 : 143.
Aulacorthum primulae (Theobald) Cottier, 1953 : 240–242.
Acyrthosiphon malvae ssp. *primulae* (Theobald); Ossiannilsson, 1959 : 484.
Acyrthosiphon pelargonii ssp. *primulae* (Theobald); Müller, 1961 : 69.
Microlophium primulae (Theobald) Hille Ris Lambers, 1966 : 17.

SPECIMENS STUDIED. ENGLAND: London, S. Kensington, 'polyanthus', 9.ii.1944, 2 apt., April 1944, 2 apt., 4 al., 22.v.1944, 10 apt., 10 al. (*M. E. Mosely*); Bedford Park, *Primula* sp., 30.iv.1926, 3 apt., 5.v.1926, 3 apt., 3 al. (*J. Waterston*). Middx., Hendon, *Primula vulgaris*, 17.ii.1920, 1 al., 24.iii.1920, 3 al. (*K. G. Blair*). Kent, Maidstone, *Primula kewensis*, 27.iii.1913, 1 apt., 1 al., both labelled type (*F. V. Theobald*), B.M. 1930/204; East Malling, trapped, 25.v.1965 (*K. R. Bock*). Surrey, Tooting Common, *Primula* sp., 2.ix.1923, 3 apt., 1 al. (*O. G. Heath*). *Primula* 'Emily Arkwright', 27.iv.1928, 1 apt., 3 al., 2 alatoid nymphs (*G. Fox Wilson*). Herts, Sawbridgeworth, 'polyanthus', 21.v.1944, 2 apt., 4 al. (*W. J. Hall*). Harpenden 'polyanthus' 18.v.1952, 1 apt., 3 al. (*J. P. Doncaster*); trap, 4.vii.1967, 1 al. (*J. Palmer*); Whetstone, m/v lamp, 3.vi.1961, 1 al. (*P. H. Ward*). Cambridge, Botanic Gdns, glasshouse, *P. kewensis*, 6–11.iv.1950, 4 apt., 3 al. (*H. L. G. Stroyan*); *P. kewensis* var. *farinosa*, 9.i.1951, 5 apt., 2 al. (*V.F.E.*). TASMANIA: New Town, 'polyanthus', 28.iv.1947, 3 apt., 1 al., 1 al. nymph; Grove, *Primula* sp., 22.v.1964, 1 apt. (*E. J. Martyn*). NEW ZEALAND: Palmerston North, primrose, 22.ix.1929, 1 apt.; 8.ii.1937, 2 al. (*W. Cottier*).

Host plants. *Primula kewensis* and perhaps more rarely other *Primula* spp. (Primulaceae).

Distribution. England, Germany (Müller, 1961 : 69), Sweden, Tasmania, New Zealand.

Notes. Hille Ris Lambers (1966 : 17) has placed *primulae* in *Microlophium* Mordw. but it has been included in this account of *Acyrthosiphon* as, if apterae alone are collected, they are difficult to distinguish from *Acyrthosiphon* Mordw. No earlier reference to the combination *Acyrthosiphon primulae* has been found than my 1951 paper on Berkshire aphids. Since I do not remember consciously proposing a new combination, it may have been used before or the information was derived from Dr Hille Ris Lambers or Mr Stroyan.

Acyrthosiphon (A.) pseudodirhodum (Patch, 1919)

Macrosiphum pseudodirhodum Patch, 1919 : 213; 1923 : 309.
Acyrthosiphon brevis Richards, 1963 : 254–256.
Acyrthosiphon pseudodirhodum (Patch) MacGillivray, 1968 : 353–357.

Specimens studied. U.S.A.: Penn., Scotia, *Spiraea* sp., 5.vii.1963, 5 apt. (*J. O. Pepper*). Canada: Manitoba, Caddy Lake, *Spiraea* sp., 20.vii.1963, 1 apt. (*A. G. Robinson*).

Host plants. *Spiraea latifolia* and perhaps other *Spiraea* spp., *Rosa* sp. or spp.

Distribution. Maine, New York, Pennsylvania, Manitoba, New Brunswick, Nova Scotia, Ontario.

Notes. According to MacGillivray, 1968 : 356, Griswold, 1927 : 16 and Leonard's 1963 : 363–364 records from rose applied to *Rhodobium porosum* (Sand.) (see p. 79) and Glendenning (1929 : 56) had *Placoaphis siphunculata* Richards, 1961 : 624–625.

Acyrthosiphon (A.) rjabushinskiji Mordwilko, 1914

Acyrthosiphon rjabushinskiji Mordwilko, 1914 : appendix 5; 1919 : 244–246.

Host plant. Unknown.

Distribution. Kamchatka.

Notes. See *soldatovi*, p. 69.

Acyrthosiphon (A.) rubi rubi Narzikulov, 1957

Acyrthosiphon rubi Narzikulov, 1957 : 673–675; Stroyan & Nagaich, 1964 : 61.
Acyrthosiphon (*Metropolophium*) *rubi* Narzikulov, Narzikulov & Umarov, 1969 : 164–166.

Host plants. *Rubus caesius* var. *turkestanicus* (Rosaceae).

Distribution. Tadjikistan.

Acyrthosiphon (A.) rubi elliptici Stroyan & Nagaich, 1964

Acyrthosiphon rubi ssp. *elliptici* Stroyan & Nagaich, 1964 : 59–62.

SPECIMENS STUDIED. INDIA: U.P., Chambatiya dist., 6000′, *Rubus ellipticus*, October/November 1957 (*B. S. Nagaich*), holotype and 3 paratype apterae, H. L. G. Stroyan leg., B.M. 1966–144; New Delhi, *R. ellipticus*, October, 1958, 4 apt., Agricultural Research Institute.

HOST PLANTS. *Rubus ellipticus* and perhaps *Fragaria* sp. (Rosaceae).

DISTRIBUTION. Northern India.

NOTES. Similar to *pelargonii* s.lat., of which several of the subspecies live on Rosaceae. Specimens with a strongly sclerotic dorsum collected from strawberry at Galu by Dr Rabinder Kumar are probably this species.

Acyrthosiphon (A.) rubiformosanus (Takahashi, 1927)

Macrosiphum ? rosae (L.); Takahashi, 1923 : 13–14 nec Linnaeus, 1758 : 452.
Macrosiphum rubiformosanum Takahashi, 1927 : 3–4.
Acyrthosiphon (*Microlophium*) *rubiformosanus* (Takahashi) Takahashi, 1965 : 21–23.

SPECIMENS STUDIED. JAPAN: Osaka, Chihaya, *Rubus* sp., 1.vi.1958, 2 apt. (*R. Takahashi*), B.M. 1962–228.

HOST PLANTS. *Rubus* sp. (Rosaceae).

DISTRIBUTION. Japan, Taiwan.

NOTES. Takahahsi (1923 : 14) thought *rubiformosanus* was close to *kamshaticum* Mdw. (see p. 86) and in 1965 : 21 placed it in the subgenus *Microlophium* Mdw. Tao (1963 : 195) thought it might come in *Aulacorthum* Mdw.

Acyrthosiphon (A.) rumicis Narzikulov, 1969

Acyrthosiphon rumicis Narzikulov, *in* Narzikulov & Umarov, 1969 : 193–194.

HOST PLANT. *Rumex paulseniana* (Polygonaceae).

DISTRIBUTION. Tadzhikistan.

Acyrthosiphon (A.) salviae Nevsky, 1929

Acyrthosiphon salviae Nevsky, 1929 : 88–89; Narzikulov & Umarov, 1969 : 176–177.

HOST PLANT. *Salvia sclarea* (Labiatae).

DISTRIBUTION. Kazakhstan.

NOTES. The original description is similar in some respects to that of *soldatovi* Mdw. (see p. 69). When refound the alatae should be readily recognizable, as the third antennal segment is described as bearing 40–50 rhinaria, an unusually high number for an *Acyrthosiphon*. Narzikulov & Umarov (1969) figure siphunculi with reticulated apices which, together with the long antennal hairs, make it unlikely that *salviae* really belongs in *Acyrthosiphon*.

Acyrthosiphon (A.) scalaris (Richards, 1963) **comb. n.**

Chaetosiphon scalaris Richards, 1963 : 690, 692, 693.

SPECIMENS STUDIED. CANADA: Ontario, Little Current, *Potentilla fructosa*, 12.vii.1961, 1 paratype aptera (*W. R. Richards*), B.M. 1963–621; Manitoba, Stony Mtn, *Potentilla* sp., 27.vii.1965, 1 apt. (*A. G. Robinson*).

HOST PLANT. *Potentilla fructosa* (Rosaceae).

DISTRIBUTION. Manitoba, Ontario.

NOTES. Mr Stroyan pointed out that it would be useful to include this species in a key to *Acyrthosiphon*.

Acyrthosiphon (A.) soldatovi soldatovi Mordwilko, 1914

Acyrthosiphon soldatovi Mordwilko, 1914 : 80, 168–171; Narzikulov, 1957 : 883.

HOST PLANT. *Spiraea hypericifolia*.

DISTRIBUTION. Tadzhikistan.

NOTES. The first of five species to be described from Asiatic Russia and China with a rather unusual combination of proportions. None of these proportions is unusual in itself but they are rare in this combination.

Ratios	Body length / Siphunculi	Siphunculi / Cauda.	Processus terminalis / Base antennal VI	Host Plant	Page No:
hoffmani Tak.	4·0–4·3	2·4	5·6	*Wisteria*	91
pamiricum Nevsky	2·9–3·8	2·6	5·6	Gramineae	51
rjabushinskiji Mdw.	3·4–3·5	2·8	4·6	unknown	67
salviae Nevsky	3·0–3·7	2·7	4·6	*Salvia*	68
soldatovi Mdw.	4·0–4·3	2·4	4·3	*Spiraea*	69

It is possible that *soldatovi* should be placed in the sg. *Metopolophium* Mdw., with *pamiricum* as a synonym or close relative on the secondary host plant.

Acyrthosiphon (A.) soldatovi tadzhikistanica Narzikulov & Umarov, 1969

Acyrthosiphon soldatovi ssp. *tadzhikistanica* Narzikulov & Umarov, 1969 : 193.

HOST PLANT. *Spiraea hypericifolia* (Rosaceae).

DISTRIBUTION. Tadzhikistan.

Acyrthosiphon (A.) spiraeae Narzikulov, 1957

Acyrthosiphon spiraeae Narzikulov, 1957 : 675–676; 1968 : 6.
?*Acyrthosiphon spiraeae* Rupais, 1961 : 128–129, teste Narzikulov & Umarov, 1969 : 169.
Acyrthosiphon (*Metopolophium*) *spiraeae* Narzikulov; Narzikulov & Umarov, 1969 : 169–170.

HOST PLANT. *Spiraea hypericifolia* (Rosaceae).

DISTRIBUTION. Tadzhikistan.

NOTES. Said to be close to *soldatovi* Mdw. and *ignotum* Mdw., which inhabit other species of *Spiraea*, but to differ from them in having shorter antennae, the third segment of the alatae bearing only 14–15 rhinaria, 7–11 in *ignotum* and 22–24 in *soldatovi*. *A. spiraeae* and *fragariaevescae* resemble the *soldatovi* group but the processus terminalis is only 3¼–4 times as long as the base of the sixth antennal segment. According to Rupais (1969 : 358) *A. spiraeae* Rupais is a synonym of *ignotus* Mdw.

Acyrthosiphon (A.) spireaellae Umarov, 1964

Acyrthosiphon spireaellae Umarov, 1964 : 67–68; Narzikulov, 1966 : 32; Narzikulov & Umarov, 1969 : 172–174.

HOST PLANT. *Spiraea hyperifolia.*

DISTRIBUTION. Kazakhstan.

Acyrthosiphon (A.) svalbardicus Heikinheimo, 1968

Acyrthosiphon svalbardicus Heikinheimo, 1968 : 88–90.

HOST PLANT. Unknown.

DISTRIBUTION. Spitzbergen.

NOTES. The short processus terminalis and paired, pigmented, segmentally arranged, spinopleural transverse bands should make identification easy.

Acyrthosiphon (A.) thracicus Tashev, 1962

Acyrthosiphon sp. nr. *euphorbiae* Börner; Tashev, 1961 : 158.
Acyrthosiphon thracicus Tashev, 1962 : 419–422.
?*Acyrthosiphon euphorbiae* (Börner); Tuatay & Remaudière, 1965 : 269 nec Börner, 1940.

HOST PLANT. *Euphorbia platphyllos* (Euphorbiaceae).

DISTRIBUTION. Bulgaria, Czechoslovakia (Holman, 1965 : 281).

Acyrthosiphon (A.) titovi Mordwilko, 1932

Acyrthosiphon titovi Mordwilko, 1932 : 57; Titov, 1936 : 157 (as sp. n.); Nevsky, 1951 : 48; Narzikulov & Umarov, 1969 : 192.

HOST PLANT. *Papaver somniferum* (Papaveraceae).

DISTRIBUTION. Kazakhistan.

NOTES. I have not seen a description of this species, although the name has occurred in several lists of insects attacking opium poppy. It may be a *nomen nudum.*

Acyrthosiphon (A.) tutigula (Hottes, 1933)

Adactynus tutigula Hottes, 1933 : 17–19.
Kakimia tutigula (Hottes) Gillette & Palmer, 1934 : 167; Hottes, 1949 : 56; Palmer, 1952 : 284.
Acyrthosiphon tutigula (Hottes) Hille Ris Lambers, 1961 : 182.

SPECIMENS STUDIED. U.S.A.: Colorado, Skyway, *Capnoides* sp., 10.ix.1948, 1 apt.; 7.vii.1951, 6 al. (*F. C. Hottes*), B.M. 1959–403.

HOST PLANTS. *Rosa* sp. (Rosaceae) and *Corydalis* (*Capnoides*) sp. (Fumariaceae).

DISTRIBUTION. Colorado.

BIOLOGY. Alternation between *Rosa* and *Corydalis* (Hille Ris Lambers, 1961 182).

NOTES. The five hairs on the first tarsal segments distinguish *tutigula* from most other *Acyrthosiphon.* The short thick cauda is remniscent of that of *chelidonii,* which feeds on the related family Papaveraceae.

Acyrthosiphon (A.) vasilijevi Mordwilko, 1915

Acyrthosiphon vasilijevi Mordwilko, 1915 : 11; Nevsky, 1929 : 92; Narzikulov & Umarov, 1969 : 174.

HOST PLANT. *Cucurbita pepo* (Cucurbitaceae).

DISTRIBUTION. Turkestan (Mordwilko, 1929 : 79).

NOTES. Described as a green aphid living on the leaves of *Cucurbita* and similar to *caraganae* Chol. Del Guercio (1913 : 94) obtained aphids from cucumbers and melons which he attributed to a variety of *A. cyparissiae.*

Acyrthosiphon (A.) wasintae (Hottes, 1933)

Adactynus wasintae Hottes, 1933 : 19.
Macrosiphum wasintae (Hottes) Gillette & Palmer, 1934 : 200; Hottes, 1948 : 31; Palmer, 1952 : 330.

SPECIMENS STUDIED. U.S.A.: Colorado, Skyway (*Daysophora fruticosa*), 4.vii. 1932, 3 apterous paratypes (*F. C. Hottes*), B.M. 1953–83. Mesa, *Dasiophora* sp., 3.x.1947, 6 oviparae (*F. C. Hottes*).

HOST PLANT. *Dasiophora fruticosa* (Rosaceae).

DISTRIBUTION. Colorado.

Acyrthosiphon (Liporrhinus) chelidonii (Kaltenbach, 1843)

Aphis chelidonii Kaltenbach, 1843 : 41–42.
Siphonophora chelidonii (Kaltenbach) Koch, 1855 : 169–170.
Myzus chelidonii (Kaltenbach) Henrich, 1910 : 32–33; Paik, 1965 : 66.
Macrosiphum chelidonii (Kaltenbach) Opmanis, 1928 : 394.
Acyrthosiphon (?) *chelidonii* (Kaltenbach) Mordwilko, 1929 : 50.
Liphorrhinus chelidonii (Kaltenbach) Börner, 1939 : 82–83.
Acyrthosiphon (*Liphorrhinus*) *chelidonii* (Kaltenbach) Hille Ris Lambers, 1947 : 257–260. Shaposhnikov, 1964 : 603.
Aulacorthum chelidonii (Kltb.) Börner, 1952 : 155.

SPECIMENS STUDIED. AUSTRIA: Carinthia, Hochostewitz, *Chelidonium* sp., 9.viii.1966, 1 apt. (*V.F.E.*). CZECHOSLOVAKIA: Trencin, *C. majus*, 30.v.1944, 11 al. (*J. Holman, P. Stary, V.F.E.*). GERMANY: Berlin, *Chelidonium* sp., 10.v.1950, 2 apt. (*K. Heinze*). KOREA: Seoul, *C. sinense*, 20.v.1965, 1 al.; Suwon, 3.v.1967, 1 al. (*W. H. Paik*). NETHERLANDS: St. Pietersburg, *C. majus*, 5.xi.1939, 5 oviparae (*D. Hille Ris Lambers*).

HOST PLANTS. *Chelidonium majus, C. sinense* (Papaveraceae).

DISTRIBUTION. Austria, Crimea (Holman, 1961 : 8), Denmark (Heie, 1961 : 87), France (Remaudière, 1954 : 235), Germany, Hungary, Korea, Latvia, Netherlands, Poland, Sweden, Switzerland.

NOTES. Type-species of *Liporrhinus* Börner, 1939. *Xanthomyzus glaucii* Narzikulov, (see p. 85) which lives on *Glaucium* in Tajikistan and the apterae of which are devoid of secondary rhinaria, have siphunculi $\frac{1}{10}$–$\frac{1}{8}$ as long as the body and the processus terminal is only 1½ to twice as long as the base of the sixth antennal segment may be related. British records of *chelidonii* are based on misidentified specimens of *Aulacorthum solani* (Kaltenbach).

Acyrthosiphon (Metopolophium) albidus (Hille Ris Lambers, 1947)

Metopolophium albidum Hille Ris Lambers, 1947 : 278–218; Stroyan, 1950 : 93–94.

SPECIMENS STUDIED. AUSTRIA: Tirol, Kitzbuhel, 18–29.viii.1962, 1 aptera, (*A. H. Hayes*). CZECHOSLOVAKIA: Strazovice, *Arrhenatherum elatius*, 29.v.1964, 1 alata, 1 larva (*J. Holman, P. Stary, V.F.E.*). ENGLAND: London, 18.iv.1961, 1 al., 26.v.1961, 1 al; Kent, Gravesend, trap, 1942, 2 al. (*J. P. Doncaster*); Berks, Reading, *A. elatius*, 2.v.1948, 1 apt. (*V.F.E.*); Gloucs., Cirencester, *A. elatius*, 4.vii.1945, 1 apt. (*H. K. Airy Shaw*); Somerset, Long Ashton, 1964, 6 al. (*A. Stringer*); Surrey, Kew, 1.v.1961, 3 al.; 8.v.1964, 1 al.; 14.v.1966, 1 al.; grass tufts, 4.vi.1961, 3 apt., 1 al.; 30.iv.1966, 7 apt., 1 al.; 28–29.v.1966, 1 apt., 5 al.; 1.iv.1967, 2 apt.; *Arrhenatherum elatius*, 4–5.v.1958, 10 apt., 1 al., 1 alatoid nymph, 6 first instar larvae (*V.F.E.*), Box Hill, 16.v.1960, 1 al. (*J.P.D.*); Bucks, Waddesdon, grass, 17.v.1952, 3 apt., 1 al. (*V.F.E.*); Herts, Harpenden, *Dactylis glomerata*, 5.vi.1943, 3 apt.; trap, 13.v.1944, 2 al. (*J.P.D.*); Whetstone, m/v lamp, 16.vi.1960, 1 al. (*P. H. Ward*); Beds, Cardington, trap, 8.vi.1948, 1 al. (*C. G. Johnson*); Cambridge, Shepreth, *A. elatius*, 20.v.1948, 3 apt., 2 al. (*H. L. G. Stroyan*); Lincs, Spalding, trap, 8.vi.1943, 6 al. (*J.P.D.*). NETHERLANDS: St. Pietersberg, *A. elatius*, 5.xii.1939, 3 apterous cotypes (*D. Hille Ris Lambers*), B.M. 1950–554; Limberg, Gulpen, 26.vi.1952, 4 apt., 1 al. (*D.H.R.L. & V.F.E.*). WALES: Anglesey, Llanddona, *Dactylis glomerata*, 27.v.1961, 1 apt. (*V.F.E.*).

HOST PLANTS. Usually *Arrhenatherum elatius*, occasionally *Dactylis glomerata* (Graminaeae).

DISTRIBUTION. Austria, Czechoslovakia, England, Germany, Italy (Hille Ris Lambers, 1966 : 117), Netherlands, Norway (Tambs-Lyche, 1968 : 6), Poland (Szelegiewicz, 1964 : 262), Sweden (Ossiannilsson, 1959 : 387), Wales.

BIOLOGY. Alate males are recorded from Holland in October, where *albidum* overwinters as an egg. Numerous alatae occur in the third generation, and alatae occur from late April to early June in Southern England.

Acyrthosiphon (Metopolophium) alpinus (Hille Ris Lambers, 1966)

?*Macrosiphum solanifollii* (Ashmead) Fenjves, 1945 : 3–124 nec Ashmead, 1882.
Acyrthosiphon catharinae Nevsky, Hille Ris Lambers, 1953 : 63 nec Nevsky, 1928.
Metopolophium alpinum Hille Ris Lambers, 1966 : 111–117.

SPECIMENS STUDIED. SWITZERLAND: Nante, *Rosa* sp., 7.vi.1953, 1 apt., 2 al., (*W. Meier* coll.), D. Hille Ris Lambers leg., B.M. 1954–417.

HOST PLANTS. *Rosa* sp. (Rosaceae) and *Poa alpina* (Gramineae).

DISTRIBUTION. Austria, Switzerland.

BIOLOGY. Alternation between *Rosa* and *Poa alpina*.

NOTES. Hille Ris Lambers, 1966 : 116 points out 'that there are reasons for considering *Metopolophium* Mordw. a sub-genus of *Acyrthosiphon* Mordv. as Mordwilko (1914) himself did'.

Acyrthosiphon (Metopolophium) arctogenicolens Richards, 1964

Acyrthosiphon (*Metopolophium*) *arctogenicolens* Richards, 1964 : 1027–1029.

HOST PLANT. *Taraxacum arctogenum* (Compositae).

DISTRIBUTION. Canadian Arctic.

NOTES. Differs from *Aúlacorthum palustre* H.R.L. in that the head is smooth ventrally (some spinules in *palustre*), the ultimate rostral segment is only $\frac{7}{10}$ as long as the second segment of the hind tarsus (1¼ in *palustre*), the processus terminalis is 3–3½ times as long as the base of the sixth antennal segment (4 in *palustre*) and the siphunculi are 1½ times as long as the cauda (2–2½ in *palustre*).

Acyrthosiphon (Metopolophium) beiqueti (Hille Ris Lambers, 1960)

Metopolophium beiqueti Hille Ris Lambers, 1960 : 259–260.

Host plant. Unknown, 'presumably Gramineae or Cyperaceae'.

Distribution. Quebec.

Notes. Described from 3 apterae viviparae with cauda bearing about 15–21 rather inconspicuous hairs. 'Recognition of this large species should be easy as no other known *Metopolophium* has such a large number of caudal hairs', Hille Ris Lambers, 1960 : 260. *A.* (*M*). *graminearum* Mordw. (p. 78) is similar.

Acyrthosiphon (Metopolophium) chandrani Kanakaraj David & Narayanan, 1968

Acyrthosiphon (*Metopolophium*) *chandrani* Kanakaraj David & Narayanan, 1968 : 102–103.

Host plants. *Bromus unioloides, Poa annua* (Gramineae).

Distribution. Himachal Pradesh.

Notes. The eighth abdominal tergite bearing only 2 hairs and the third antennal segment bearing 2–7 tuberculate rhinaria distinguish *chanandri* from other *Metopolophium* species.

Acyrthosiphon (Metopolophium) dirhodum (Walker), 1849)

Aphis dirhoda Walker, 1848 : 372, nom. nud., (migration) : 1849 : 43–45 (description).
Siphonophora dirhoda (Walker) Buckton, 1876 : 132–134.
Siphonophora longipennis Buckton, 1876 : 146–148.
Myzus gracilis Buckton, 1876 : 176–177.
Siphonophora caianensis Del Guercio, 1900 : 167.
Macrosiphum dirhodum (Walker) Schouteden, 1906 : 238; Theobald, 1913 : 128; Van der Goot, 1915 : 62–66; Opamis, 1928 : 396; Palmer, 1952 : 302.
Macrosiphum longipennis (Buckton) Theobald), 1913 : 118.
Macrosiphum arundinis Theobald, 1913 : 144.
Macrosiphum graminum Theobald, 1913 : 145.
Acyrthosiphon (*Metopolophium*) *dirhoda* (Walker) Mordwilko, 1914 : 82 ; 1919 : 272–291; Narzikulov & Umarov, 1969 : 154–158.
Acyrthosiphon (*Metopolophium*) *graminum* (Theobald) Mordwilko, 1914 : 82; 1919 : 296–297.
Macrosiphum rosaeollae Theobald, 1915 : 110, 111, 112.
Myzus myrmecophilus Theobald, 1926 : 352–354.
Myzus longipennis (Buckton) Theobald, 1926 : 354–356.
Illinoia dirhoda (Walker) Börner, 1926 : 229.
Metopolophium dirhodum (Walker) Mordwilko, 1929 : 86, 89, 90: Hille Ris Lambers, 1947 : 281–286; 1966 : 117; Doncaster, 1961 : 58–61; Heie, 1961 : 90–91; Rupais, 1969 : 262.
Acyrthosiphon dirhodum (Walker) Nevsky, 1929 : 82–83; Börner, 1938 : 4.
Amphorophora dirhoda (Walker) Börner, 1932 : 626.
Aulacorthum dirhodum (Walker) Börner, 1936 : 4.
Acyrthosiphon dirhoda (Walker) Knechtel & Manolache, 1941 : 551–552.
Macrosiphum (*Goidanichiellum*) *dirhodum* (Walker) Martelli, 1950 : 318–324.

SPECIMENS STUDIED. DENMARK: Lyngby, trap, 5–11.vii.1958, 8 alatae (*O. Heie*). ENGLAND: London, Southgate, *Rosa* sp., 17–22.v.1847, 2 apterae, 8 al. (*F. Walker*) 333, 303, 308, B.M. 1847–61, 1953–565; 15.x.1847, 2 al. (*F. Walker*) 301; *Glyceria fluitans*, 5.vii.1847, 2 al. (*F. Walker*) 306; South Kensington, *Rosa* sp., Oct. 1943, 7 oviparae (*M. E. Mosely*). *Dactylis glomerata*, 1.vi.1923, 1 apt., 4 al. (*F. Laing*); Chelsea Physic Gdn, 25–31.v.1960, *Agrostis canina*, 11 apt., 5 al.; *Aira capillaris*, 1 apt.; *Arrhenatherum elatius*, 1 apt., 3 al.; *Asperella hystrix*, 4 apt.; *Avena desertorum*, 1 apt.; *Bromus madritensis*, 7 apt., 7 al.; *B. unioloides*, 4 apt., 2 al.; *Festuca pratensis*, 2 apt., 1 al., 1 al. nymph; *F. rubra*, 2 apt.; *F. varia*, 4 apt., 2 al.; *Glyceria aquatica* var. *variegata*, 8 apt.; *Hordeum jubatum*, 3 apt., 2 al.; *H. murinum*, 2 apt., 4 al.; *H. vulgare*, 1 apt., 1 al.; *Lagurus ovatus*, 1 apt., 1 alatoid nymph; *Larmarkia aurea*, 10 apt., 6 al.; *Nardus stricta*, 1 apt., 2 al.; *Poa nemoralis*, 6 apt., 1 al.; *Triticum spelta*, 10 apt., 9 al., 6 al. nymphs; *T. trichophorum*, 9 apt., 2 al.; *Bromus inermis*, 3 apt., 2 alatoid nymphs; *Carex secta*, 1 apt., 2 larvae (*V.F.E.*); Kent, St Mary's Marshes, *Rosa canina*, 23.vi.1958, 1 apt. (*J. P. Doncaster & V.F.E.*); Bromley, *Rosa* sp., 16.v.1965, 1 al. (*H. C. Dale*); East Malling, 30.x.1936, 1 al. (*G. H. L. Dicker*). Berks, Reading, *Rosa* sp., 24.iv.1949, 1 apt.; *Phalaris arundinacea*, 25.vi.1949, 2 apt.; *Lolium perenne*, 28.v.1950, 11 apt., 1 alatoid nymph; *Carex* sp., 27.v.1950, 2 al. (*V.F.E.*); Oxon, Washford, *Phalaris arundinaria*, 16.vi.1925, 1 apt.; *Glyceria* sp., 20.vi.1925, 1 apt. (*O. W. Richards*); Surrey, Kew, *Rosa* sp., 10.x.1914, 1 al. (*F. Laing*); *Bromus carinatus*, 23.ii.1958, 4 apt., 8 al., 18 first instar larvae, 1.iii.1958, 5 apt., 1 al.; 16.iii.1958, 3 apt.; 1.iv.1967, 4 apt., 7 al.; 6.iv.1968, 8 apt.; 5.vi.1966, 7 apt., 5 al.; 24.viii.1966, 3 apt., 1 al.; 16.x.1966, 2 apt., 2 al. viviparae, 2 alate males; *Bromus sterilis*, 23.ii.1958, 8 apt., 4 al.; 16.iii.1958, 5 apt., 5 first instar larvae; *Festuca rubra*, 12.viii.1962, 2 apt.; *Glyceria aquatica*, 4.xi.1961, 8 apt., 1 al., 2 al. nymphs, 4 first instar larvae; Beddington, *Glyceria plicata*, June 1968, 7 al., 1 alatoid nymph (*A. Hutson*). Sussex, nr Washington, *Avena sativa*, June 1969, 17 apt., 5 al. (*G. R. Potts*); Herts, Harpenden, *Rosa* sp., 26.iv.1944, 6 apt., 5 apt., 3 al.; 10.v.1944, 3 al.; 18.xi.1945, 1 al. ♂ (*J.P.D.*); *Hordeum vulgare*, 26.ix.1949, 1 apt. (*V.F.E.*); Bucks, Eton, *Phalaris arundinacea*, 17.vi.1950, 4 apt.; Waddesdon, grass, 4.viii.1958, 2 apt., 4 al. (*V.F.E.*); Beds, Woburn Abbey, trap, 1 al.♂ (*J.P.D.*); Cambridge, *Rosa* sp., 2.v.1951, 2 apt., Maddingley, grass, 29.vii.1951, 2 apt., 1 al. (*V.F.E.*); Suffolk, Walberswick, *Bromus sterilis*, 22.vi.1951, 1 apt.; Lincs., Bourne Fen, *Avena sativa*, 15.vii.1942, 2 apt., 2 al.; Twenty, *A. sativa*, 15.vii.1942, 2 apt., 2 al.; Kirton Institute glasshouse, *Poa annua*, 20.ii.1945 (*J.P.D.*); Lancs., Burnage, grass, 15.iv.1923, 1 apt. (*H. Britten*); Cumberland, Great Salkeld, *Rosa* sp., 18.x.1912, 1 al. ♂ (*H. Britten*). FINLAND: Tikkurila, *Avena sativa* 'sisu', 1.vi.1963, 9 apt., 3 al. (*M. Markkula*). GERMANY: Bonn, trap, 12–28.x.1961, 3 al. vivip., 3 al. ♂♂ (*E. Haine*). ITALY: Bergamo, *Zea mays*, June 1968, 3 al. and larvae (*F. Baranyovits*). SYRIA: Lebanon, wheat, 2 apt., 1 al. (*A. S. Talhouk*). MOROCCO: High Atlas, S. Asni, S.W. Imlil, 5–5,500′, 26–28.iv.1961, 7 al. (*P. N. Lawrence*). NORWAY: Fana, 12.vii.1954, 1 al.; Vollebekk, 3–14.vii.1954, 20 al. (*H. Tambs-Lyche*). SCOTLAND: Midlothian, Boghall Farm, *Avena sativa*, 8.vii.1939, 1 apt., 1 al. (*A. E. Cameron*). WALES: Bethymaen, 16.vi.1933, 3 al. (*W. Maldwyn Davies*); Flint, Holywell, Mostyn, August 1967, 1 al. (*F. Owens*). YUGOSLAVIA: Srpska Crnja, 4.x.1962, 1 al.; Zemun, *Avena sativa*, 14.vi.1962, 1 apt.; Cacak, *Triticum sativum*, 17.vi.1962, 1 al., 1 alatoid nymph (*N. Tanasijevic*).

KENYA: Muguga, 6,850′, *Bromus catharticus*, 31.x.1952, 2 al.; 17.vii.1954, 3 al., 4 first instar larvae; 10.viii.1954, 6 apt., 9 al. (*V.F.E.*). INDIA: Himachal Pradesh, Fagu, *Triticum vulgare*, 11.vi.1966, 1 al. (*Rabinder Kumar*), Central Potato Research Institute colln. ARGENTINA: Mendoza, barley, July/August 1968, 4 apt., 15 al. (*P. A. Mansur*). BOLIVIA: Cochabama, 'cereals', May 1968, 1 apt., 1 al. (*D. Corbett*) coll., T. Lewis leg. U.S.A.: California, Carmel, *Avena* sp., wild oats, 28.iii.1964, 4 apt., 1 alatoid nymph (*R. C. Dickson, O. Heie, V.F.E.*); Colorado, Ft. Collins, oats, 24.vii.1912, 3 apt., 1 al. (*L. C. Bragg*). Indiana, Lafayette, Oct. 1912, 1 al. (*J. J. Davis*); Oregon, Fruitland, wheat, 10.vii.1957, 2 al. (*G.F.K.*); Salem, *Poa trivialis*, 2.i.1963, 1 apt. (*F. P. Lawson*) coll., G. F. Knowlton leg. Utah, Farmington, *Rosa* sp., 23.x.1958, 4 al. vivip., 1 al. ♂; Garden City, 16.x.1958, 2 al. vivip., 4 al. ♂♂; Hooper, wheat, 11.vi.1930, 2 apt.; Hyrum, 3.x.1958, 1 al. vivip.; Lake Point, wheat, 22.vii.1947, 1 apt., 1 al.; Larketown, *Rosa* sp., 16.x.1958, 2 al.; Lahi, wheat, 18.vii.1936, 1 apt., 1 al., 6 alatoid nymphs; Logan, 6.xi.1958, 1 al. vivip., 13.x.1962, 1 al. ♂; Logan Canyon, Bridge Camp, *Rosa* sp., 16.x.1958, 3 al.; Magna, wheat, 9.vii.1949, 1 al., 2 al. nymphs; Meadow, *Rosa fendleri*, 16.x.1958, 1 al.; Ogden, *R. fendleri*, 14.x.1958, 6 al. vivip., 3 oviparae, 1 al. ♂; Providence, 3.x.1958, 1 al.; Provo, 30.x.1953, 1 al., 30.vii.1958, 1 al.; Salt Lake City, 23.x.1954, 1 al. ♂; Scipio, 7.vii.1958, 1 al. (*G. F. Knowlton*); Washington, Prosser, trap, 14.vii.1955, 11 al. (*R. S. Robertson*); Union Gap, *Rosa* sp., 10.iv.1947, 5 apt.; 24.x.1947, 2 oviparae (*G. F. Knowlton*). CANADA: Manitoba, Winnipeg, 12.x.1963, 1 al. ♂; *Rosa* sp., 8.x.1962, 1 al. vivip.; 15.x.1964, 2 oviparae; *Avena sativa*, 15.vii.1957, 1 apt.; *Hordeum vulgare*, 31.viii.1964, 1 apt. (*A. G. Robinson*); New Brunswick, Fredericton, barley, 1961, 11 apt., 2 al. (*G. B. Orlob*); Saskatchewan, Eston, 15.viii.1965, 1 al. (*A. G. Robinson*).

HOST PLANTS. *Rosa* spp. (Rosaceae) and numerous genera of Gramineae, common on *Bromus* spp. and *Phalaris arundinacea*. Robinson and Hsu (1963 : 135) and Eastop (1966 : 427) list host plants.

DISTRIBUTION. Crimea (Holman, 1961 : 118), Czechoslovakia (Pintera, 1957 : 513), Denmark, England, Finland, France (Remaudière, 1951 : 134), Germany, Iceland, (Prior & Stroyan, 1960 : 273), Italy, Latvia (Rupais, 1961 : 129–130), Morocco, Norway, Poland (Szelegiewicz, 1967 : 84), Portugal (Ilharco, 1969 : 30), Rumania, European Russia, Transcaucasia, Central Asia, Scotland, Sweden, Switzerland (Hille Ris Lambers, 1966 : 117), Turkey (Tuatay & Remaudière, 1969 : 268), Wales, Yugoslavia, Kenya, Himalayas, Argentine, Bolivia, U.S.A., Canada.

BIOLOGY. Alternation between *Rosa* spp. and Gramineae and sometimes Cyperaceae. Walker, 1848 : 372 described the host plant alternation. Orlob (1961 : 497) gives references to recent papers on the biology. Chromosomes. 2n=18 (Sun & Robinson, 1966 : 651).

NOTES. Type-species of *Metopolophium* Mordwilko, 1914. It seems likely that some of the 'greenbug' records from Central and South America apply to *A. dirhodum* and not to *Schizaphis graminum* (Rond.).

Acyrthosiphon (Metopolophium) festucae (Theobald, 1917)

?*Aphis suffragans* Walker, 1848 : 2221 (see Doncaster, 1961 : 129–130).
Myzus festucae Theobald, 1917 : 80–81; 1923 : 8–10; 1926 : 335–336; Jary & Austin, 1935 : 9–14; Warburton, 1935 : 499–506; Massee, 1936 : 164–170.
Myzus sp., Lindroth, 1931 : 152 (teste Hille Ris Lambers, 1955 : 7).
Metopolophium festucae (Theobald) Hille Ris Lambers, 1933 : 175; 1947 : 287–290; 1955 : 7; Prior & Stroyan, 1960 : 272–273.

SPECIMENS STUDIED. ENGLAND: 1 alata without data, possibly the specimen described as *Aphis suffragans* by Walker, 1848 (see Doncaster, 1961 : 129–130); Devon, Coombe Martin, Little Hangman, 19.iv.1957, 1 apt. (*C. A. Prevost*); Seale Hayne, trap, 27.v.1943, 4 al. (*J. P. Doncaster*); Sussex, Washington, spring barley, June 1969, 13 apt., 5 al., winter oats, June 1969, 8 apt., 1 al., (*G. R. Potts*); Kent, Wye, *Festuca ovina*, 25.v.1916, 1 alate type (*F. V. Theobald*), B.M. 1930–204; Gravesend, trap, June, 1942, 2 al. (*J.P.D.*); Berks, Reading, grass, 13.v.1961, 4 apt;. Surrey, Kew, grass, 13.v.1961, 3 al., 8.v.1964, 1 al. (*V.F.E.*); London, *Holcus* sp., 24.v.1923, 6 al., 2 alatoid nymphs (*H. Britten*); *Dactylis glomerata* + *Festuca rubra*, 18.iv.1961, 5 apt., *F. rubra*, 18.iv.1961, 16 apt. (*V.F.E.*); Herts, Harpenden, trap, 8.vi.1942, 1 al.; *Dactylis glomerata*, 5–17.vi.1942, 4 apt., 2 al. (*J.P.D.*); Whetstone, m/v light, 4.vi.1961, 1 al. (*P. H. Ward*); Beds, Cardington, trap, 6.vii.1948, 2 al. (*C. G. Johnson*); Salop, Newport, Harper Adams Agric. Coll., winter oats, 13.v.1935, 5 apt., 4 al. (*H. C. F. Newton*); Isle of Man, Chasms, grass, 27.ii.1949, 2 apt., 1 al. nymph (*V.F.E.*); Derby, wheat, 22.v.1949, 4 apt., 6 al.; Leics, Loughborough, oats, 27.v.1935, 1 apt., 3 al.; Notts, Sherwood Forest, Bestwood Park, '*Agrostis vulgaris* & *Anthoxanthum*', 14.vi.1932, 1 apt., 1 alatoid nymph (*A. Roebuck*); Lincs., Spalding, trap, 8.vi.1943, 12 al. (*J.P.D.*); Northumberland, Tynemouth, 24.vii.1948, 1 al. (*R. S. Bagnall*). FRANCE: Brittany, La Trinité sur Mer, 25.vii.1968, 1 al., *Festuca rubra*, 1.viii.1968, 2 apt. (*V.F.E.*). GERMANY: Kehl, 31.vii.1966, 2 apt. (*V.F.E.*). ICELAND: Reykjavik, grass, 25.vii.1947, 2 apt. (*J. L. Cloudsley-Thompson*); nr. Gandar, '? *Festuca* sp.', 28.vii.1958, 4 apt. (*R. N. B. Prior*). NORWAY: Fana, trap, 10–22.vi.1954, 4 al. (*H. Tambs-Lyche*). SCOTLAND: Aberdeen, Dyce, grass, 4.vi.1964, 1 al. (*L. A. Mound*); Donmouth, *Agropyron repens*, 4.ii.1928, 1 apt. (*G. D. Morison*); Argyll, Ardnamuchan Ben, 15.vii.1962, 2 apt. (*J.P.D.*); Kincardine, Cove, grass, 15.v.1928, 4 apt. (*G. D. Morison*); Midlothian, *Phleum pratense*, 11.v.1944, 11 apt., 1 al.; Edinburgh, *Phleum pratense*, 30.v.1944, 10 apt., 6 al. (*A. E. Cameron*). SWEDEN: L. Tjultrask, 16° 5′ E, 66° N, grass, 29–30.viii.1962, 11 apt., 2 al., 3 alatoid nymphs (*British Schoolboys Exploration Society*). WALES: Anglesey, Llandonna, grass, 6–16.vi.1962, 30 apt., 13 al. (*V.F.E.*); Cardiff, 6.ii.1944, 1 al. (*D. R. Arthur*); Aberystwyth, *Festuca rubra*, S 59, 3.vi.1969, 3 apt., 4 al.; *Lolium perenne*, S 23, 3.vi.1929, 16 apt., 11 al. (*J. A'Brook*). YUGOSLAVIA: Wurzen Pass, ? *Festuca* sp., 10.viii.1966, 2 apt., 1 al. (*V.F.E.*). U.S.A.: California, L.A. Co., Calabavar, *Festuca* turf, 1.ii. 1970, 1 al. (*Williams* coll.), R. C. Dickson leg.

Host plants. Gramineae, particularly *Festuca rubra* but also *F. ovina, Dactylis glomerata, Holcus* sp., *Lolium perenne, Phleum pratense,* barley and oats.

Distribution. Czechoslovakia (Pintera, 1957 : 513), Denmark (Heie, 1961 : 91), England, Faroes, Finland (Heikinheimo, 1966a : 107), France (Remaudière, 1959 : 36–37), Germany, Iceland, Netherlands, Norway (Heikinheimo, 1966*b* : 338); Sweden (Ossiannilsson, 1959 : 488), Switzerland (Hille Ris Lambers, 1966 : 117), ? Argentine (Remaudière, 1963 : 347), California.

Biology. Hille Ris Lambers (1947 : 287) describes fundatrices from the Netherlands and mentions (1955 : 7) alate males from Iceland.

Notes. It is possible that two species are confused under this name. Populations with 2–4 accessory hairs on the ultimate rostral segment are described from England and the Netherlands, but 4–7 is a more normal range in Scotland and Iceland (H.R.L., 1955 : 7), *A.* (*M.*) *montanum* is said to differ from *festucae* by bearing 6–10 accessory hairs on the ultimate rostral segment. It is possible that *festucae* is only one of a number of holocyclic or anholocyclic species derived from the host alternating species *montanum.* Müller (1968 : 131–141) records a red holocyclic race from Northern Germany.

Acyrthosiphon (Metopolophium) frisicum (Hille Ris Lambers, 1947)

Metopolophium frisicum Hille Ris Lambers, 1947 : 290–292; Stroyan, 1950 : 94.

Specimens studied. England: Harpenden, trap, 11–12.vii.1948, 1 al. (*C. G. Johnson*); Soil Sample, 1969, 2 apt. (*C. A. Edwards*); Cambs., nr Harston, 'base of meadow herbage', 17.xi.1949, 1 apt., *Poa pratensis,* April 1949 (in culture), 3 al. (*H. L. G. Stroyan*); Cambridge, grass under logs, 27.i.1951, 1 al., 1 larva. Wales: Anglesey, Llandonna, 6–8.vi.1962, 1 al. (*V.F.E.*).

Host plants. *Poa pratensis, P. trivialis* (Gramineae).

Distribution. England, Germany, Netherlands, Norway (Tambs-Lyche, 1968 : 7), Sweden (Ossiannilsson, 1969 : 31).

Biology. Hille Ris Lambers (1947 : 292) describes apterous males from the Netherlands so *frisicum* appears to be holocyclic on *Poa.*

Acyrthosiphon (Metopolophium) graminearum Mordwilko, 1919

Acyrthosiphon (*Metopolophium*) *graminearum* Mordwilko, 1919 : 291–296; 1921 : 43.
Metopolophium graminearum (Mordwilko) Hille Ris Lambers, 1947 : 281; 1966 : 106. Ossiannilsson, 1969 : 31–32.

Host plants. 'Undetermined Gramineae', *Arrhenatherum elatius* according to Mamontova (1959 : 43).

Distribution. Russia (nr Leningrad) and Sweden.

Notes. Originally described from sexuales but Ossiannilsson obtained a single parthenogenetic female from Sweden which may be the same species. It is similar to *beiqueti* H.R.L. (see p. 74) described from Canada.

Acyrthosiphon (Metopolophium) montanus (Hille Ris Lambers, 1966)

Metopolophium gramineatum (Mordw.) Börner, 1952 : 157 partim, nec Mordwilko, 1919.
Metopolophium montanum Hille Ris Lambers, 1966 : 106–111.

HOST PLANTS. *Rosa* sp. (Rosaceae) and *Poa alpina* (Gramineae).

DISTRIBUTION. Austria, Switzerland.

BIOLOGY. Alternation between *Rosa* and *Poa alpina*.

NOTES. The apterous exules are said to resemble *festucae* but to differ in the presence of 6–10 accessory hairs on the ultimate rostral segment which bears/only 2–7 in *festucae* (p. 78).

Acyrthosiphon (Metopolophium) sophorae Narzikulov & Umarov, 1969

Acyrthosiphon ignotum Mordwilko, Nevsky 1951 : 47 partim, nec Mordwilko, 1914.
Acyrthosiphon (*Metopolophium*) *sophorae* Narzikulov & Umarov, 1969 : 158–159.

HOST PLANT. *Sophora japonica* (Leguminosae).

DISTRIBUTION. Tadzhikistan.

NOTES. As Narzikulov & Umarov's (1969) concept of *Metopolophium* seems closer to that of Börner (1950 : 13; 1952 : 155–157) than to that of Mordwilko (1914 & 1919) and Hille Ris Lambers (1947) which has been followed here, *sophorae* would probably be placed in *Acyrthosiphon* s.str. in the latter system.

Acyrthosiphon (Metopolophium) tener (Hille Ris Lambers, 1947)

Metopolophium tenerum Hille Ris Lambers, 1947 : 293–296; Stroyan, 1953 : 94–95.

SPECIMENS STUDIED. ENGLAND: Berks, Reading, *Deschampsia flexuosa*, 19.ii. 1950, 13 apt. (*V.F.E.*); Derbys., Stanton Moor, '*Nardus stricta* ?', 21.vi.1946, 3 apt., *Vaccinium myrtillus*, 21.vi.1946, 1 apt., 1 al. (*J. P. Doncaster*); nr. Baslow, Garden's Edge, *V. myrtillus*, 24.vi.1956, 1 apt. (*C. A. Prevost*). NETHERLANDS: Bennekom, *Deschampsia flexuosa*, 26.vi.1952, 1 apt., 1 al. (*D. Hille Ris Lambers & V.F.E.*), 22.vi.1954, 3 apt. (*D.H.R.L. & J.P.D.*). NORWAY: Espeland, Fana, 12.vii.1954, 1 al. (*H. Tambs-Lyche*).

HOST PLANTS. *Deschampsia flexuosa, Festuca ovina, F. rubra* (Gramineae).

DISTRIBUTION. England, Germany, Netherlands, Norway, Sweden, Wales.

BIOLOGY. Holocyclic on *Deschampsia flexuosa* and *Festuca* growing in the shade. Hille Ris Lambers, 1947 : 295 describes alate males but says that as the oviparae are in the progeny of apterae viviparae migration was lost long ago. Small samples have twice been collected from *Vaccinium*.

Acyrthosiphon (Rhodobium) porosus (Sanderson, 1900)

Myzus porosus Sanderson, 1900 : 205; Hottes & Frison, 1931 : 340–343; Mason, 1940 : 18.
Macrosiphon rosaefolium Theobald, 1915 : 109; Takahashi, 1925 : 9.

Aulacorthum viride Van der Goot, 1917 : 31–32.
Aulacorthum pseudorosaefolium Blanchard, 1922 : 199–201; 1939 : 978–979.
Aulacorthum sp. Timberlake, 1923 : 456.
Acyrthosiphon rosaefoliae (Theobald) Takahashi, 1931 : 64.
Acyrthosiphon rosaefolii (Theobald) Tseng & Tao, 1936 : 146.
Macrosiphum zoorosarum Knowlton & Smith, 1936 : 264.
Rhodobium rosaefolium (Theobald) Hille Ris Lambers, 1947 : 301–303.
Rhodobium porosum (Sanderson) Hille Ris Lambers, 1948 : 285; MacGillivray, 1963 : 892–896; Takahashi, 1965 : 24; Ilharco, 1968 : 133–142; Smith et al., 1963 : 82–84.
Metopolophium rosaefolium (Theobald) Börner, 1950 : 156; Börner & Heinze, 1957 : 237.
Acyrthosiphon porosum (Sanderson) Börner & Heinze, 1957 : 235; Russell, 1963 : 84.
Metopolophium zoorosarum (Knowlton & Smith) Börner & Heinze, 1957 : 238.
Acyrthosiphon (*Rhodobium*) *porosum* (Sanderson); Kennedy, Day & Eastop, 1962 : 30.

Specimens studied. Many, including Czechoslovakia: Prague, *Rosa* sp., 2.vi.1964, 1 apt., (*V.F.E.*). Egypt: Giza, *Rosa* sp., 22.xi.1920, 1 apt.; 17–31.iii. 1924, 3 apt., 3 al.; 5.iv.1924, 7 apt.; 16.xi.1924, 2 apt., Gezireh, *Rosa* sp., 4–26.v.1924, 18 apt., 1 al. (*W. J. Hall*). England: Herts, Cheshunt, glasshouse, *Rosa* sp., 4.vii.1940, 2 apt. (*E. R. Speyer*). Iraq: Haidari, *Rosa* sp., 21.iv.1967, 1 al. (*Dept. Agric.*). Israel: Mishmar Hasharon, *Rosa* sp., 5.xii.1946, 1 apt. (*E. Swirskii.*) Netherlands, Aabmeer, glasshouse, *Rosa* sp., November 1939, 2 apt., 1 al. (*D. Hille Ris Lambers*). Yugoslavia: Doboj, *Rosa* sp., 18.ix.1963, 4 apt. (*N. Tanasijevic*). Cameroon: Bamenda, *Rosa* sp., 20–25.i.1957, 69 apt., 26.i.1957, 5 al., 6–8.ii.1957, 2 apt., 1 al. (*V.F.E.*). Ethiopia: Alemaya, *Rosa* sp., 16.viii.1963, 4 apt. (*R. G. Hill*). Kenya: Nairobi, *Rosa* sp., 3.iii.1953, 3 apt., 14.vii.1953, 5 apt. (*V.F.E.*). Uganda: Kampala, *Rosa* sp., 10.x.1917, 11 apt., 1 al., part of the sample from which the type-series of *rosaefolium* was selected. Mauritius: Rose Hill, *Rosa* sp., 15.vii.1962, 8 apt. (*A. J. Orian*). Australia: Victoria, Melbourne, *Rosa* sp., 5–12.iv.1959, 16 apt., 7.v.1959, 2 apt. (*V.F.E.*). Fiji: Koronivia, *Rosa* sp., ? 1967, 3 apt. (*Dept. Agric.*). Brazil: São Paulo, Campinas, trap, May/June 1968, 1 al. (*C. L. Costa*). Chile: Santiago, *Rosa* sp., 22.ii.1967, 1 apt. (*J. V. Apablaza*). Jamaica: Hopedale, *Rosa* sp., 24.xi.1925, 7 apt. (*C. G. Gowdey*). U.S.A.: California, Berkeley, *Rosa* sp., 23.iv.1941, 1 apt., 5 al. (*N. W. Frazier* coll.), E. O. Essig leg. Delaware, *Fragaria* sp., 190?, 2 oviparae ex G. B. Buckton colln.; Kansas, Manhattan, trap, 11.v.1965, 1 al. (*J. T. Medler*); New York, Rochester, *Rosa carolina*, 16.vii.1963, 1 apt. (*M. D. Leonard*); Oregon, nr McMinnville, Peuinie Ridge, *Rosa nukkhans*, 1 al.; Utah, St. George, *Rosa* sp., 16.iv.1962, 1 apt. (*G. F. Knowlton*); Virginia, Norfolk, *Fragaria* sp., 9.ii.1949, 3 apt. (*R. W. Brubaker*). Canada: Manitoba, Whitemouth Lake, *Rosa* sp., 12.viii.1964, 1 apt. (*A. G. Robinson*); Nova Scotia, Berwick, *Fragaria* sp., 30.v.1963, 2 apt., 19.vi.1963, 4 apt., 26.vii.1962, 4 apt., 24.ix.1963, 6 apt., 5.xi.1963, 1 apt. vivipara, 7 oviparae, 2 al. ♂♂, 19.xi.1963, 1 apt., 3 ovip., 3 al. ♂♂. Cambridge, *Fragaria* sp., 12.v.1963, 1 al., 27.vi.1963, 1 al., 12–17.vii.1962, 2 apt., 3 al., 17.x.1963, 1 al. ♂. Centerville, *Fragaria* sp., 5.vii.1963, 2 apt., 1 al., Kentville, *Fragaria* sp., 2.x.1962, 1 al. ♂; Fort Williams, *Fragaria* sp., 5.vii.1963, 2 al. (*H. Stultz* coll.), M. E. MacGillivray leg.

Host plants. *Fragaria* and *Rosa* spp. (Rosaceae).

Distribution. Czechoslovakia, England and Netherlands in or near glasshouses.

Egypt, Iraq, Israel, Portugal, Spain (Mimeur, 1936 : 39), Yugoslavia, Cameroon, Ethiopia, Kenya, South Africa (Müller & Schöll, 1958; 395), Uganda, Mauritius, India, Taiwan, Java, Australia, Fiji, Argentina, Brazil, Chile, Cuba (Müller, 1968 : 444), Jamaica, Puerto Rico, Venezuela (Cermelli, 1966 : 254), U.S.A., Canada.

BIOLOGY. Living on either *Rosa* or *Fragaria* without regular alternation. Ilharco, 1968 : 133 records attendance by the ant *Iridomyrmex humilis* and suggests that *porosum* is a recent introduction to Portugal.

NOTES. Type of *Rhodobium* Hille Ris Lambers, 1947. Craig & Stultz (1964 : 235, 237–239) give results from some experiments with *porosum* as a virus vector.

Acyrthosiphon (Tlja) lactucae (Passerini, 1860)

Siphonophora lactucae Passerini, 1860 : 34 (with *Aphis lactucae* Schrank, 1801 queried as a synonym), 1863 : 137; Ferrari, 1872 : 213.
Siphonophora lactucae (Schrank) Schouteden, 1906 : 239 (giving the Passerini reference).
Acyrthosiphon scariolae Nevsky, 1929*a* : 197–198; 1929*b* : 89–91.
Macrosiphum lactucarium Börner, 1931 : 11.
Macrosiphon lactucarius Börner; Börner; 1932 : 627.
Tlja lactucae (Passerini) Mordwilko, 1932 : 55.
Acyrthosiphon (*Lactucobium*) *scariolae* Nevsky; Hille Ris Lambers, 1947 : 255–157.
Macrosiphum barri Essig, 1949 : 151–153.
Macrosiphum scariola (Nevsky) Essig, 1949 : 153.
Lactucobium scariolae (Nevsky) Remaudière, 1951 : 134.
Aulacorthum scariolae (Nevsky) Börner, 1952 : 155.
Acyrthosiphon (*Tlja*) *scariolae* (Nevsky) Hille Ris Lambers, 1953 : 174; Stroyan, 1955 : 334; Shaposhnikov, 1964 : 603.
Acyrthosiphon (*Tlja*) *lactucae* (Passerini) Meier, 1958 : 29.
Acyrthosiphon (*Tlja*) *scariolae* ssp. *barri* (Essig) Kennedy et al., 1962 : 53.
Acyrthosiphon barri (Essig) Russell, 1963 : 84.
Tlja scariolae (Nevsky) Tuatay & Remaudière, 1964 : 269.
Acyrthosiphon scarioli (Nevsky); Leonard, 1968 : 265.
Acyrthosiphon (*Metopolophium*) *scariolae* Nevsky, Narzikulov & Umarov, 1969 : 171–172.

SPECIMENS STUDIED. ENGLAND: Essex, Fobbing, *Lactuca scariola*, 16.vii.1948, 2 apt. (*V.F.E.*); Bucks., Iver, lettuce flowers, 20.ix.1949, 12 apt., 1 al. (*L. Broadbent*); Cambridge, *Lactuca saligna*, 8.x.1951, 25 apt. vivip., 3 al. ♂♂, 5 first instar larvae (*V.F.E.*). FRANCE: Marseilles, *Lactuca* sp., 10.x.1952, 3 apt. (*V.F.E.*). IRAQ: Abu Ghraib, *Lactuca scariola*, 9.v.1966, 1 apt.; *Sonchus* sp., 9.v.1967, 4 apt. (*Dept. Agric.*). ISRAEL: Rehovoth, *Lactuca sativa*, 11.iv.1951, 3 al. (*E. Swirski*). YUGOSLAVIA: ? nr. Skoplje, *L. sativa*, 25.vi.1962, 2 al. (*N. Tanasijevic*). U.S.A.: Arizona, Yuma, *Lactuca* ? *sativa*, 17.iv.1959, 6 apt., 9 al. (*D. Muse & D. Tuttle*); Idaho, Parma, *L. sativa*, seed heads, 25.ix.1947, 2 apt., 2 al. (paratypes of *barri*) (*W. E. Barr* coll.), E. O. Essig leg., B.M. 1950–292; Illinois, Rochford, *L. scariola*, 3.vi.1948, 1 al. (*L. L. English* coll.), W. R. Richards leg.; Montana, 9 m. W. of Whitehall, *Sonchus* sp., 24.vii.1958, 5 apt., 2 al. (*R. C. Dickson*); Utah, Bear Canyon, Mt. Nebo, 2.viii.1962, 1 apt.; Bountiful, wild lettuce, 23.x.1958, 5 apt. vivip., 1 ovipara; Fayette, 22.viii. 1958, 5 apt., 2 al.; Magna, 28.ix.1955, 2 apt.; Medon, 28.vii.1958, 12 apt., 1 al.;

Moab, wild lettuce, 12.vii.1951; Moroni, 21.viii.1963, 3 apt., 2 al.; Vernon, wild lettuce, 5.viii.1958, 20 apt., 1 al.; Wellsville Canyon, 3.x.1963, 2 apt. (*G. F. Knowlton*); Washington, Prosser, 14–21.vii.1955, 7 al.; 9–24.viii.1954, 3 al. (*R. S. Robertson*). CANADA: Manitoba, Winnipeg, *Lactuca scariola*, 28.ix.1964, 2 apt. (*A. G. Robinson*).

HOST PLANTS. *Lactuca saligna*, *L. sativa*, *L. serriola* (=*scariola*), *L. virosa* (Compositae).

DISTRIBUTION. Belgium, Bulgaria (Tashev, 1964 : 182), England, France, Germany, Hungary (Szelegiewicz, 1969 : 90), Iraq, Israel, Italy, Poland (Szelegiewicz, 1965 : 39), Portugal (Ilharco, 1969 : 31), Turkey (Tuatay & Remaudière, 1964 : 269), Crimea (Holman, 1961 : 118), Khazakstan, U.S.A., Canada.

BIOLOGY. Apparently holocyclic on *Lactuca* despite the alate males.

NOTES. Type-species of *Tlja* Mordwilko, 1914. Nevsky (1929) gives the siphunculi as 2⅓ times as long as the cauda but in the Western European specimens examined the siphunculi do not exceed twice the length of the cauda. Hille Ris Lambers (1947 : 257) states 'There is no doubt that my specimens belong to Nevsky's species'. *Aulacorthum porrifolii* Börner, 1950, is said in its original description to resemble *scariolae* but to be very short-haired, with the second tarsal segments bearing only 2 dorsal hairs and living on *Hieracium porrifolium*.

UNNAMED SPECIES OF *ACYRTHOSIPHON*

Most of the species originally mentioned without a binominal have subsequently been named and are included in the synonymy of the species concerned. Remaudière, 1963 : 347, records a still unidentified *Acyrthosiphon* from Argentina.

APHIDS OTHER THAN *ACYRTHOSIPHON* INCLUDED IN THE KEYS

Cryptaphis Hille Ris Lambers, 1947

Cryptaphis Hille Ris Lambers, 1947 : 296–297.

The species described by Takahashi, 1961 : 105–108 feeding on dicotyledons in Japan have spinulose heads and are not included in the keys.

Cryptaphis bromi Robinson, 1967

Cryptaphis poae (Hardy) Robinson & Bradley, 1965 : 42 nec Hardy, 1850.
Cryptaphis bromi Robinson, 1967 : 566–569.

SPECIMENS STUDIED. CANADA: Manitoba, Winnipeg, *Bromus inermis*, 17.v.1965, 1 apterous paratype; 24–25.v.1965, 1 apt., 1 al.; 31.v.1965, 1 alate paratype (*A. G. Robinson*), B.M. 1967–297 & 300.

HOST PLANT. *Bromus inermis* (Gramineae).

DISTRIBUTION. Manitoba.

BIOLOGY. Chromosomes. 2n=16 (Robinson & Chen, 1969 : 512).

Cryptaphis poae (Hardy, 1850)

?*Aphis pilosa* Walker, 1849 : liv; 1852 : 1027 (see Doncaster, 1961 : 106).
Aphis poae Hardy, 1850 : 112.
Cryptaphis setiger Hille Ris Lambers, 1947 : 298–300.
Cryptaphis poae (Hardy) Hille Ris Lambers, 1956 : 229; Doncaster, 1961 : 106–107.

SPECIMENS STUDIED. CZECHOSLOVAKIA: Kostelni Lhota, *Festuca ovina*, 1.vi.1964, 2 apt. (*J. Holman, P. Stary, V.F.E.*). ENGLAND: Devon, Seale Hayne, trap, 27.v. 1943, 1 al. (*J. P. Doncaster*); London, Chelsea Physic Gdns, *Koeleria alpina*, 26.v. 1960, 1 apt. (*V.F.E.*); Surrey, Camberley, etiolated grass stems under stone, 10.vi.1959, 1 apt. (*J.P.D.*); Kew Gdns, *Holcus lanatus*, 26.viii.1962, 1 al. & larva, 9.ix.1962, 3 apt., 1 al. (*V.F.E.*); Herts, Harpenden, trap, 27.vii.1947, 1 al., (*C. G. Johnson*); 28.viii.1950, 1 al. (*Singh*); Cambridge, grass, 21.i.1957, 1 apt. (*V.F.E.*). NETHERLANDS: Bennekom, *Holcus* sp. under stone, 1 apt. (*D. Hille Ris Lambers & V.F.E.*); Grass under stones, 17.vi.1964, 2 apt. (*D.H.R.L. & J.P.D.*); Limberg, Gulpen, grass, 2.vi.1952, 1 apt. (*D.H.R.L. & V.F.E.*). WALES: Aber., 1935 ?, 1 al. (*W. Maldwyn Davies*).

HOST PLANTS. *Festuca ovina, Holcus lanatus, H. mollis, Poa trivialis* (Gramineae).

DISTRIBUTION. Austria (Müller, 1961 : 70), Czechoslovakia, England, France (Leclant, 1966 : 129), Netherlands, Norway (Tambs-Lyche, 1968 : 7), Poland (Szelegiewicz, 1965 : 39), Scotland (Stroyan, 1955 : 334), Wales. The Canadian record (Robinson & Bradley, 1965 : 42) applies to *C. bromi* Robinson.

HYALOPTEROIDES Theobald, 1916

Hyalopteroides Theobald, 1916 : 51; Hille Ris Lambers, 1949 : 212–217.
Hayhurstia Mordwilko, 1921 : 45 nec del Guercio, 1917 : 208.

The type-species *H. pallida* Theobald, 1916 = *humilis* Walker, 1852 (see Doncaster, 1961 : 81–82 for detailed synonymy) differs from *Acyrthosiphon* in having very short siphunculi but *H. palmerae* is included in the key as it is intermediate between *H. humilis* and *Metopolophium*.

Hyalopteroides palmerae Hille Ris Lambers, 1949

Hyalopteroides palmerae H. R. L., 1949 : 216–217.

SPECIMENS STUDIED. U.S.A.: Colorado, Fort Collins, *Elymus* sp., 5.viii.1913, 1 aptera, 15.ix.1913, 4 apt. vivip., 1 ovipara (*L. C. Bragg*), B.M. 1930–204.

HOST PLANT. *Elymus* sp. (Gramineae).

DISTRIBUTION. Colorado.

MICROLOPHIUM Mordwilko, 1914

Microlophium Mordwilko, 1914 : 80, 198–236; 1919 : 237–238; Hille Ris Lambers, 1949 : 201–212.

Microlophium was originally described as a subgenus of *Acyrthosiphon* with the result that the following *Urtica*—feeding aphids have been listed under *Acyrthosiphon, urticae* Schrank, 1801 nec L., 1758 = *evansi* Theobald, 1923, *schranki* Gillette & Palmer, 1934; *carnosum* Buckton, 1876; *sibiricum* Mordwilko, 1914; *rjabushinskiji* Mdw., 1914; *kirgiz* Mdw., 1919.

MYZAPHIS van der Goot, 1913

Myzaphis van der Goot, 1913 : 96; 1915 : 181–188; Nevsky, 1929*b* : 149–153; Jacob, 1946 : 110–117; Hille Ris Lambers, 1948 : 281; Heinze, 1960 : 800–804; Richards, 1963 : 682–687.

The palaearctic species are not likely to be confused with *Acyrthosiphon* and the presence of a dorsal abdominal black patch on the alatae suggests that they are not closely related. Richards (1963) describes a species from Ontario in which the alata does not have a dorsal abdominal black patch and specimens without their last antennal segment would resemble *Acyrthosiphon.*

Myzaphis canadensis Richards, 1963

Myzaphis canadensis Richards, 1963 : 864, 866, 687.

HOST PLANT. *Dasiphora fruticosa* (Rosaceae).

DISTRIBUTION. Ontario.

NOTES. The presence of only 2 hairs on the first tarsal segments is characteristic.

SUBACYRTHOSIPHON Hille Ris Lambers, 1947

Subacyrthosiphon H. R. L., 1947 : 260–264.

Acyrthosiphon hoffmani (see p. 91) was transferred to *Subacyrthosiphon* by Tao, 1963 : 177–178, but as no material is available it is not included in the key. From the description it appears to bear longer hairs than most *Acyrthosiphon* species and very much longer hairs than the type and only other species of *Subacyrthosiphon* which is very short-haired.

Subacyrthosiphon cryptobius Hille Ris Lambers, 1947

Subacyrthosiphon cryptobium H. R. L., 1947 : 261–264; Stroyan, 1953 : 92; 1955 : 334.
Metopolophium cryptobium (H. R. L.) Börner, 1952 : 156.

SPECIMENS STUDIED. ENGLAND: Somerset, Winsford, *Trifolium repens,* 23.ix, 1955, 15 apterae, 12.x.1955, 11 oviparae; Bucks, Waddesdon, 6.viii.1952, 1 apt.. *Trifolium repens,* 8.viii.1952, 2 apt., 23.ix.1952, 1 apt. (*V.F.E.*); Beds., Cardington, trap, 21.viii.194?7, 1 alata (*C. G. Johnson*); Salop, Newport, Harper Adams Inst., trap, 4.vi.1946, 1 al. (*J. P. Doncaster*). NORWAY: Vollebaeck, As, 10.viii.1954, 1 al. (*H. Tambs-Lyche*).

HOST PLANT. *Trifolium repens* (Leguminosae).

DISTRIBUTION. England, Netherlands, Norway (Tambs-Lyche, 1968 : 6), Sweden (Ossiannilsson, 1959 : 482).

BIOLOGY. Holocyclic on *Trifolium repens*, apterous sexuales being produced in the autumn.

VOLUTAPHIS Bärner, 1930

Volutaphis Börner, 1939 : 90.
Silenobium Börner, 1939 : 78–79.

Volutaphis centaureae Börner, 1939, would not be confused with *Acyrthosiphon* as it has distinctly clavate siphunculi but *V. schusteri* resembles *Acyrthosiphon* in general appearance.

Volutaphis schusteri (Borner, 1939)

Silenobium schusteri Börner, 1939 : 78–79; Hille Ris Lambers, 1947 : 265–267.
Volutaphis schusteri (Börner) Börner, 1952 : 116.

SPECIMENS STUDIED. ITALY: Ruta-San Rocco, *Melandryum album*, 23.iv.1955, 3 apt., (*H. L. G. Stroyan & D. Hille Ris Lambers*), May 1955, 3 apt., 2 al. (*D.H.R.L.*).

HOST PLANT. *Silene alba* (Caryophyllaceae).

DISTRIBUTION. Germany, Italy.

SPECIES NOT SEEN BUT WHICH MAY COME IN OR NEAR *ACYRTHOSIPHON*

Macrosiphum purshiae Palmer, 1938

Macrosiphum purshiae Palmer, 1938 : 356; 1952 : 321.

HOST PLANT. *Purshia tridentata* (Rosaceae).

DISTRIBUTION. Colorado.

NOTES. The description reads like that of an unusually long haired *Acyrthosiphon* but as specimens have not been seen it is not formally transferred.

Xanthomyzus glaucii Narzikulov, 1966

Xanthomyzus glaucii Narzikulov, 1966 : 575–578; Narzikluov & Umarov, 1969 : 70–72.

HOST PLANT. *Glaucium fimbrilligerum* (Papaveraceae).

DISTRIBUTION. Tajikistan.

NOTES. The apterae are without secondary rhinaria, the siphunculi are only $\frac{1}{10}$–$\frac{1}{8}$ as long as the body, the processus terminalis is 1½ to twice as long as the base of the sixth antennal segment. The cauda bears 10 hairs. The description together with the host plant suggests an affinity with *Liporrhinus* (p. 72).

SPECIES NOT SEEN AND PROBABLY NOT BELONGING TO *ACYRTHOSIPHON*

Acyrthosiphon berkemiae Shinji, 1941

Acyrthosiphon berkemiae Shinji, 1941 : 1158–1162.

HOST PLANT. *Berchemia racemosa* (Rhamnaceae).

DISTRIBUTION. Japan.

NOTES. The reticulated apices of the siphunculi figured in the original description are suggestive of *Macrosiphoniella* or *Sitobion* rather than *Acyrthosiphon.*

Acyrthosiphon elaeocarpi Tao, 1963

Acyrthosiphon elaeocarpi Tao, 1963 : 190–192.

HOST PLANT. *Elaeocarpus serratus* (Elaeocarpaceae).

DISTRIBUTION. Taiwan.

NOTES. Probably nearer *Aulacorthum* or *Sinomegoura* than *Acyrthosiphon.* The surface of the head is described as spinulose but otherwise, apart from the paler appendages, the description resembles that of *Acyrthosiphon evodiae* Takahashi. The length given for the siphunculi is probably a misprint as it does not agree with the illustration.

Acyrthosiphon kamtshatkanum Mordwilko, 1914

Acyrthosiphon kamtshatkanum Mordwilko, 1914 : 144; 1915 : 11.
Anameson kamtshaticum (Mordwilko) Mordwilko, 1932 : 240.

HOST PLANT. Unknown.

DISTRIBUTION. Eastern Siberia, Kamchatka.

NOTES. The aptera is described as 3·5 mm long and with the processus terminalis slightly less than twice as long as the base of the sixth antennal segment, about half as long as the third antennal segment and equal in length to the cauda. These proportions separate it from other species currently placed in *Acyrthosiphon* but are reminiscent of oriental aphids from Ericaceae now placed in *Chaetomyzus* Ghosh & Raychaudhuri, 1962, *Ericolophium* Tao, 1963 and *Neoacyrthosiphon* Tao, 1963.

SPECIES NO LONGER INCLUDED IN *ACYRTHOSIPHON*

Only synonyms relevant to the history in *Acyrthosiphon* are quoted.

Amphorophora ampullata Buckton, 1876

Amphorophora ampullata Buckton, 1876 : 187–188; Hille Ris Lambers, 1949 : 231–234.
Acyrthosiphon (*Amphorophora*) *ampullata* (Buckton) Mordwilko, 1914 : 82; 1919 : 247–248.

Amphorophora rubi (Kaltenbach, 1843)

Aphis rubi Kaltenbach, 1843 : 24.
Amphorophora rubi (Kaltenbach) Schouteden, 1906 : 242; Hille Ris Lambers, 1949 : 237–242.
Acyrthosiphon (*Amphorophora*) *rubi* (Kaltenbach) Mordwilko, 1914 : 82; 1919 : 248–263.

Aphis sanguisorbicola Takahashi, 1966

Aphis sanguisorbae Shinji, 1935 ; 740 nec Schrank, 1801.
Acyrthosiphon sanguisorbae (Shinji) Shinji, 1941 : 1162–1164 (teste M. Miyazaki in litt.)
Aphis sanguisorbicola Takahashi, 1966 : 547–548.

Aulacophora formosana (Takahashi, 1923)

Amphorophora formosana Takahashi, 1923 : 30.
Acyrthosiphon formosana (Takahashi) Takahashi, 1931 : 65; Shinji, 1941 : 705–706.
Aulacophora formosana (Takahashi) Tao, 1963 : 175–176.

Aulacorthum cirsicola (Takahashi, 1923)

Macrosiphum cirsicola Takahashi, 1923 : 10–11.
Acyrthosiphon circifoliae Shinji, 1935 : 251; 1941 : 1156–1158.
Acyrthosiphon circicola (Takahashi) Shinji, 1941 : 705).
Aulacorthum cirsicola (Takahashi) Takahashi, 1965 : 113.

Aulacorthum ibotum (Essig & Kuwana, 1918)

Macrosiphum ibotum Essig & Kuwana, 1918 : 46–47; Shinji, 1941 : 858–864.
Aulacorthum ibotum (Essig & Kuwana) Takahashi, 1965 : 111.
Acyrthosiphon ibotum (Essig & Kuwana) Hille Ris Lambers, in Takahashi, 1965 : 113 (footnote).

Aulacorthum kerriae (Shinji, 1930)

Illinoia kerriae Shinji, 1930 : 137–140.
Acyrthosiphon kerriae (Shinji) Shinji, 1935 : 249; 1941 : 709–617.
Aulacorthum kerriae (Shinji) Takahashi, 1965 : 111.

Aulacorthum nipponicum (Essig & Kuwana, 1918)

Macrosiphum nipponicum Essig & Kuwana, 1918 : 48–49.
Macrosiphum paederiae Takahashi, 1921 : 11; 1923 : 15, 73.
Acyrthosiphon paederiae (Takahashi) Takahashi, 1931 : 64; Shinji, 1941 : 706.
Aulacorthum nipponicum (Essig & Kuwana) Takahashi, 1965 : 102–105.

Aulacorthum solani (Kaltenbach, 1843)

(Text-fig. 8)

Aphis solani Kaltenbach, 1843 : 15–16.
?*Siphonophora malvae* (Mosley) Passerini, 1863 : 137 partim nec Mosley, 1841.
Macrosiphum chelidonii (Kaltenbach) Theobald, 1913 : 37 nec Kaltenbach, 1843.
Macrosiphum malvae (Mosley) Theobald, 1913 : 131 partim nec Mosley, 1841.
Aulacorthum pelargonii (Kaltenbach) Mordwilko, 1914 : 52, fig. 36 nec Kaltenbach, 1843.
Acyrthosiphon (*Microlophium*) *ranunculi* Mordwilko, 1914 : 81.
Macrosiphum pelargonii (Kaltenbach) van der Goot, 1915 : 80–82 nec Kaltenbach, 1843.
Acyrthosiphon ranunculinum (Walker) Mordwilko, 1919 : 239–243 nec Walker, 1852.
?*Macrosiphum sobae* Shinji, 1922 : 787 teste Takahashi, 1965 : 113.
Macrosiphum matsumuraeanum Hori, 1926 : 52–83.
Myzus chelidonii (Kaltenbach) Theobald, 1926 : 346–347 nec Kaltenbach, 1843.
Acyrthosiphon pisi (Kaltenbach) Takahashi, 1931 : 63 nec Kaltenbach, 1843, teste Takahashi, 1939 : 26.
?*Acyrthosiphon kuwanai* Takahashi, 1932 : 295–297.
Aulacorthum solani (Kaltenbach) Hille Ris Lambers, 1933 : 174; 1949 : 182–194.
?*Aulacorthum kuwanai* (Takahashi) Takahashi, 1939 : 27; 1965 : 113.
Acyrthosiphon (*Aulacorthum*) *solani* (Kaltenbach) Kennedy et al., 1962 : 52.
Acyrthosiphon solani (Kaltenbach) Russell, 1963 : 84.

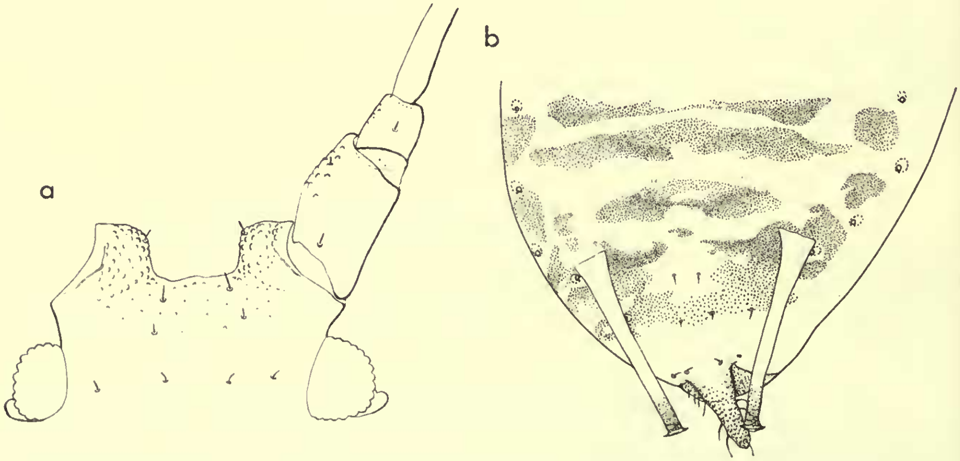

FIG. 8. *Aulacorthum solani*, a, head of aptera; b, apex of abdomen of alata. a × 90, b × 45.

Aulacorthum solani has been misidentified in Asia with *Acyrthosiphon pisum* (Harris). The wide host plant range of *Aulacorthum solani* includes many Leguminosae, the usual hosts of *Acyrthosiphon pisum.* The short cauda will distinguish *solani* from most *Acyrthosiphon* species in addition to the strongly spinulose ventral surface of the head. Because *Aulacorthum solani* frequently occurs on pot plants including *Pelargonium,* it has been identified by some authors with *Aphis pelargonii* Kaltenbach. Gomez-Menor (1963 : 48–51) uses the name *Aulacorthum pelargonii* for an aphid from an unknown host plant resembling *Ulex* in the Canary Islands. Gomez-Menor's alatae have only 11–16 rhinaria on the third antennal segment, which is very few for *pelargonii,* but the base of the sixth antennal segment is 140–148µ long, which is too short (in specimens with body length 2½ mm) for *solani.* The dorsum of the alatae is not pigmented and the processus terminalis is given as 5¼ times as long as the base of the sixth antennal segment, while that of the aptera is given as 3½ times as long. It seems probable that Gomez-Menor's *pelargonii* is different from both Kaltenbach's and Mordwilko's species. Hille Ris Lambers (1949 : 183–185) lists the numerous synonyms of *Aulacorthum solani,* only those relevant to *Acyrthosiphon* are given above.

Aulacorthum symplocois (van der Goot, 1917)

Aulacorthum symplocois van der Goot, 1917 : 28–31.
Acyrthosiphon symplocois (van der Goot) Takahashi, 1936 : 602.
Megoura symplocois (van der Goot) Takahashi, 1950 : 594.

Aulacorthum takahashii (Mason, 1923)

Amphorophora sp., Takahashi, 1923 : 32.
Amphorophora takahashii Mason, 1925 : 67.
Acyrthosiphon takahashii (Mason) Takahashi, 1931 : 65; Shinji, 1941 : 724.
Aulacorthum takahashii (Mason) Tao, 1963 : 178.

Aulacorthum (Perillaphis) perillae (Shinji, 1924)

Macrosiphum perillae Shinji, 1924 : 363.
Macrosiphum perillae Takahashi, 1924 : 25–27.
?*Acyrthosiphon perillae* (Takahashi) Takahashi, 1931 : 64; Shinji, 1941 : 716.
Aulacorthum perillae (Takahashi) Takahashi, 1939 : 117.
Acyrthosiphon perillae (Shinji) Shinji, 1941 : 716–721.
Aulacorthum (*Perillaphis*) *perillae* (Shinji) Takahashi, 1965 : 99–101.

Ericolophium itoe (Takahashi, 1925)

Macrosiphum itoe Takahashi, 1925 : 11–13.
Ericolophium itoe (Takahashi) Tao, 1962 : 187.

See note under *Neoacyrthosiphon taiheisianum* below.

Impatientinum impatiens (Shinji, 1922)

Tuberosiphum impatiens Shinji, 1922 : 789.
Macrosiphum smilaceti Takahashi, 1924 : 101–102; 1937 : 23–24.
Macrosiphum impatiensae Shinji, 1941 : 864–871 (presumed rectification of *impatiens* Shinji, although that reference is not given).
Acyrthosiphon smilaceti (Takahashi) Tao, 1963 : 190.
Impatientinum impatiensae (Shinji) Takahashi, 1964 : 358.
Impatientinum impatiens (Shinji) Takahashi, 1965 : 23–24, 1937.

Metopolophium euryae (Takahashi, 1937)

Macrosiphum euryae Takahashi, 1937 : 7–8.
Metopolophium euryae (Takahashi) Tao, 1963 : 189.

The black siphunculi 2½ times as long as the yellow cauda which bears only 5 hairs, the processus terminalis only 2½ times as long as the base of the sixth antennal segment, the absence of rhinaria from the third antennal segment of the aptera and the presence of a dorsal abdominal black patch make it unlikely that *euryae* really belongs to *Acyrthosiphon*. In the original description it is compared with *Macrosiphum holstii* Takahashi, which has been placed in *Ericolophium* and *Neoacyrthosiphon* (*Pseudoacyrthosiphon*).

Neoacyrthosiphon taiheisianum (Takahashi, 1935)

Macrosiphum taiheisanum Takahashi, 1935 : 504–506.
Acyrthosiphon taiheisanum (Takashashi) Tao, 1963 : 189.
Neoacyrthosiphon taiheisanum (Takahashi) Tao, 1963 : 189.

Ericolophium Tao, (1963 : 187) and *Neoacyrthosiphon* Tao, (1963 : 189) belong to a group of Oriental species resembling *Acyrthosiphon* and associated with *Rhododendron* and related Ericaceae. They differ from *Acyrthosiphon* in that the apterae are devoid of secondary rhinaria, while the third antennal segment of the alate bears 30–110 rhinaria, the body may be variously pigmented or tuberculate and usually bears longer hairs than are usual in *Acyrthosiphon* and the processus terminalis of the described species is only 1½–3½ times as long as the base of the sixth antennal segment. The oldest generic name in the group is *Chaetomyzus* Ghosh & Ray Chaudhuri, 1962 (not *Chaitomyzus* Takahashi, 1960), which having clavate siphunculi and abdominal tubercles least resembles *Acyrthosiphon*. Tao, 1963 : 187–189, Hille Ris Lambers & Basu, 1966 : 17–19 and Ghosh & Ray Chaudhuri, 1969 : 93–96 have contributed to the understanding of this group. There are other undescribed species with both clavate and cylindrical siphunculi with the processus terminalis up to 5 times as long as the base of the sixth antennal segment so the short processus terminalis will not serve to distinguish the group from *Acyrthosiphon*. *Neoacyrthosiphon setosum* Hille Ris Lambers & Basu, 1966 : 17–19, is the only described member of the group not now the type-species of an available generic name. *Neoacyrthosiphon* (*Pseudacyrthosiphon*) *holsti* (Takahashi, 1935) is the type-species of *Pseudacyrthosiphon* Ghosh & Raychaudhuri, 1969.

Sinomegoura citricola (van der Goot, 1917)

Macrosiphoniella citricola van der Goot, 1917 : 34–36.
Tuberosiphum camphorae Shinji, 1922 : 789.
Megoura jacobsoni Mason, 1927 : 88–89.
Sinomegoura citricola (van der Goot) Takahashi, 1960 : 228–229.
Acyrthosiphon citricola (van der Goot) Basu, 1961 : 390; Behura, 1965 : 41.

Sinomegoura photiniae (Takahashi, 1936)

Acyrthosiphon photiniae Takahashi, 1936 : 600–602.
Sinomegoura photiniae (Takahashi) Takahashi, 1960 : 228–229.

Sinomegoura rhododendri (Takahashi, 1937)

Acyrthosiphon rhododendri Takahashi, 1937 : 8–10.
Sinomegoura rhododendri (Takahashi) Takahashi, 1960 : 228.

Subacyrthosiphon hoffmanni (Takahashi, 1937)

Acyrthosiphon hoffmanni Takahashi, 1937 : 56–58.
Subacyrthosiphon hoffmanni (Takahashi) Tao, 1963 : 177–178.

Probably more closely related to *Aulacorthum nipponicum* (Essig & Kuwana) than to the type-species of *Subacyrthosiphon* (see p. 84).

Tubaphis ranunculina (Walker, 1852)

Aphis ranunculina Walker, 1852 : 1046.
Macrosiphum ranunculinum (Walker) Theobald, 1913 : 161.
Myzus ranunculinus (Walker) Theobald, 1926 : 316–318.
Tubaphis ranunculina (Walker) Hille Ris Lambers, 1947 : 312; Doncaster, 1961 : 113–114.

According to Hille Ris Lambers (1949 : 184) Mordwilko found *Aulacorthum solani* on *Ranunculus* and misapplied Walker's name to it (see p. 88).

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HOST PLANT CATALOGUE

Arranged largely according to Engler's system as given in Willis (1966: ii – xlvii)

MONOCOTYLEDONEAE

4. GLUMIFLORAE

1. GRAMINEAE

1. MAYDAE.

Zea mays
Acyrthosiphon (*Metopolophium*) *dirhodum*

7. PHALARIDAE

Phalaris arundinacea
Acyrthosiphon (*M.*) *dirhodum*

8. AGROSTIDEAE

Agrostis canina
Acyrthosiphon (*M.*) *dirhodum*
Agrostis tenuis
Acyrthosiphon (*M.*) *festucae*
Calamagrostis sp.
Acyrthosiphon (*M.*) *dirhodum*
Lagurus ovatus
Acyrthosiphon (*M.*) *dirhodum*

9. AVENEAE

Aira capillaris
Acyrthosiphon (*Metopolophium*) *dirhodum*
Arrhenatherum elatius
Acyrthosiphon (*M.*) *albidum*
A. (*M.*) *dirhodum*
Avena sativa
Acyrthosiphon (*M.*) *dirhodum*
A. (*M.*) *festucae*
Deschampsia caespitosa
Acyrthosiphon (*M.*) *festucae*
Deschampsia flexuosa
Acyrthosiphon (*M.*) *dirhodum*, *tener*
Helicotrichon desertorum
Acyrthosiphon (*M.*) *dirhodum*
Holcus lanatus
Cryptaphis poae
Holcus mollis
Cryptaphis poae
Holcus sp.
Acyrthosiphon (*M.*) *dirhodum*

10. FESTUCAE

Bromus carinatus
Acyrthosiphon (*Metopolophium*) *dirhodum*
Bromus willdenowii (=catharticus)
Acyrthosiphon (*M.*) *dirhodum*
Bromus inermis
Acyrthosiphon (*M.*) *dirhodum*
Cryptaphis bromi
Bromus madritensis
Acyrthosiphon (*M.*) *dirhodum*
Bromus sterilis
Acyrthosiphon (*M.*) *dirhodum*
Bromus unioloides
Acyrthosiphon (*M.*) *chandrani*
A. (*M.*) *dirhodum*
Dactylis glomerata
Acyrthosiphon (*M.*) *albidum*
A. (*M.*) *dirhodum*
Festuca ovina
Acyrthosiphon (*Metopolophium*) *tenerum*
Cryptaphis poae
Festuca pratensis
Acyrthosiphon (*M.*) *dirhodum*
Festuca rubra
Acyrthosiphon (*M.*) *dirhodum*
A. (*M.*) *festucae*
A. (*M.*) *tenerum*
Festuca varia
Acyrthosiphon (*M.*) *dirhodum*

Glyceria maxima (=aquatica)
Acyrthosiphon (*M.*) *dirhodum*
Glyceria plicata
Acyrthosiphon (*M.*) *dirhodum*
Lamarckia aurea
Acyrthosiphon (*M.*) *dirhodum*
Lolium perenne
Acyrthosiphon (*M.*) *dirhodum*
A. (*M.*) *festucae*
Nardus stricta
Acyrthosiphon (*M*) *dirhodum*
Phleum pratense
Acyrthosiphon (*M*) *dirhodum*
Poa alpina
Acyrthosiphon (*M.*) *alpinum*
A. (*M.*) *montanum*
Poa annua
Acyrthosiphon (*M.*) *chandrani*
A. (*M.*) *dirhodum*
Poa arctica
Acyrthosiphon (*A.*) *calvulus*
Poa nemoralis
Acyrthosiphon (*Metopolophium*) *dirhodum*
Poa pratensis
Acyrthosiphon (*M.*) *frisicum*
Poa trivialis
Acyrthosiphon (*M.*) *dirhodum*
A. (*M.*) *frisicum*
Cryptaphis poae

12. TRITICEAE

Agropyron repens
Acyrthosiphon (*Metopolophium*) *dirhodum*
A. (*M.*) *festucae*
Agropyron trichophorum
Acyrthosiphon (*M.*) *dirhodum*
Elymus arenarius
Acyrthosiphon (*M.*) *festucae*
Elymus sp.
Hyalopteroides palmerae
Hordeum jubatum
Acyrthosiphon (*Metopolophium*) *dirhodum*
Hordeum murinum
Acyrthosiphon (*M.*) *dirhodum*
Hordeum vulgare (= sativum)
Acyrthosiphon (*M.*) *dirhodum*
A. (*M.*) *festucae*
Hystrix (= Asperella) hystrix
Acyrthosiphon (*M.*) *dirhodum*
A. (*M.*) *festucae*
Triticum aestivum (= sativum)
Acyrthosiphon (*M.*) *dirhodum*
Triticum spelta
Acyrthosiphon (*M.*) *dirhodum*

2. CYPERACEAE

Carex curta (= canescens)
Acyrthosiphon (*Metopolophium*) *dirhodum*
Carex ovalis (= leporina)
Acyrthosiphon (*M.*) *festucae*

9. LILLIFLORAE

3. LILIACEAE

Polygonatum giganteum (= commutatum)
Acyrthosiphon (*A.*) *niwanista*
Polygonatum multiflorum
Acyrthosiphon (*Metopolophium*) *dirhodum*
Smilacina sp.
Acyrthosiphon (*A.*) *niwanista*

— SMILACACEAE

Smilax china
Impatientinum impatiens
Smilax sp.
Sinomegoura citricola

DICOTYLEDONEAE

ARCHICHLAMYDEAE

12. URTICALES

2. MORACEAE

Ficus spp.
Sinomegoura citricola

3. URTICACEAE

Urtica spp.
Microlophium spp.

16. POLYGONALES

1. POLYGONACEAE

Rumex paulsenianus
Acyrthosiphon (*A.*) *rumicis*

17. CENTROSPERMAE

9. CARYOPHYLACEAE

Honkenya peploides
Acyrthosiphon (*A.*) *auctum*
Silene alba
Volutaphis schusteri
Silene maritima
Acyrthosiphon (*A.*) *auctus*
Stellaria media
Acyrthosiphon (*A.*) *auctus*

18. RANALES

17. LAURACEAE

Cinnamon camphora
Sinomegoura citricola
Persea americana
Sinomegoura citricola

19. RHODEALES

1. PAPAVERACEAE

Chelidonium majus
Acyrthosiphon (*Liporrhinus*) *chelidonii*
Glaucium fimbrilligerum
Xanthomyzus glaucii
Glaucium sp.
Acyrthosiphon (*A.*) *ilka*
Papaver nudicaule
Acyrthosiphon (*A.*) *bidentis*
A. (*A.*) *ilka*
Papaver somniferum
Acyrthosiphon (*A.*) *ilka*
A. (*A.*) *papaverinum*
A. (*A.*) *titovi*

2. FUMARIACEAE

Corydalis sp.
Acyrthosiphon (*A.*) *tutigula*

3. CRUCIFERAE

Cakile maritima
Acyrthosiphon (*A.*) *auctus*
Capsella bursa-pastoris
Acyrthosiphon (*A.*) *auctus*
A. (*A.*) *pisum*
Lepidium perfoliata
Acyrthosiphon (*A.*) *gossypii*

21. ROSALES

16. ROSACEAE

I. SPIRAEOIDEAE

Sibiraea laevigata
Acyrthosiphon (*A.*) *ignotus*
Spiraea alba, x arguata, bella, chamedrifolia, x cinerea
Acyrthosiphon (*A.*) *ignotus*
Spiraea hypericifolia
Acyrthosiphon (*A.*) *ignotus*
A. (*A.*) *spiraeae*
Spiraea latifolia
Acyrthosiphon (*A.*) *ignotus*
A. (*A.*) *pseudodirhodum*
Spiraea media, nipponica, obovata, x sempervirens, trichocarpa, x vanhouttei
Acyrthosiphon (*A.*) *ignotus*
Spiraea sp.
Acyrthosiphon (*A.*) *soldatovi*
A. (*A.*) *spiraeaellae*

II. PYROIDEAE (POMOIDEAE)

Amelanchier alnifolia
Acyrthosiphon (*A.*) *macrosiphum*
Photinia glabra
Sinomegoura photiniae

III. ROSOIDEAE

1. KERRIEAE

Kerria japonica
Aulacorthum kerriae

2. POTENTILLEAE

a. RUBINAE

Rubus caesius var. turkestanicus
Acyrthosiphon (*A.*) *rubi*
Rubus ellipticus
Acyrthosiphon (*A.*) *rubi elliptici*
Rubus sp.
Acyrthosiphon (*A.*) *rubiformosanus*

b. POTENTILLINAE

Comarum palustre
Acyrthosiphon (*A.*) *pelargonii borealis*
A. (*A.*) *p. potha*
Dasiophora fruticosa
Acyrthosiphon (*A.*) *scalaris*
Dasiophora sp.
Acyrthosiphon (*A.*) *wasintae*
Fragaria vesca
Acyrthosiphon (*A.*) *fragariaevescae*
Fragaria vesca x viridis
Acyrthosiphon (*A.*) *pelargonii rogersii*
Fragaria spp.
Acyrthosiphon (*Rhodobium*) *porosus*
Potentilla alpestris, anglica, anserina, artica, argentea,
Acyrthosiphon (*A.*) *pelargonii borealis*
Potentilla blashkiana, crantzii
Acyrthosiphon (*A.*) *p. borealis*
Potentilla latifolia
Acyrthosiphon (*A.*) *pseudodirhodum*
Potentilla norvegica, ornithopioides, puberula
Acyrthosiphon (*A.*) *pelargonii borealis*
Potentilla recta, reptans, sterilis, villosa
Acyrthosiphon (*A.*) *p. borealis*

c. DRYADINAE

Dryas integrifolia
Acyrthosiphon (*A.*) *brevicornis*
Dryas octopetala
Acyrthosiphon (*A.*) *brevicornis*
Dryas sp.
Acyrthosiphon (*A.*) *pelargonii borealis/potha* group.
Geum rivale
Acyrthosiphon (*A.*) *pelargonii borealis/potha* group.

3. CERCOCARPEAE

Purshia tridentata
'*Macrosiphum*' *purshiae*

5. SANGUISORBEAE

Agrimonia eupatoria
Acyrthosiphon (*A.*) *pelargonii agrimoniae*
Agrimonia odorata
Acyrthosiphon (*A.*) *pelargonii agrimoniae*
Alchemilla alpina, pyrenaica, subcrenata, vulgaris
Acyrthosiphon (*A.*) *pelargonii potha*
Acaena anserinifolia, macrostemum, microphyllum, myrophilum, novazealandica.
Acyrthosiphon (*A.*) *pelargonii borealis*
Poterium sanguisorba (= minor)
Acyrthosiphon (*A.*) *pelargonii poterii*

6. ROSEAE

Rosa canina
Acyrthosiphon (*Metopolophium*) *dirhodum*
Rosa damascena
Acyrthosiphon (*A.*) *catharinae*
Rosa fendleri, glauca
Acyrthosiphon (*Metopolophium*) *dirhodum*
Rosa kokanica, maracandica
Acyrthosiphon (*A.*) *catharinae*
Rosa pomifera, rugosa
Acyrthosiphon (*Metopolophium*) *dirhodum*
Rosa webbiana
Acyrthosiphon (*A.*) *catharinae*
Rosa spp.
A. (*A.*) *pseudodirhodum*
A. (*A.*) *tutigula*
Acyrthosiphon (*Metopolophium*) *alpinum*
A. (*M.*) *montanum*
Acyrthosiphon (*Rhodobium*) *porosum*

18. LEGUMINOSAE

II. CAESALPINIOIDEAE

Cassia sp.
Acyrthosiphon (*A.*) *pisum spartii*

III. PAPILIONACEAE

1. SOPHOREAE

Sophora japonica
Acyrthosiphon (? *M.*) *sophorae*

3. GENISTEAE

Cytisus austriacus capitatus, pilosus, rhodopeum
Acyrthosiphon (*A.*) *parvus*
Cytisus sp.
Acyrthosiphon (*A.*) *pisum spartii*
Genista anglica
Acyrthosiphon (*A.*) *ericetorum*
Genista nigricans
Acyrthosiphon (*A.*) *pisum spartii*
Genista tinctoria
Acyrthosiphon (*A.*) *pisum spartii*
Sarothamnus monspessulanus
Acyrthosiphon (*A.*) *pisum spartii*
Sarothamnus scoparius
Acyrthosiphon (*A.*) *parvus*
A. (*A.*) *pisum spartii*
Spartium junceum
Acyrthosiphon (*A.*) *pisum spartii*

4. TRIFOLIEAE

Medicago carstiensis, falcata, lupulina
Acyrthosiphon (*A.*) *p. pisum*
Medicago sativa
Acyrthosiphon (*A.*) *kondoi*
A. (*A.*) *loti*
A. (*A.*) *p. pisum*
Melilotus officinalis
Acyrthosiphon (*A.*) *p. pisum*
Ononis repens
Acyrthosiphon (*A.*) *pisum ononis*
Ononis spinosus
Acyrthosiphon (*A.*) *pisum ononis*
Trifolium arvense, dubium, hybridum
Acyrthosiphon (*A.*) *p. pisum*
Trifolium medium pannonicum, pratense
Acyrthosiphon (*A.*) *p. pisum.*

Trifolium repens
Acyrthosiphon (A.) p. pisum
Subacyrthosiphon cryptobium
Trifolium spp.
Acyrthosiphon (A.) brevicaudata
A. (A.) kondoi
Trigonella foenum-graecum
Acyrthosiphon (A.) p. pisum

5. LOTEAE

Anthyllis hermanniae
Acyrthosiphon (A.) caraganae
Anthyllis vulneria
Acyrthosiphon (A.) loti
Dorycnium herbaceum
Acyrthosiphon (A.) loti
Lotus corniculatus
Acyrthosiphon (A.) loti
A. (A.) p. pisum
Lotus hispidus
Acyrthosiphon (A.) loti
A. (A.) p. pisum
Lotus requienii
Acyrthosiphon (A.) p. pisum
Lotus tenuifolius
Acyrthosiphon (A.) p. pisum
Lotus uliginosus
Acyrthosiphon (A.) loti
A. (A.) p. pisum

6. GALEGEAE

Astragalus alpinus
Acyrthosiphon (A.) loti
A. (A.) p. pisum
Astragalus sp.
Acyrthosiphon (A.) astragali
Caragana arborescens, pygmaea, spinosa
Acyrthosiphon (A.) caraganae
Colutea arborescens
Acyrthosiphon (A.) caraganae
A. (A.) pisum ? spartii
Colutea frutex, media, orientalis
Acyrthosiphon (A.) caraganae
Milettia reticulata
Aulacophora formosana
Phaca frigida
Acyrthosiphon (A.) loti
Robinia pseudacacia
Acyrthosiphon (A.) pisum ? spartii
Sesbania grandiflora
Acyrthosiphon (A.) gossypii
Wisteria chinensis
'*Subacyrthosiphon*' *hoffmanni*

7. FABEAE (VICEAE)

Cicer soongonicus
Acyrthosiphon (A.) hissarica
Lathyrus alphaca, latifolius, nissolia
Acyrthosiphon (A.) p. pisum
Lathyrus odoratus, pratensis, roseus
Acyrthosiphon (A.) p. pisum
Lathyrus sp.
Acyrthosiphon (A.) loti
Lens nigricans
Acyrthosiphon (A.) p. pisum
Pisum sativum
Acyrthosiphon (A.) p. pisum
Pisum sp.
Acyrthosiphon (A.) brevicaudatus
Vicia cracca
Acyrthosiphon (A.) pisum
Vicia faba
Acyrthosiphon (A.) gossypii
A. (A.) p. pisum
Vicia hirsuta
Acyrthosiphon (A.) p. pisum
Vicia sinensis
Acyrthosiphon (A.) p. pisum

9. PHASEOLEAE

Dolichos lablab
Acyrthosiphon (A.) gossypii
Glycine soya
Acyrthosiphon (A.) p. pisum
Phaseolus mungo
Acyrthosiphon (A.) gossypii
Macrocaudus phaseoli
Vigna catjung, sinensis, ungiculata
Acyrthosiphon (A.) gossypii

10. HEDYSAREAE

Arachis hypogea
Acyrthosiphon (A.) bidentis (experimental only)
Coronilla emerus
Acyrthosiphon (A.) caraganae
Hippocrepis comosa
Acyrthosiphon (A.) caraganae
A. (A.) loti
A. (A.) p. pisum
Onobrychis viscaefolia
Acyrthosiphon (A.) p. pisum
Undetermined Leguminosae
Acyrthosiphon (A.) dubium

23. GERANIALES

1. GERANIACEAE

Erodium cicutarium
Acyrthosiphon (A.) pelargonii geranii
A. (A.) p. zerozalphum

Erodium moschatum
Acyrthosiphon (*A.*) *p. pelargonii*
A. (*A.*) *pelargonii zerozalphum*
Erodium trichomanifolium
Acyrthosiphon (*A.*) *pelargonii geranii*
Geranium dissectum, lucidum, molle, pratense, pyrenaicum, pusillum, robertianum, sanguinium
Acyrthosiphon (*A.*) *pelargonii geranii*
Pelargonium domesticum, hederaceum, odoratissimum
Acyrthosiphon (*A.*) *p. pelargonii*

4. LINACEAE

Linum grandiflorum
Acyrthosiphon (*A.*) *bidentis*
Linum usitatissimum
Acyrthosiphon (*A.*) *mordwilkoi*

7. ZYGOPHYLLACEAE

Peganum harmala
Acyrthosiphon (*A.*) *gossypii*

9. RUTACEAE

Citrus sp.
Sinomegoura citricola
Evodia triphylla
Acyrthosiphon (*A.* ?) *evodiae*
Murraya sp.
Sinomegoura citricola

19. EUPHORBIACEAE

Bridelia sp.
Sinomegoura citricola
Euphorbia cyparissias
Acyrthosiphon (*A.*) *cyparissiae*
A. (*A.*) *euphorbiae neerlandicum*
Euphorbia esula
Acyrthosiphon (*A.*) *cyparissiae*
A. (*A.*) *euphorbiae neerlandicum*
Euphorbia helioscopia
Acyrthosiphon (*A.*) *moltshanovi* (based on one specimen only).
Euphorbia palustris
Acyrthosiphon (*A.*) *e. euphorbiae*
Euphorbia pithyusa ovalifolia
Acyrthosiphon (*A.*) *e.* ? *euphorbiae*
Euphorbia platyphyllos
Acyrthosiphon (*A.*) *thracicus*
Euphorbia polychroma
Acyrthosiphon (*A.*) *euphorbiae neerlandicum*
Euphorbia seguierana (= gerardiae)
Acyrthosiphon (*A.*) *cyparissiae*
Euphorbia virgatum
Acyrthosiphon (*A.*) *cyparissiae turkestanicum*
Euphorbia sp.
Acyrthosiphon (*A.*) *euphorbinus*

24. SAPINDALES

5. ANACARDIACEAE

Mangifera sp.
Sinomegoura citricola

21. BALSAMINACEAE

Impatiens spp.
Impatientinum spp.

25. RHAMNALES

1. RHAMNACEAE

Berchemia racemosa
'*Acyrthosiphon*' *berkemiae*

2. VITIDACEAE

Vitis sp.
Aulacorthum kuwanai

26. MALVALES

1. ELAEOCARPACEAE

Elaeocarpus serrulatus
'*Acyrthosiphon*' *elaeocarpi*

5. MALVACEAE

Gossypium spp.
Acyrthosiphon (*A.*) *gossypii*
Acyrthosiphon (*A.* ?) *gossypicola*
Malva neglecta
Acyrthosiphon (*A.*) *gossypii*
Malva sp.
Acyrthosiphon (*A.*) *p. pelargonii*

27. PARIETALES

7. THEACEAE

Eurya japonica
Aulacorthum symplocois
Eurya sp.
Aulacorthum euryae
Thea sp.
Sinomegoura citricola

15. BIXACEAE

Bixia sp.
Sinomegoura citricola

29. MYRTIFLORAE

14. MYRTACEAE

Eugenia sp.
Sinomegoura citricola

16. ONAGRACEAE
Epilobium latifolium
Acyrthosiphon (A.) pelargonii borealis

30. UMBELLIFLORAE

2. UMBELLIFERAE
Laserpitium siler
Acyrthosiphon (A.) n. nigripes
Peucedanum officinale
Acyrthosiphon (A.) nigripes peucedani
Seseli austriacum
Acyrthosiphon (A.) nigripes blattnyi
Seseli leucospermum
Acyrthosiphon (A.) nigripes blattnyi
Torylis africana
Acyrthosiphon (A.) bidentis
Undetermined Umbelliferae
Acyrthosiphon (A. ?) navozovi

SYMPETALAE

1. ERICALES

4. ERICACEAE
Pentapterygium serpus
Neoacyrthosiphon (N.) setosum
Pieris japonica
Sinomegoura citricola
Rhododendron formosanum
Neoacyrthosiphon (N.) taiheisianum
Rhododendron lasiostylum
Ericolophium itoe
Rhododendron morii
Neoacyrthosiphon (Pseudoacyrthosiphon) holstii
Rhododendron oldhami
Sinomegoura rhododendri
Vaccinium myrtillus
Acyrthosiphon (Metopolophium) tener
Vaccinium uliginosum
Acyrthosiphon (A.) brachysiphon
A. (A.) knechteli

2. PRIMULALES

3. PRIMULACEAE
Primula kewensis
Acyrthosiphon (A.) primulae

4. EBENALES

3. SYMPLOCACEAE
Symplocos sessilifolia
Aulacorthum symplocois

5. CONTORTAE

1. OLEACEAE
Ligustrum ibota
Aulacorthum ibotum

6. TUBIFLORAE

4. BORAGINACEAE
Mertensia sibirica
Acyrthosiphon (A.) niwanista

6. LABIATAE
Perilla ocymoides
Aulacorthum (Perillaphis) perillae
Salvia sclarea
Acyrthosiphon (A.) salviae

8. RUBIALES

1. RUBIACEAE
Lasianthus sp.
Sinomegoura citricola
Paederia tomentosa
Aulacorthum nipponicum

– NAUCLEACEAE
Nauclea sp.
Sinomegoura citricola

9. CUCURBITALES

1. CUCURBITACEAE
Cucumis melo
Acyrthosiphon (A.) cyparissiae 'var. *cucurbitae*'
Cucumis sativis
Acyrthosiphon (A.) cyparissiae 'var. *cucurbitae*'
Cucurbita pepo
Acyrthosiphon (A.) vasiljevi

10. CAMPANULATAE

6. COMPOSITAE

A. ASTEROIDEAE (TUBULIFLORA)

1. HELIANTHEAE
Bidens pilosa
Acyrthosiphon (A.) bidenticola
Acyrthosiphon (A.) bidentis
Helianthus annuus
Acyrthosiphon (A.) bidenticola

2. ASTEREAE
Aster spp.
Acyrthosiphon (A.) asterifoliae

6. SENECIONEAE

Erechtites valerianaefolia
Acyrthosiphon (*A.*) *bidenticola*
Petasites tricholobus
Aulacorthum cirsicola

10. CYNAREAE

Arctium lappa
Aulacothum cirsicola
Cirsium spicatum
Aulacorthum cirsicola
Saussurea salicifolia
Acyrthosiphon (*A.*) *dauricum* (? true host)

B. LACTUCOIDEAE (LIGULIFLORAE)

Hieracium porrifolium
Aulacorthum porrifolii
Lactuca sativa, serriola (= scariola), virosa
Acyrthosiphon (*Tlja*) *lactucae*
Sonchus oleraceus
Acyrthosiphon (*A.*) *ghanii*
Sonchus sp.
Acyrthosiphon (*A.*) *bidentis*
Taraxacum arctogenum
Acyrthosiphon (*Metopolophium*) *artogenicolens*
Taraxacum officinale
Aulacorthum palustre

UNKNOWN HOST PLANTS

Acyrthosiphon (*A.*) *aurlandicus*
A. (*A.*) *dauricum* (? *Saussurea*)
A. (*A.*) *emeljanovi*
A. (*A.*) *hissarica*)
A. (*A.*) *moltshanovi*
A. (*A.*) *navozovi* (? Umbelliferae)
A. (*A.*) *norvegicum*
A. (*A.*) *orientale*
A. (*A.*) *rjabushinskiji*
A. (*A.*) *svalbardicus* (? Gramineae)
Acyrthosiphon (*Metopolophium*) *beiqueti* (? Gramineae)
'*Acyrthosiphon*' *kamtshakanum*

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INDEX TO GENERA AND SPECIES

(Invalid names in italics)

V. F. Eastop, M.Sc., Ph. D.
Department of Entomology
British Museum (Natural History)
Cromwell Road
London, S.W.7