

the egg parasite complex of British Pentatomoidea (Hemiptera) : Taxonomy  
of Telenominae (Hymenoptera : Scelionidae)

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With 2 Plates and 15 Text-figures

SYNOPSIS

Four new species of *Asolcus* are described from males and females taken in southern England. The male and female of *Telenomus truncatus* and *T. sokolovi* are redescribed from material taken in southern England.

I. INTRODUCTION

Six species of egg parasite of Pentatomoidea were collected in southern England. They were of the family Scelionidae and comprised four species of *Asolcus* and two of *Telenomus*. The identification of these parasites is based on a comparison of telenomid species in the British Museum and on a study of the biomorphology of the European, Mediterranean and Near Eastern species.

It was also found necessary to study the males, particularly in the closely related species. Although the male genitalia were sometimes found to give good diagnostic characters, they appeared to be rather similar in the closely related species. The size of the adult did not appear to be very important, since this was found to be variable, especially in the polyphagous species.

Coloration was variable in the antennae and, to a much lesser extent, in the legs of individuals within some species bred under different conditions and on various hosts in the laboratory. However, it was almost constant and a very useful character in several other species.

Two species of *Asolcus* were found to be specific to only two or three hosts, whereas others were bred from the eggs of more than 10 Pentatomoidea and two others also on one species of Coreidae. The females mated once, and the progeny was of both sexes; unmated females always produced males only. All attempts to cross these parasites, especially closely related species, were unsuccessful.

Holotype females, allotypes and 20 pairs of each of the six British species, as well as 20 pairs of *Asolcus semistriatus* Nees and *A. grandis* Thomson, have been deposited in the British Museum (Natural History), London; 10 pairs of paratypes (females and males) of the new species and all other species discussed in this work are in the Plant Pests and Diseases Research Institute, Evin, Tehran, Iran, and the author's collection.

II. TERMINOLOGY AND METHODS

The terminology of Richards (1956), with slight modifications, was used for morphological features. The descriptions were made from dried specimens mounted

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on card-points, as well as from material killed in Kahle's fluid and mounted on slides in Hoyer's solution. The drawings were made with the aid of a squared eyepiece.

### III. GENUS *Asolcus* NAKAGAWA (= *Microphanurus* KIEFFER)

The species of *Asolcus* dealt with in this work have the following generic characters in common:

Body stout (Plate I). Frons rugose or punctate in greater part. Eyes bare, or with very few minute scattered hairs. Last 6 antennal segments of female forming a club; first segment of male flagellum larger than pedicel. Mandibles tridentate and rather thick. Mesoscutum rugose. Parapsidal furrows feebly indicated or absent. Scutellum finely sculptured or almost smooth. Abdomen nearly as long as wide. Anterior part of second tergite striated, these striae usually extending beyond middle of the sclerite.

The four British species of *Asolcus* can be separated from the closely related *A. grandis* and *A. semistriatus* by means of the following key:

- 1 Legs predominantly brownish-yellow to reddish-yellow in both sexes. Parapsidal furrows very feebly indicated (even under magnifications of  $\times 125$ ). Head distinctly wider than thorax. Antennae of male usually brownish-yellow in greater part . . . . . 2
- At least femora always black in both sexes. Parapsidal furrows absent. Head not distinctly wider than thorax; seen from in front striated in greater part (fig. 10). Antennae of male black or deep brownish . . . . . 3

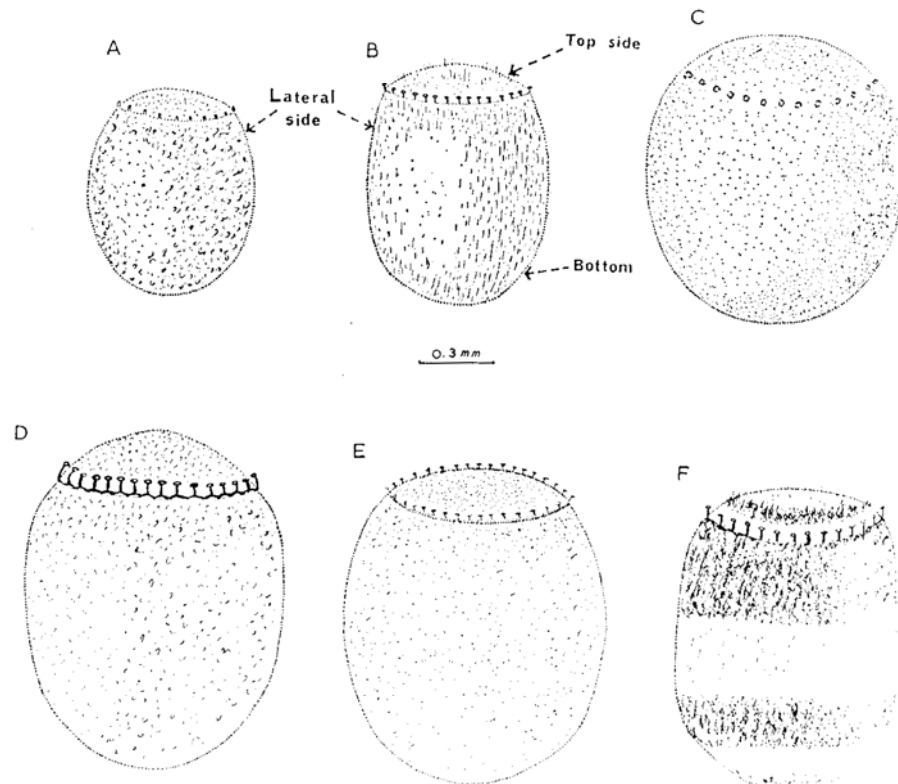


FIG. 1.—Eggs of Pentatomoidea: (A) *Neottiglossa pusilla*; (B) *Aelia acuminata*; (C) *Turygaster integriceps*; (D) *Picromerus bidens*; (E) *Palomena prasina*; (F) *Piczodorus lituratus*.

- 3 Mesoscutum and scutellum finely rugose. Head rather concave seen from above (fig. 4). Antennae of female black. Club normal. Length of fore wing rather short . . . . . *A. waloffae* sp. n.
- Mesoscutum rugose with longitudinal elements. Scutellum weakly rugose, becoming smooth and shiny in the middle. Segments 1-4 of antennae of the female brownish-yellow. Club feebly stout (fig. 3). Length of fore wing normal . . . . . *A. davatchii* sp. n.
- 4 All tibiae almost black. Wings feebly darkened, venation dark or brown; stigmalis and postmarginalis slightly longer (fig. 9). Seen from above, head feebly convex (fig. 10). Antennae of male always black; segments 6-11 square in outline . . . . . 4
- 5 At least front tibiae always brownish-yellow in both sexes. Wings hyaline, venation faintly brown; stigmalis and postmarginalis slightly shorter (normal for the genus) (fig. 9). Seen from above, head feebly concave (fig. 10). Antennae of male brownish; length of segments 6-11 of male longer than wide or subequal . . . . . 5
- 4 First flagellar segment of male twice as long as pedicel and 1.5 times longer than the second segment (fig. 8); rugosity of head strong, particularly on frons; distance between the lateral ocelli and eyes about half the diameter of an ocellus. Veins rather thick; stigmalis less than half length of postmarginalis. Male genitalia longer than in the related species (fig. 11A). Tarsi blackish or deep brown in both sexes  
*A. silwoodensis* sp. n.
- 5 First flagellar segment 1.5 times as long as pedicel but less than 1.5 times as long as the second segment (fig. 8); rugosity of head fine and becoming almost smooth around the frontal line; distance between the lateral ocelli and eyes about equal to diameter of an ocellus. Stigmalis and postmarginalis rather thin, the former about half as long as postmarginalis. Male genitalia short and similar to those of *A. semistriatus* (fig. 11C). Tarsi brownish or brownish-yellow in both sexes . . . . . *A. grandis* Thomson
- 5 All tibiae and tarsi brownish-yellow in both sexes. Head weakly concave (fig. 10). Segments 6-11 of male antennae subequal (fig. 8). Stigmalis about half as long as postmarginalis. Male genitalia as in figure 11C  
*A. semistriatus* Nees
- 4 At least middle and hind tibiae almost black in both sexes. Head somewhat concave (fig. 10). Segments 6-11 of male antennae longer than wide. Stigmalis less than half as long as postmarginalis. Male genitalia different in size and form from those of related species (fig. 11B)  
*A. nixomartini* sp. n.

*Asolcus waloffae* sp. n.

Female

Body black. Antennae black throughout except base of scape and extreme end of pedicel which are reddish-yellow; radicle black. Mandibles tridentate, black, becoming reddish towards apex; wings hyaline, venation brownish. Legs brownish-yellow to reddish-yellow, except coxae which are black; two apical segments of tarsi brownish, or dark.

Head.—Clearly transverse; weakly concave seen from above (fig. 4); width distinctly greater than greatest width of thorax (Plate I). Frons and face rugose and hairy all over except frontal line and bulge of antennal insertions which are rather shiny, smooth with very fine hairs. Distance between lateral ocelli twice that between median ocellus and a lateral one. Eyes with a few minute scattered hairs; length of eye 1.5 times greater than its greatest width.

Antennae.—End of scape does not reach median ocellus. Radicle black, smooth, three times longer than width, whereas in *A. ghorfii* Del. and Voeg. and *A. rufiventris* Mayr (1908) (= *A. anitis* Nixon, 1939) it is shorter and brownish-yellow; scape black and hairy except at its base (it is longer and brownish-yellow in *basalis* Wollaston, *bennisi* Voegelé, *nigribasalis* Voegelé, *rungsii* Voegelé (1965) and *rufiventris* Mayr); pedicel slightly longer than first segment of flagellum, latter being

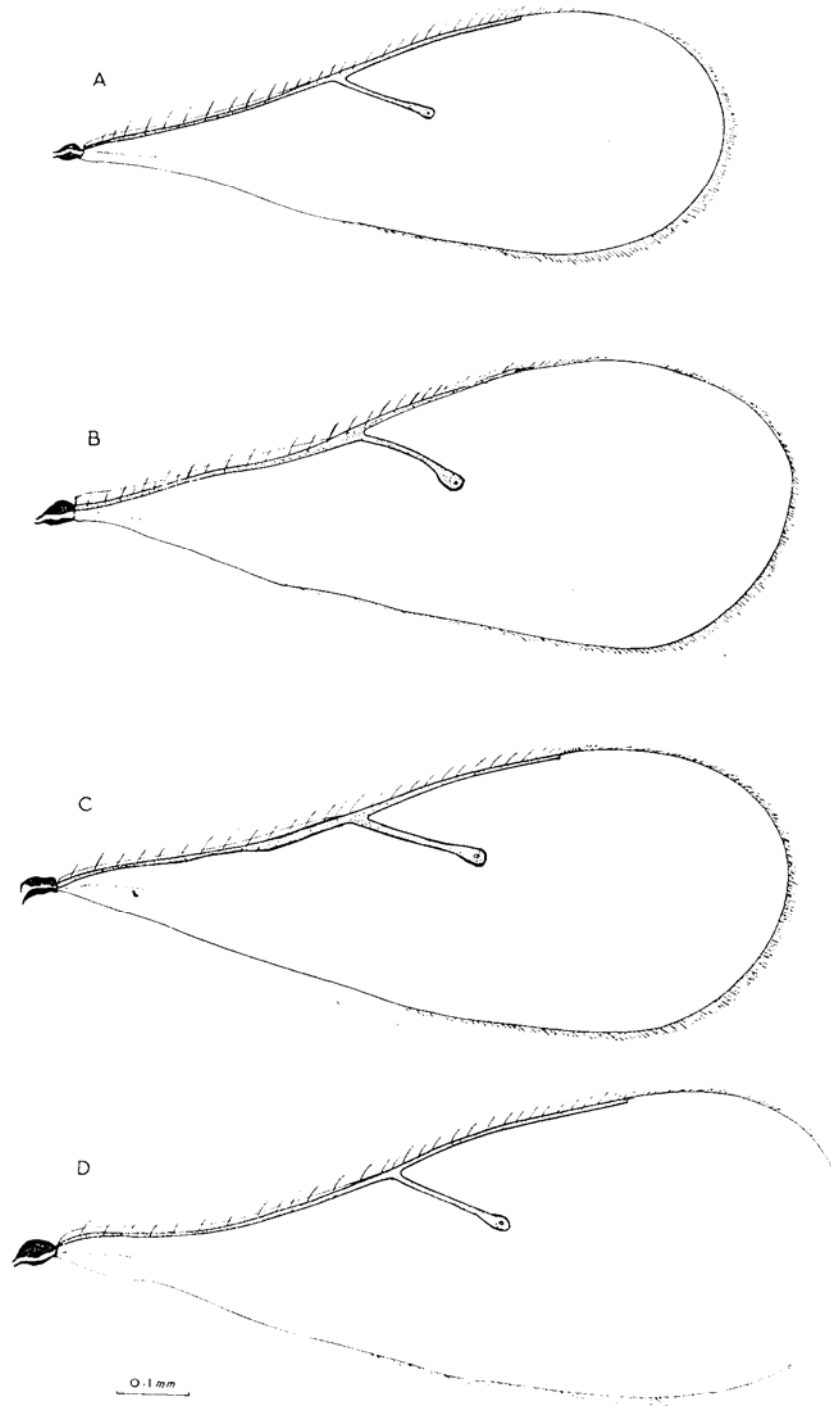


FIG. 2.—Venational details of right fore wing of females of: (A) *Asolcus waloffae* sp. n.; (B) *A. nigribasalis*; (C) *A. bennisi*; (D) *A. ringsi* Voegelé.

distinctly longer than segment that follows; pedicel shorter than in *nigribasalis*; third segment of flagellum about the smallest, half size of pedicel; last 6 segments of flagellum forming a club which is normal in shape and not particularly thick.

*Notes.* Pronotum and mesoscutum feebly shiny, and mostly with fine sculpture and hairs. Scapular furrows obscure, whereas they are conspicuous in *ghorfii*. Sculpture of mesoscutum may end to form longitudinal elements. Scutellum dull, scaly-reticulate laterally, becoming weak and narrow medially, its greatest width more than half that of mesoscutum. Postscutellum swollen anteriorly with a broken marginal line. Length of fore wing about twice greatest width of thorax, posteriorly about twice as long as stigmalis, latter longer than marginalis and differs from that of *ghorfii* (fig. 2).

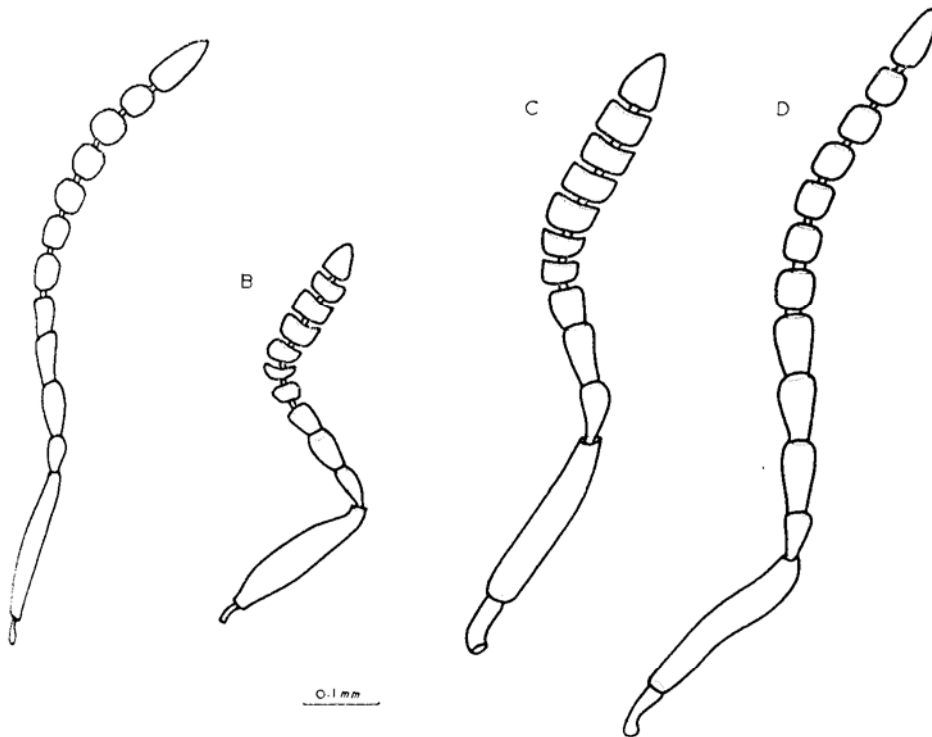


FIG. 3.—Antenna of: (A, B) *Asolcus walloffae* sp. n., ♂, ♀; (C, D) *A. davatchii* sp. n., ♀, ♂.

*Abdomen.*—A little wider than greatest width of thorax (50 : 47), but narrower than head. Width of second tergite distinctly more than its greatest median length (50 : 30); length of second tergite measured by the median line more than three times greater than that of first tergite (33 : 10). Furrows of first tergite very distinct; 4 lateral and 1 sublateral seta present; furrows of second tergite distinct over more than half its length; beyond this striate area there are about 7 setae on each side, situated on a crescentic line. Remaining tergites dull, hairy, feebly punctate.

*Length:* 0.85–1.96 mm.

#### Male

Like the female, except in following details: Body narrower, but of the same colour as female. Sculpture of head and thorax finer than in female; in region of frontal line, head somewhat smooth, rare and shiny. Antennae (fig. 3) hairy and brownish-yellow except last 4 segments of flagellum which are brownish; scape five times longer than radicle; pedicel small, somewhat conical and about half length of first segment of flagellum; first segment of flagellum longer and stouter than second; segments 4 to 9 of flagellum subequal, more or less moniliform, except 8 and 9 which are slightly longer than wide; apical segment 1.5 times longer than preceding segment.

*Genitalia* (fig. 7).

*Length:* 0.78–0.96 mm.

*Holotype* ♀, ENGLAND: Berks., Silwood Park, vi. 1965, bred from eggs of *Ache acuminata* (L.).

*Paratypes*.—24 ♂ 117 ♀, same data as holotype; 11 ♂ 50 ♀, Hants., Yateley; 4 ♂ 16 ♀, Berks., Silwood Park, bred from *Neottiglossa pusilla* (G.).

*Further material*.—Berks., Silwood Park; Hants., Yateley, vi, vii. 1965, several females swept from grass (probably overwintered).

*Host*.—*A. acuminata* and *Neottiglossa pusilla* in the field at Silwood and Yateley. Bred in laboratory from eggs of *Eurygaster integriceps* Puton. This species did not parasitise batches of eggs of *Piezodorus lituratus* (F.) and *Picromerus bidens* (L.) placed in the field at Silwood and Cricket Hill, Yateley.

*Material deposited in the British Museum*.

#### *Asolcus davatchii* sp. n.

##### Female

Body black. Antennae hairy throughout, except radicle, and with a black club; scape, pedicel and 4 following segments brownish-yellow (in some specimens occasionally brownish). Legs hairy, brownish-yellow except coxae which are black. Wings hyaline and their venation bright brownish.

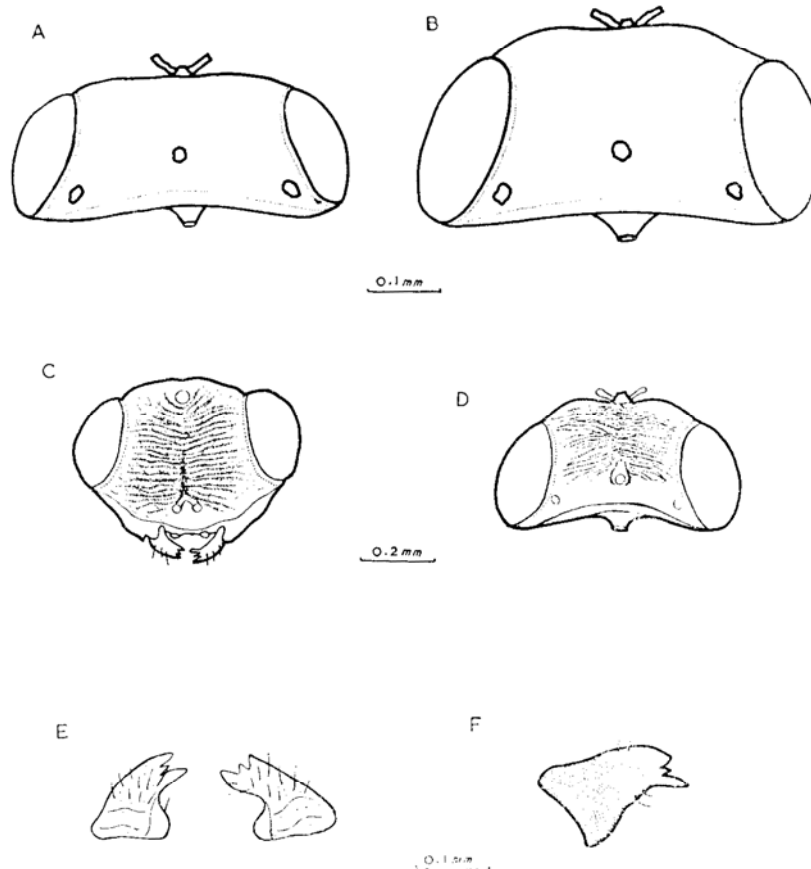


FIG. 4.—(A, B) *Asolcus waloffae* sp. n., ♂, ♀, head from above; (E) the same, left mandible. (C) *A. davatchii* sp. n., ♀, head from in front; (D) the same, head from above; (F) the same, left mandible, ♀.

*Head*.—Very transverse; its width measured from above by a horizontal line passing through lateral ocelli is about three times greatest length measured by a vertical line passing through median ocellus. Lateral ocelli almost touching eyes, distance between them twice that between one of the median ocellus and bulge of antennae; latter conspicuous (fig. 4). Greater part of frontal areas clearly striated (fig. 4); these striations become weak in areas of frons and vertex, the pattern being a little different from the other closely related species. Sculpture of frons towards occipital carina very fine. Length of eye twice its width; the eyes bear some very fine minute hairs. Marginal orbits of eyes and lateral ocelli clear and somewhat shiny. Mandible thick, black with several rather long hairs, becoming feebly reddish towards apex (fig. 4). Clypeus reticulate, becoming smooth and shiny along apical margin.

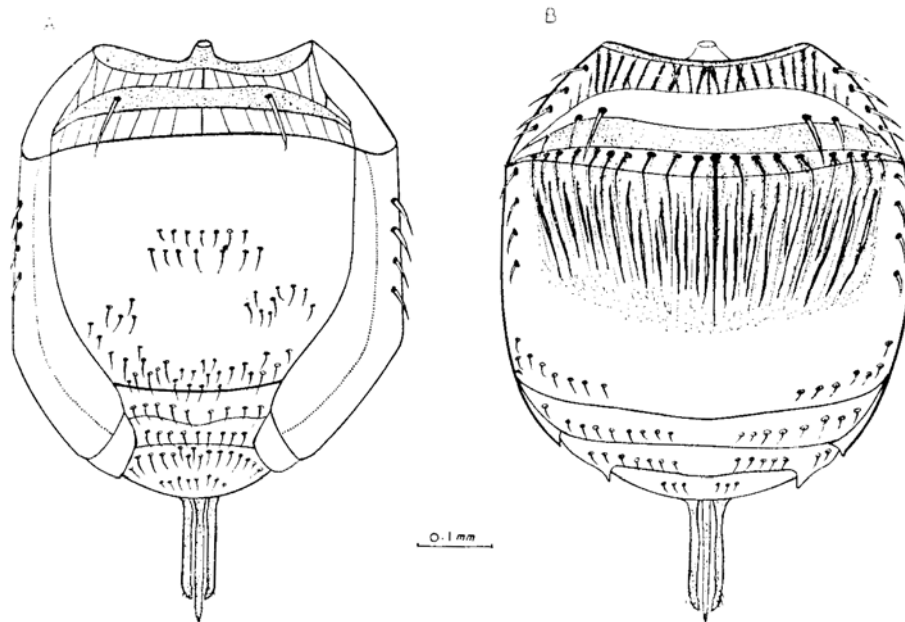


FIG. 5.—Abdomen of *Asolcus davatchii* sp. n., with external ovipositor: (A) ventral; (B) dorsal.

*Antennae* (fig. 3).—Pedicel at least three times longer than wide; distinctly shorter than first segment of flagellum but longer than second; scape about five times longer than its greatest width; first segment of flagellum twice as long as second and about twice its own greatest width; third segment of flagellum transverse and much shorter than preceding segment. Last 6 segments forming a rather stout club of which the first segment is very transverse and brownish in some individuals.

*Thorax*.—Transverse, much wider than its greatest length (50 : 30). Pronotum dull and feebly punctate. Mesoscutum somewhat shiny, hairy, scaly-reticulate, but becoming distinctly striated posteriorly. Parapsidal furrows obscured by adjacent rugosity. Scutellum three times wider than its greatest length; feebly punctate and hairy all over, becoming shiny in middle. Mesopleura finely punctate and hairy with a smooth and rather shiny broken marginal line. Coxae finely punctate. Length of fore wing a little more than twice greatest width of thorax. Stigmals rather short and about half as long as postmarginalis (fig. 6).

*Abdomen*.—Twice as long as mesoscutum; its greatest width about that of thorax, but less than that of head. Second tergite three times longer than first with lateral and sublateral setae present. Striations of first tergite becoming smooth towards apex and shiny in middle. Nearly two-thirds of basal second tergite striated, smooth at apex; about 15 setae form a crescentic line on each side at apex of striated area. Remaining tergites feebly punctate and hairy (fig. 5).

*Length*: 1.05–1.36 mm.

#### Male

Colour of body as in female. Size slightly smaller. Sculpture of head like that of female, its greatest width more than that of thorax (57 : 50); thorax a little wider than abdomen (50 : 46).

Antennae (fig. 3).—Radicle black and smooth; scape hairy, brownish-yellow; six times as long as its greatest width; pedicel rather short; about half as long as first segment of flagellum and equal to fourth flagellar segment, brownish-yellow and hairy; first segment of flagellum distinctly longer than second; first 4 segments of flagellum same colour as pedicel and scape; second segment of flagellum slightly longer than third but considerably longer than fourth segment; fourth equal to fifth; segments 8–11 subequal; blackish in colour and hairy; apical segment conical, as long as the second. Legs same colour as those of female. Wings bright brownish-yellow. Length of fore wing more than twice greatest width of thorax, stigmalis about half as long as postmarginalis. Width of the second abdominal tergite much greater than its length (48 : 32).

Genitalia (fig. 7).

Length: 1.0–1.25 mm.

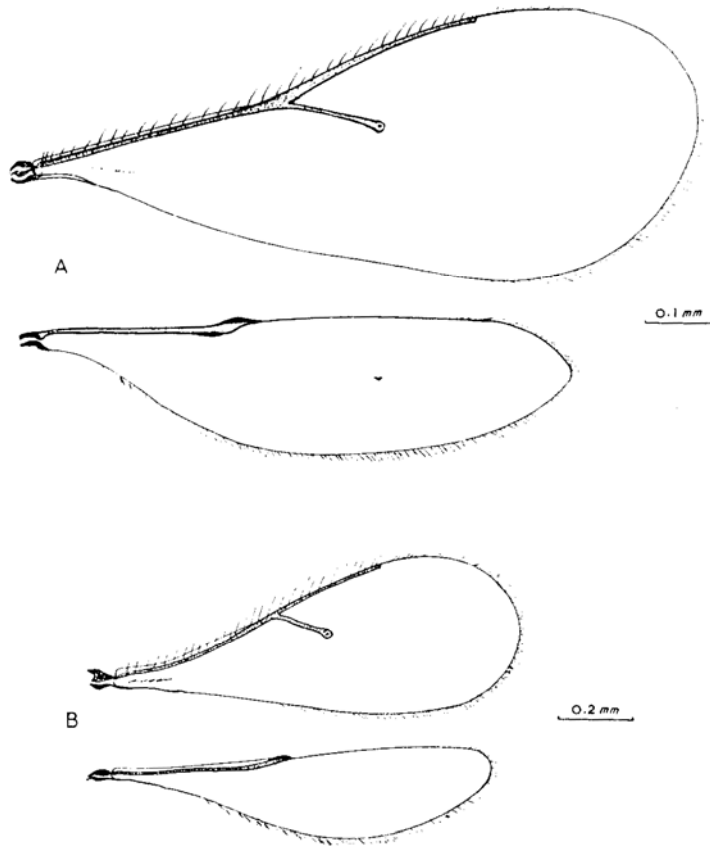


FIG. 6.—Right wings of: (A) *Asolcus waloffae* sp. n.; (B) *A. davatchii* sp. n.

*Holotype* ♀, ENGLAND: Berks., Silwood Park, vi. 1964, bred from egg of *Palomena prasina* (L.).

*Paratypes*.—30 ♂ 140 ♀, same locality and date as holotype, but bred from eggs of *Picromerus bidens* (L.).

*Further material*.—Berks., Silwood Park, Hants., Yateley, vi and early vii 1965: several females beaten from broom, and two swept from grass (probably overwintered).

*Host*.—*Palomena prasina* (L.) in the field (at Silwood and Yateley). Bred in laboratory from eggs of *P. bidens* and in smaller numbers from *Eurygaster integriceps*. This *Asolcus* did not parasitise batches of eggs of *P. lituratus*, *A. acuminata*, *P. bidens* and *E. integriceps* placed in the field at Silwood and at Cricket Hill, Yateley.

I take pleasure in dedicating this species to Professor A. Davatchi, Director of Applied Entomology, University of Tehran, for his interest and continuous advice, and for providing material for this study.

*Asolcus silwoodensis* sp. n.

Female.  
Body black. Antennae black and hairy throughout. Legs black and hairy apart from fore tibiae and first 2 segments of tarsi which are brownish at apex. Wings hyaline; venation rather thick and dark with blackish setae.

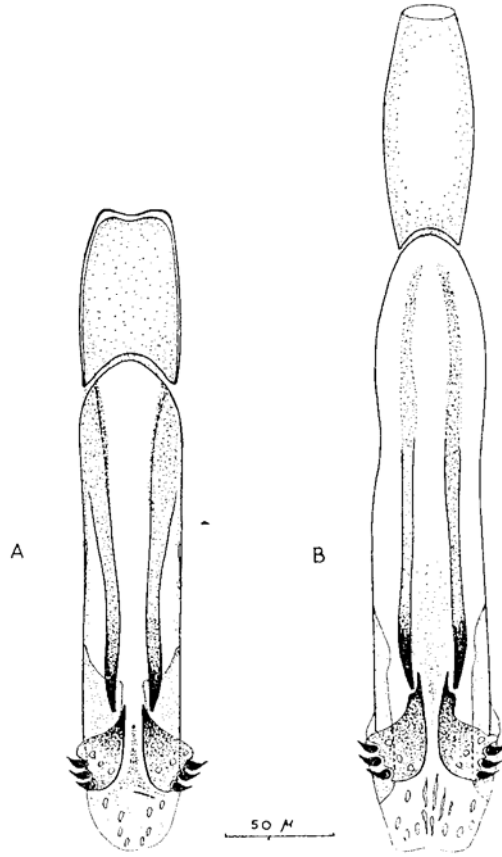


FIG. 7.—Genitalia of: (A) *Asolcus waloffae* sp. n.; (B) *A. davatchii* sp. n.

**Head.**—Strongly transverse and slightly convex (fig. 10). Head seen from in front with transverse striations starting from frontal line and hairy almost all over (fig. 10). Striations of frontal areas clearly visible and shiny on top, except around median orbit which is finely sculptured. Seen from above width of head measured along a horizontal line passing through lateral ocelli three times its length measured along a vertical line passing through median ocellus. Lateral ocelli very close to margin of eyes. Scape almost reaching median ocellus; frons rugose, hairy. Bulge between antennal insertions slightly visible. Distance between lateral ocelli twice that between one of them and median ocellus. Mandibles tridentate, very thick; black at base becoming reddish towards apex.

**Antennae** (fig. 8).—Radicle smooth, three times longer than width. Scape rather long; its length about six times its greatest width and slightly longer than in *grandis*, *nixomartini* and *semistriatus* (fig. 8). Pedicel conical and long, but distinctly shorter than first segment of flagellum; first segment of flagellum rather narrow, twice as long as second (this first flagellar segment clearly longer than in *grandis*); third segment the smallest; last 6 segments forming a club which is of normal shape for the genus and not particularly stout.

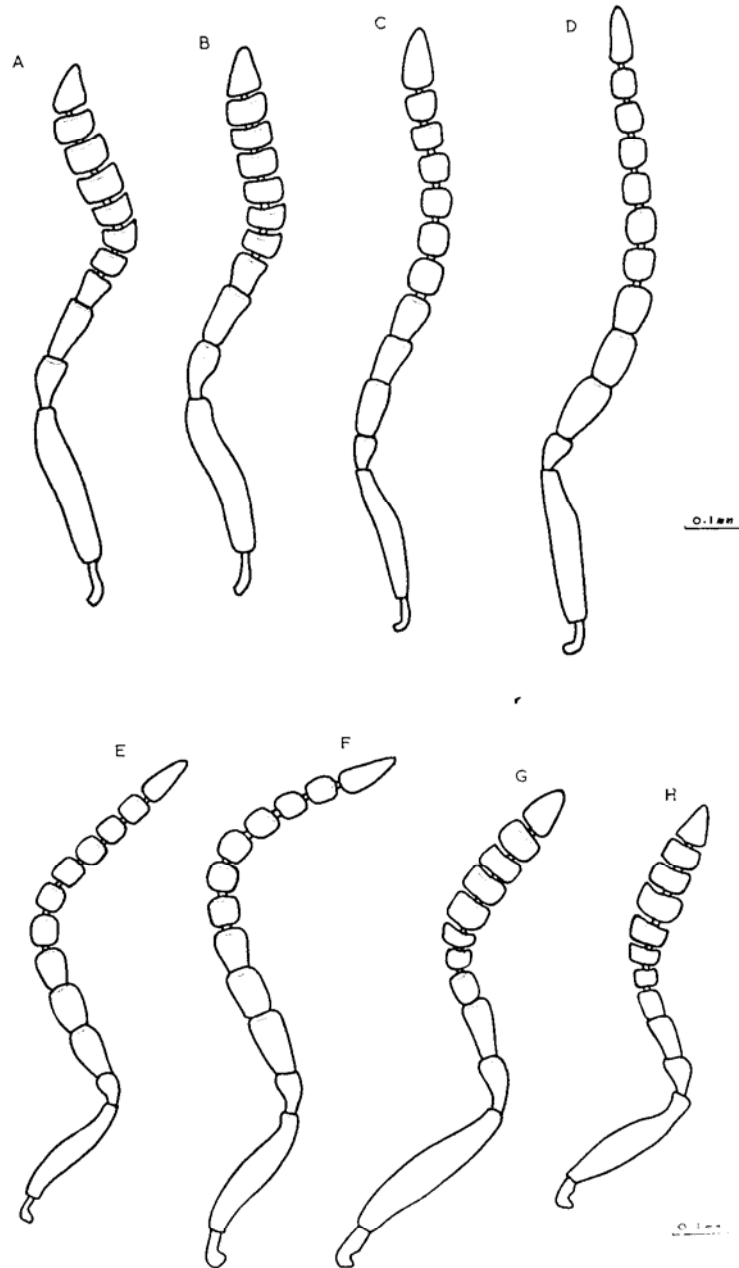


FIG. 8.—Antenna of: (A, C) *Asolcus semistriatus* Nees, ♀, ♂; (B, D) *A. nixomartini* sp. n., ♀, ♂; (E, H) *A. grandis* Thomson ♂, ♀; (F, G) *A. silwoodensis* sp. n., ♂, ♀.

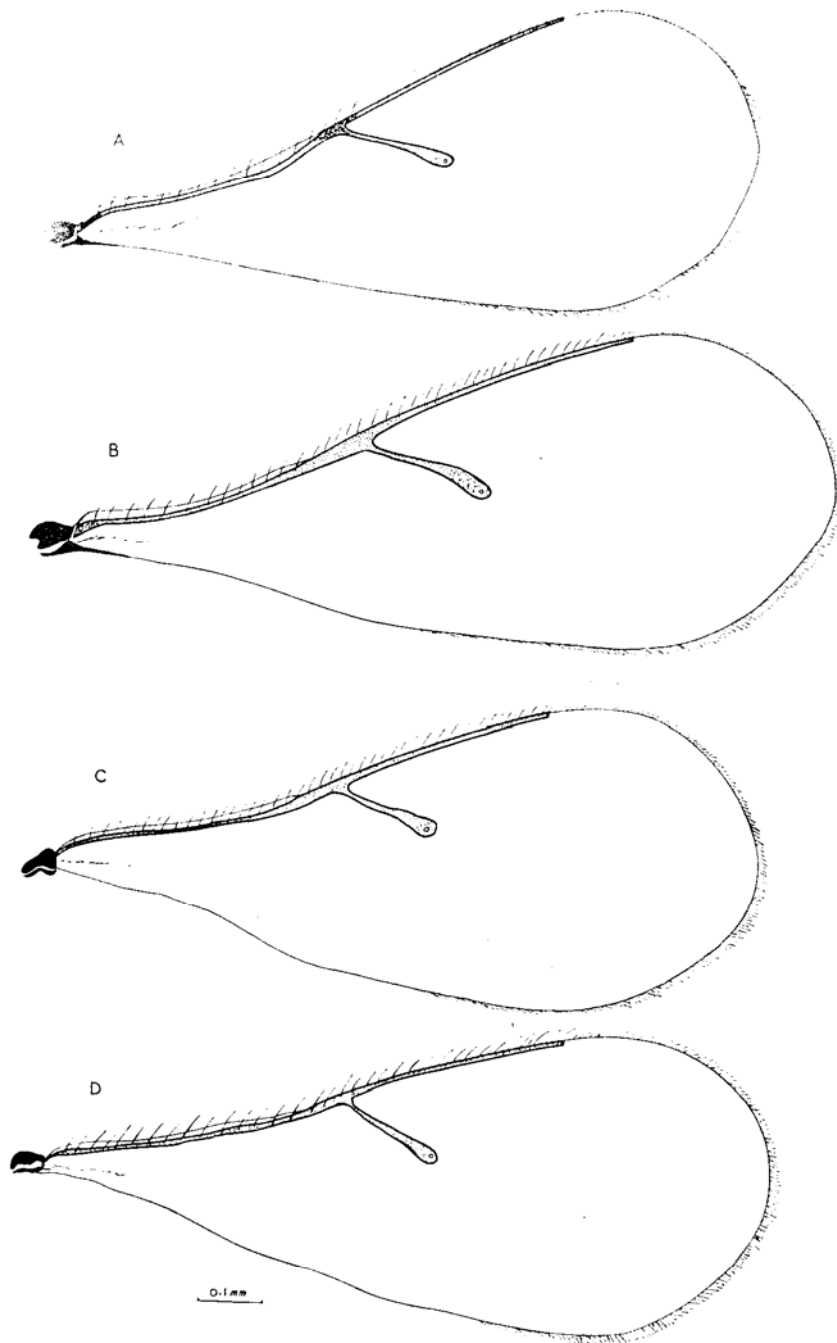


FIG. 9.—Right fore wing of females of: (A) *Asolcus grandis* Thomson; (B) *A. silwoodensis* sp. n.; (C) *A. semistriatus* Nees; (D) *A. nixomartini* sp. n.

*Thorax*.—About as wide as second tergite but narrower than head (60 : 55). Pronotum finely sculptured and hairy. Mesoscutum distinctly longer than wide (50 : 30), rugose and hairy; rugosity striate posteriorly; parapsidal furrows absent. Scutellum finely sculptured and feebly hairy; its greatest width more than three times its length. Postscutellum slightly swollen and punctate. Mesopleurae hairy and somewhat smooth. Wings cloudy, venation blackish; length of fore wing nearly two and a half times greatest width of thorax; longer than in the 3 closely related species (fig. 9); stigmalis long, twice length of marginalis but less than half that of postmarginalis.

*Abdomen*.—About as wide as long (56 : 56). First tergite striated; its greatest width five times its length (50 : 10); 4 lateral and 1 sublateral seta present. Second tergite wider than long (56 : 40); greater part of its surface striated; these striations becoming weak towards apex; about 15 setae on each side form a crescentic line at apex of striated area. Remaining tergites finely punctate and hairy.

*Length*: 0.9–1.5 mm. (Plate II).

#### Male

Black like the female; head slightly wider than thorax (54 : 50), sculpture like that of the female. Antennae always black and hairy throughout; radicle three times as long as wide; scape five times its greatest width and distinctly longer and stouter than in *grandis* (fig. 8); pedicel small, a little shorter than fourth segment of flagellum; first segment of flagellum about one and a half times as long as second, distinctly long and stouter than in *grandis* and *semistriatus* (fig. 8); second segment clearly longer than third; third longer than fourth; segments 8–11 subequal; apical segment conical; about as long as first segment. Legs black throughout apart from fore tibiae and the tarsi which are slightly brownish; fore tibiae always brownish-yellow in *nixomartini* and *semistriatus*, and almost so in *grandis*. Wings clearer than in female; length of fore wing more than twice that of thorax.

*Genitalia* longer and different in degree of chitinisation from that of the other closely related species (fig. 11).

*Length*: 0.8–1.2 mm. (Plate II).

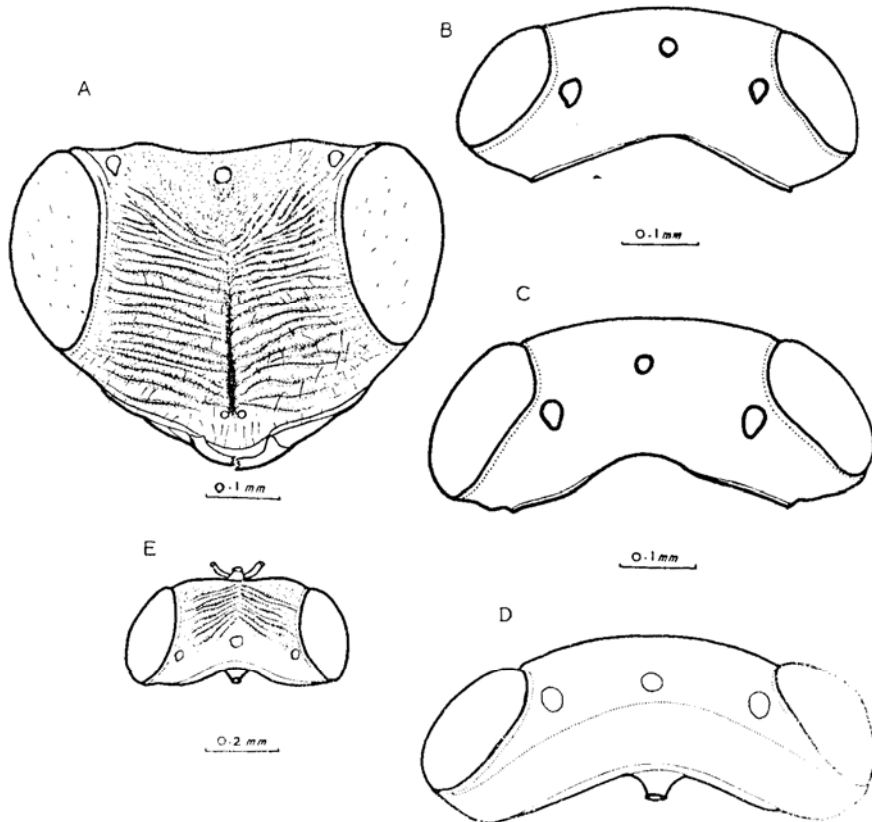


FIG. 10.—Heads of females. (A) *Asoleus nixomartini* sp. n., from front. (B–E) Frontal view of (B) *A. semistriatus* Nees; (C) *A. nixomartini* sp. n.; (D, E) *A. silwoodensis* sp. n.

*Holotype* ♀, ENGLAND: Berks., Silwood Park, vi.1964, bred from eggs of *P. lituratus*.

*Paratypes*.—3 ♀, Berks., Silwood Park, v.1965, on broom; 12 ♂ 58 ♀, Hants., Yateley, vi.1965; 12 ♀, Kent, viii.1965, on gorse; 24 ♂ 136 ♀, Hants., New Forest, viii.1966, on gorse.

*Further material*.—Berks., Silwood Park, Hants., Yateley and New Forest, vi.1965, 1966, many females beaten from gorse and broom (probably overwintered).

*Host*—*P. lituratus* in field. Bred in laboratory from eggs of *A. acuminata*, *N. castilla*, *E. integriceps*, *P. lituratus*, *P. bidens*, *P. prasina* and *Coreus marginatus* (L.). This species parasitised batches of eggs of *E. integriceps* and *P. bidens* placed in the field at Silwood and Yateley.

It gives me pleasure to name this species after Silwood Park in appreciation of the help and assistance I received there during my study at the Imperial College Field Station.

*Asolcus nixomartini* sp. n.

Closely related to *grandis*, *semistriatus* and *silwoodensis*, with all of which it may be compared as follows:

*Female*

Body almost as in *silwoodensis* apart from the head which is somewhat concave (fig. 10). Head striations towards lateral ocelli distinct, whereas they are weak in *semistriatus* and almost absent in *grandis*. Lateral ocelli not clearly visible as in the other species. Mandible slightly narrower than

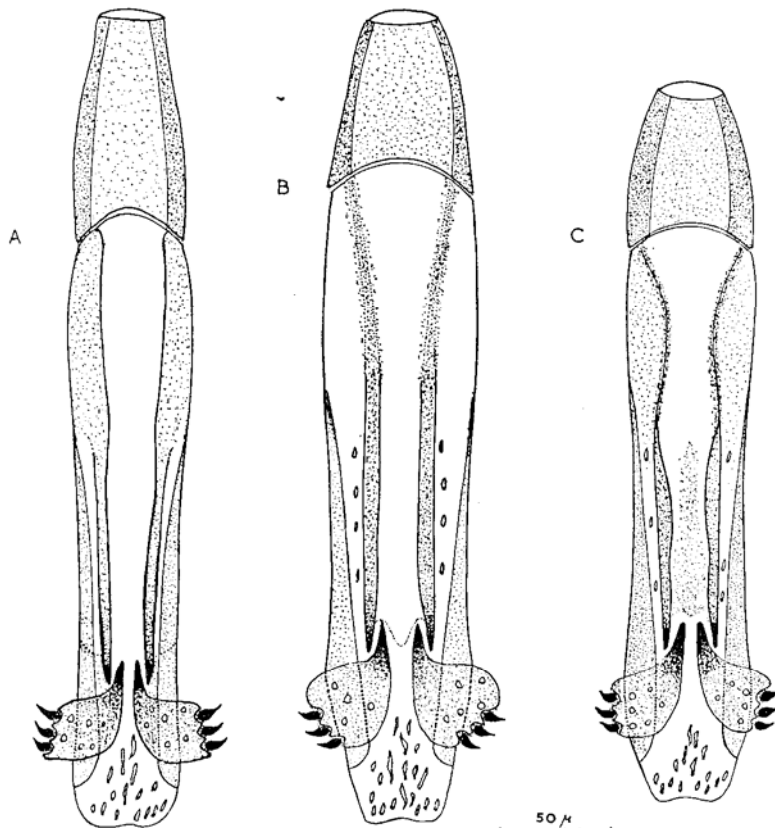


FIG. 11.—Genitalia of: (A) *Asolcus silwoodensis* sp. n.; (B) *A. nixomartini* sp. n.; (C) *A. semistriatus* Nees. All males emerged from eggs of *Picromerus bidens* (L.) at 28° C.

that of *silwoodensis*. Rugosity of head similar to that of *silwoodensis* but stronger than in *grandis* and *semistriatus*.

*Antennae*.—As in *semistriatus*: radicle, scape, pedicel and first segment of flagellum longer than in *grandis* but shorter than in *silwoodensis* (fig. 8).

*Thorax*.—Mesoscutum strongly rugose, as in *silwoodensis*, but the rugosity finer than in *grandis* and *semistriatus*. Fore wing similar to that of *grandis* but distinctly different from that of *silwoodensis* and *semistriatus* (fig. 9). Front tibiae brownish-yellow, as in *A. semistriatus*; in *grandis* only the middle tibia is brownish and in *silwoodensis* the tibiae are deep brown or blackish throughout; middle tibiae almost black except at both extremities which are brownish-yellow as in *grandis*; middle tibia always brownish-yellow in *semistriatus* and black in *A. silwoodensis*.

#### Male

First segment of flagellum distinctly longer than in *grandis* and *semistriatus*; segments 6–11 clearly longer than wide; in the 3 other species they are subequal (fig. 8).

*Genitalia* differ in form, length and degree of chitinisation from other related species (fig. 11); the genitalia of all 4 species were found to be always symmetrical (fig. 11), although in the figures given by Nixon (1939: 133) the claspers of *semistriatus* show 3 teeth on one side and 2 on the other.

*Length*: 0.8–1.2 mm.

*Holotype* ♀, ENGLAND: Berks., Silwood Park, vi. 1963, bred from eggs of *P. lituratus*.

*Paratypes*.—5 ♀, Berks., Silwood Park, vi. 1964; 17 ♂ 93 ♀, Hants., Yateley, vi. 1965; 15 ♂ 81 ♀, Hants., Yateley, vi. 1966.

*Further material*.—Berks., Silwood Park, vi. 1964, 1965 and v. 1966, Hants., Yateley v., vi. 1965, 1966, several females beaten from gorse and broom (probably overwintered).

*Host*.—*P. lituratus* in the field. Bred in laboratory from eggs of *A. acuminata*, *N. pusilla*, *E. integriceps*, *P. lituratus*, *P. bidens* and *P. prasina*. This species parasitised batches of eggs of *E. integriceps* and *P. bidens* placed in the open at Silwood Park and Yateley.

I dedicate this species to Mr. G. E. J. Nixon of the Commonwealth Institute of Entomology and to Dr. H. E. Martin, F.A.O., for their interest and helpful advice as well as for providing material for part of this work.

#### *Relationships of A. nixomartini and A. silwoodensis with other species*

The specimens of *nixomartini* and *silwoodensis* were identified as *semistriatus* and *grandis* by Mr. Nixon; the former species was also identified as *semistriatus* at F.A.O. Sunn Pest Information and Documentation Centre, Paris by Dr. G. Remaudière. After three years' detailed study of the biology, ecology and comparative taxonomy of these *Asolcus* the above identification did not appear to be acceptable.

Attempts to cross-breed the four species were unsuccessful, since only male progeny were produced. A comparison of *grandis*, *nixomartini*, *semistriatus* and *silwoodensis*, based on specimens bred on the same host (*Picromerus bidens* (L.)), under the same conditions, revealed, in my opinion, satisfactory morphological characters for separating them. This comparative study suggests that *nixomartini* is more closely related to *grandis* and *semistriatus* than is *silwoodensis*. The females of these four closely related species never mated except with the males of their own species. The females of *grandis* rarely parasitised, or hatched from, the eggs of *P. bidens*, whereas the eggs of this host were found to be very suitable for hatching the other three species. Moreover, a preliminary survey on the distribution of the Telenomids attacking the eggs of Pentatomoidea in Britain indicated that *silwoodensis* was the most common *Asolcus* and had a much wider distribution in southern England than had *nixomartini*.

In view of the above evidence, it therefore seems reasonable to accept the existence of four species. It seems desirable that more experimental breeding should be carried out to determine the validity of the other closely related species, so that a more reliable classification of these difficult scelionid parasites may be achieved.

IV. GENUS *Telenomus* HALIDAY

The species of *Telenomus* dealt with in this work have the following generic characters in common:

Body normally narrow (fig. 12). Frons smooth and glabrous in greater part. Eyes hairy and large (fig. 12, 14). Antennae of female usually with 11 segments (club of 5 segments (fig. 12, 14)). Antennae of male with 12 segments, segments 3-5 elongate, 6-11 ovate and all similar in size and shape; pedicel and last segment conical in both sexes. Mandibles narrow and tridentate. Head wider than thorax. Mesoscutum finely sculptured; parapsidal furrows absent. Scutellum smooth or feebly sculptured laterally. Hind wing usually narrow with a long fringe (fig. 13). Stigmatis rather long. Abdomen elongated, distinctly longer than its greatest width. Second abdominal tergite rather long, striated at base; these striations very short and never reaching beyond middle of sclerite.

The two species dealt with in this work may be separated as follows:

- 1. Legs predominantly clay-yellow in male and deep brownish in female. Size larger. Behind the lateral ocelli with a sharp transverse ledge (fig. 12). Hind wing rather broad, that of male very large. Stigmatis rather long. . . . . *T. truncatus* Nees
- 2. Legs mainly brownish-yellow in both sexes. Size smaller. No transverse ledge behind the lateral ocelli in both sexes. Hind wing of female narrow; that of male of normal size. Stigmatis rather short. . . . . *T. sokolovi* (Mayr)

*Telenomus truncatus* Nees, 1834

This species seems to be intermediate between *Telenomus* and *Asolcus*. It was first described by Nees (1834) as *Telenomus truncatus* and redescribed by Mayr (1879) and Kieffer (1926). Although the general form of the body, characters of the head, antennae, thorax and abdomen place this species in the genus *Telenomus*, the presence of very minute and scattered hairs on the eyes with rather broad hind wings indicated that it is not typical of the genus.

Since Kieffer's description needs amplification, I redescribe the species as follows:

*Female*

Body black. Antennae black throughout except at extreme apex of scape and pedicel which are brownish in some individuals. Legs hairy, coxae black; trochanters dark brown; femora black except at apex which is brownish. Tibiae and tarsi dark brown (tibiae and tarsi sometimes also brownish in individuals bred in the laboratory). Wings and venation dark brown.

*Head*.—Transverse and weakly concave (fig. 12); width, measured by a horizontal line passing through the later ocelli two and a half times its length (50 : 20), measured by a vertical line passing through the median ocellus; width of head more than that of the thorax (50 : 42). Frons seen from above shagreened—punctate around and between ocelli. Lateral ocelli almost touching eyes. Vertex shagreened—reticulate. Behind each lateral ocellus with a sharp transverse ledge joining the end of a wide groove which reaches hind margin of eye. Genal sulcus finely punctate. Face, as far as median ocellus, and particularly the frontal areas, smooth and shiny. Eyes rather large with some very minute hairs. No distinct bulge between lateral insertion of radicle and base of eye. Mandible tridentate, narrow and brownish towards the apex.

*Antennae*.—Radicle bare, three times as long as wide; scape rather slender, its length five times its greatest width; pedicel shorter than first segment of flagellum; first segment of flagellum twice as long as second; third segment shorter than second, but distinctly longer than fourth, last 5 segments forming a narrow club (fig. 12).

*Thorax*.—Slightly longer than wide (46 : 42), narrower than head. Pronotum finely sculptured. Mesoscutum rugose-punctate, hairy and matt, but becoming somewhat shiny in middle; sculpture forms weak longitudinal elements. Parapsidal furrows absent. Scutellum smooth and shiny, its width nearly twice its length. Postscutellum rugose and dull with a broken marginal line. Length of fore wing three times greatest width of thorax; stigmatis rather long, at least half as long as post-marginalis; hind wing broad (fig. 12), its fringe less than half its greatest width.

*Abdomen*.—Somewhat elongate, longer than its width (50 : 40). First tergite three times as wide as its greatest length; 4 lateral and 1 sublateral setae present; second tergite nearly as wide as long,

weakly striated at base. Number of lateral hairs near apex fewer than in the 4 British species of *Asolcus* dealt with in this paper. Remaining tergites somewhat smooth and with somewhat long, sparse hairs.

Length: 1.2–1.5 mm.

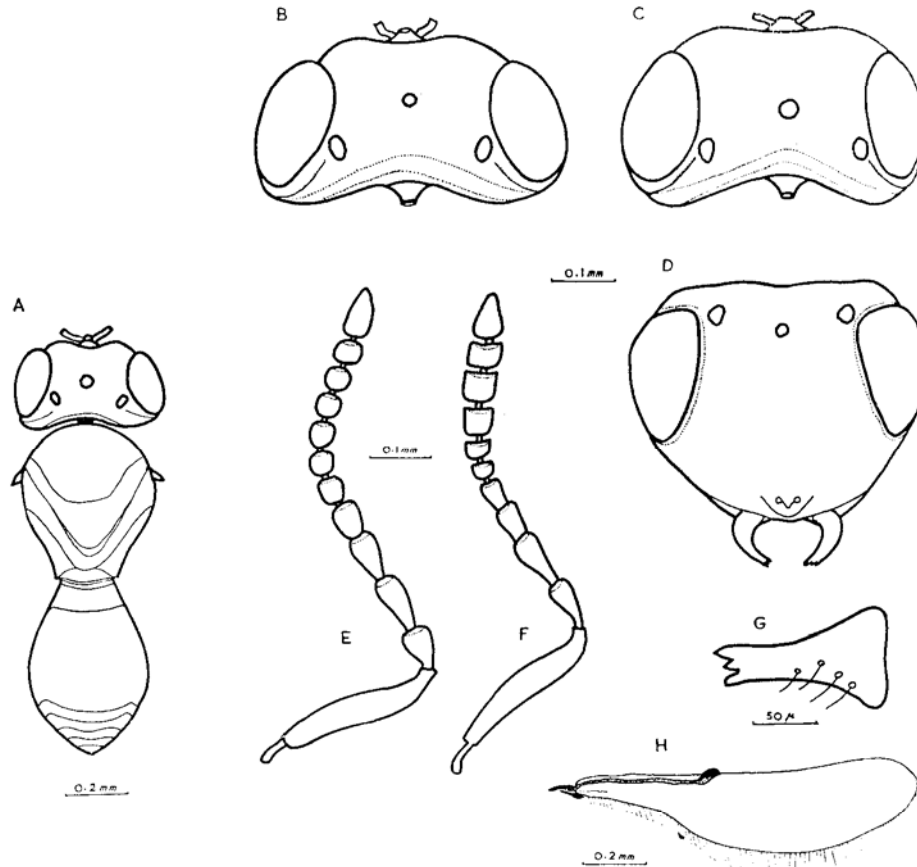


FIG. 12.—*Telenomus truncatus* Nees: (A) outline of male body; (B, C) head from above, ♂, ♀; (D) head from in front, ♀; (E, F) antennae, ♂, ♀; (G) right mandible, ♀; (H) right hind wing, ♀.

#### Male

Coloration of body as in female. Sculpture of frons more distinct than in female. Antennae (fig. 12) brown to almost black, particularly the flagellum. Scape rather slender, its length at least five times its greatest width; pedicel conical and clearly shorter than first segment of flagellum; first segment of flagellum distinctly longer and narrower than second, twice as long as wide; second segment longer than third; segments 6–11 subequal; apical segment conical, about as long as third segment. Mandible tridentate, narrow and brownish (fig. 12). Mesoscutum and scutellum as in female, scutellum laterally more hairy than in the female. Fore wing larger than in female, its length more than three times greatest width of the thorax. Hind wing very large. Coxae black; rest of legs clay-yellow except femora and the last segment of tarsi which are dark brownish. Abdomen more slender than that of female. Striations on second tergite very weak and short.

Genitalia (fig. 15).

Length: 1.1–1.3 mm.

#### Material examined

ENGLAND: Hants., Yateley, New Forest, v. 1965, 1966, females beaten from horse (probably overwintered). Hants., Yateley and New Forest, Surrey, Wisley Common.

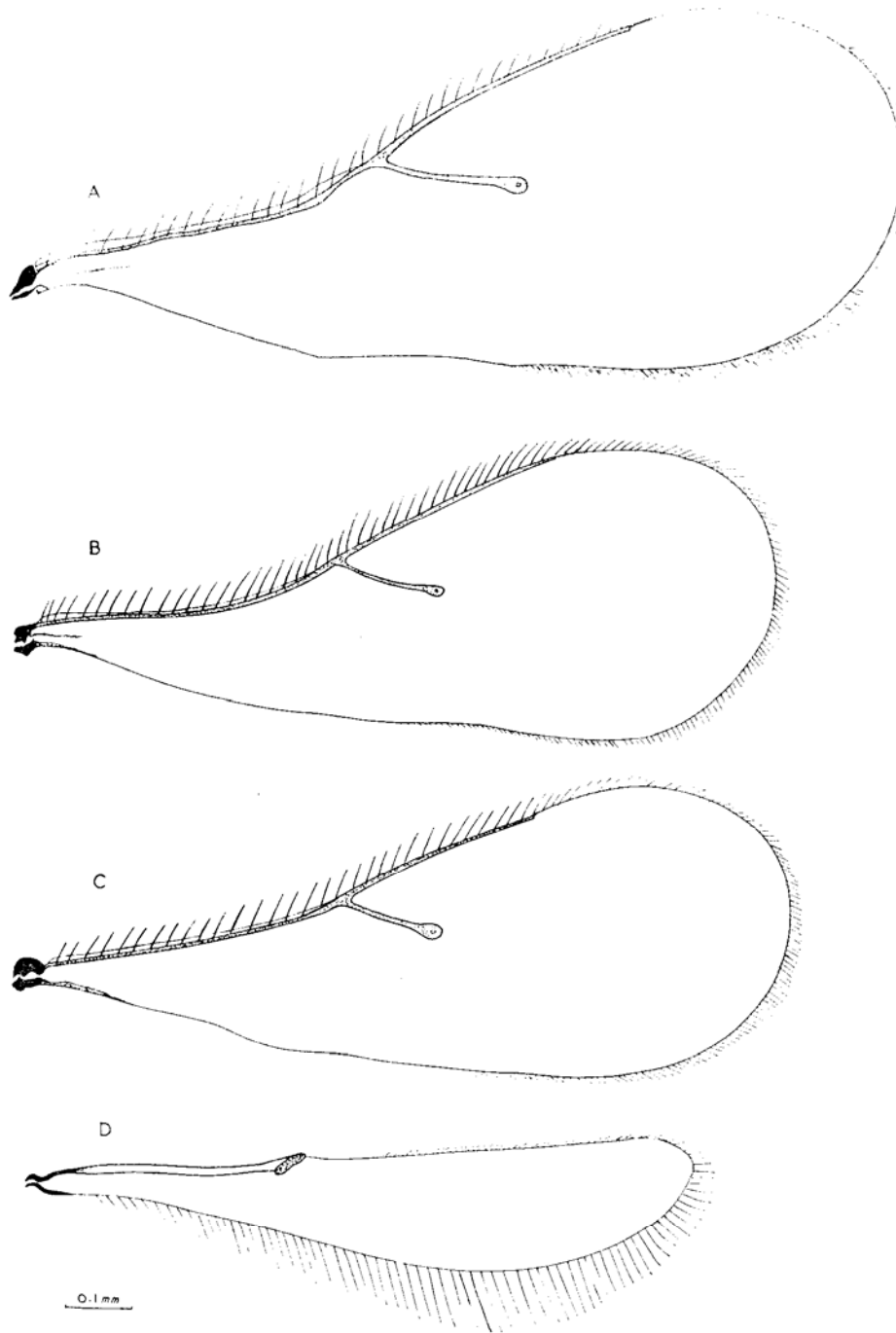


FIG. 13.—(A, B, C) Right fore wings of females of: (A) *Telenomus truncatus* Nees; (B) *T. sokolovi*, Russian specimen; (C) *T. sokolovi*, British specimen. (D) Hind wing of *T. sokolovi*, ♀.

vi, vii, viii. 1965 and 1966, males and females bred from eggs of *P. lituratus* collected on gorse. Berks., Silwood Park, vi, vii. 1965, three females captured on broom by beating.

*Host.*—*P. lituratus* in the field. Bred in laboratory from eggs of *A. acuminata*, *E. integriceps*, *P. lituratus*, *P. prasina* and *P. bidens*. This species parasitised batches of eggs of *E. integriceps* and *P. bidens* placed in the open at Yateley, v, vi, vii. 1965.

*Telenomus sokolovi* Mayr (1897)

This species is close to *Telenomus tischleri* Nixon (1939) (= *T. truncatus* Nees; Masner, 1958). A comparative study of the morphology of this species and of *T. sokolovi* (Russian specimens), both bred from *Eurygaster integriceps*, suggest that they are the same species, but differ from *T. tischleri*, which was bred from *Dolycoris baccarum* L. in Germany in 1938.

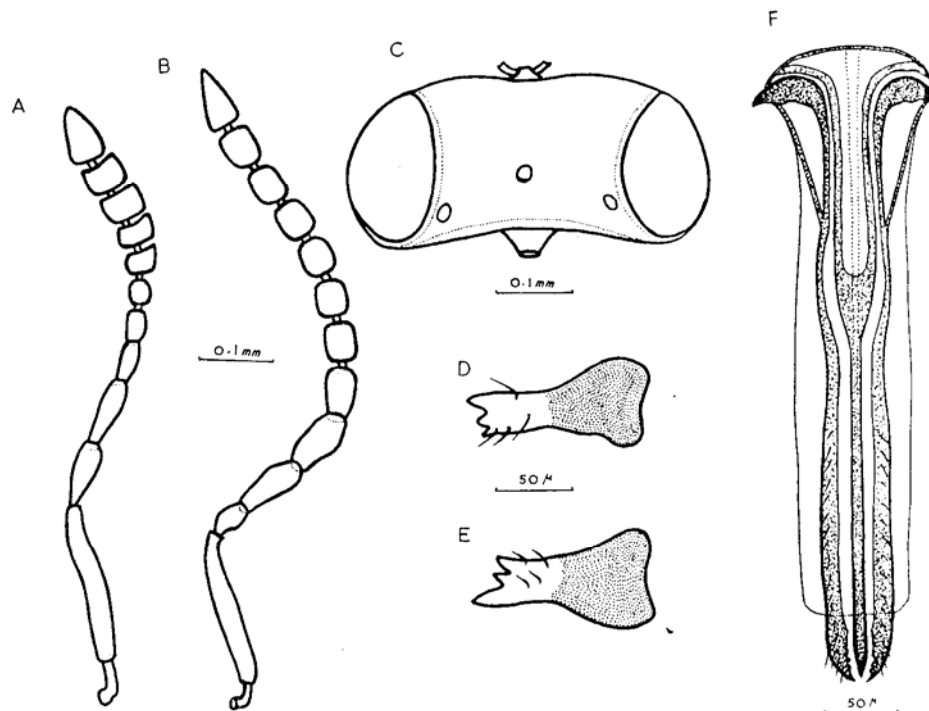


FIG. 14.—*Telenomus sokolovi* Mayr: (A, B) antenna of ♀ and ♂; (C) head from above; (D, E) right and left mandibles; (F) ovipositor, ventral view.

Although slight differences were found between the fore wing of the British specimens and that of *T. sokolovi* from Russia (fig. 13), I think that the name *sokolovi* should be used for the material from Britain until further experimental work can be carried out on the species. The following is my comparison of *sokolovi* with *truncatus*:

*Female*

Body black, smaller than *truncatus*. No sharp transverse ledge behind the lateral ocelli. Antennae black and hairy except radicle, apex of scape and extreme apex of pedicel which are brownish. Legs brownish-yellow except femora and apical segments of tarsi which are slightly brownish. Coxae black apart from extreme ends which are brownish.

*Head.*—Seen from front with a row of punctures along inner eye-margin. Eyes rather large and distinctly covered with hairs. Head clearly wider than thorax (57 : 40).

*T. truncatus* (fig. 14).—Radicle bare, about three times as long as wide, scape very slender, its length exceeds its greatest width; pedicel clearly shorter than first segment of flagellum; first segment of flagellum very slender, one and a half times as long as second segment, second segment also slender and is slightly longer than third, fourth segment the smallest; apical 5 segments forming a narrow club.

*T. sokolovi*.—Similar to that of *T. truncatus*. Hind wing narrow. Stigmatalis slightly shorter and darker than in the Russian specimens than in the Russian specimens (fig. 13).

*T. truncatus*.—Similar to that of *A. truncatus*. Ovipositor (fig. 14).

Length: F 1-1.3 mm.

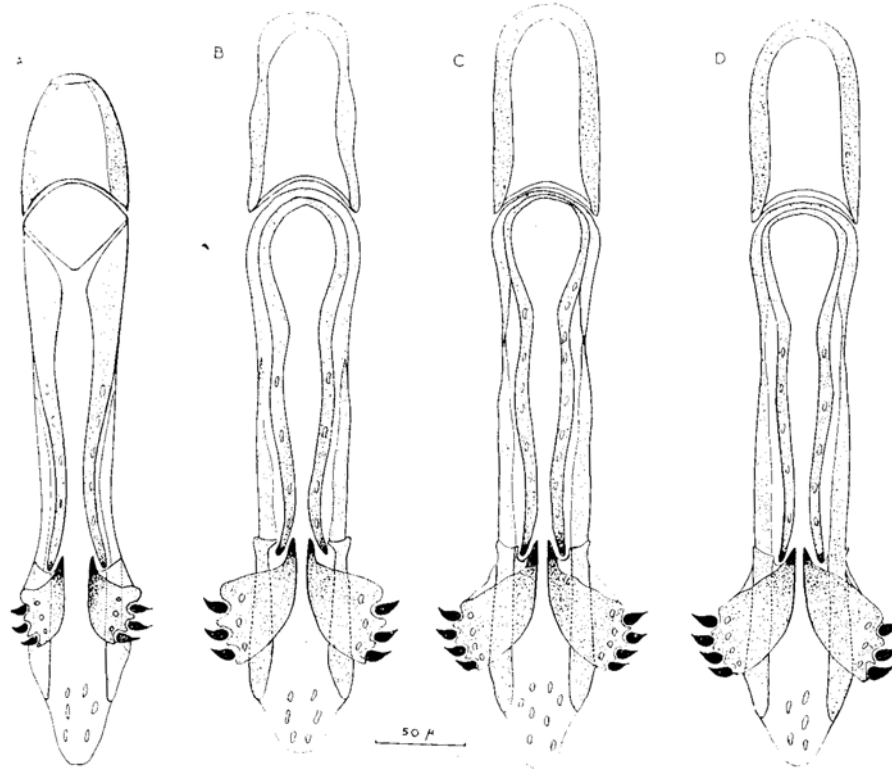


FIG. 15.—Genitalia of: (A) *Telenomus truncatus* Nees; (B, C, D) *T. sokolovi* Mayr: B, common; C, very rare; D, rare.

#### Male

Differs from female as follows:

Size smaller.

Antennae (fig. 14).—Radicle and scape usually brownish-yellow; flagellum deep brown. Scape four times longer than its greatest width. Pedicel brownish at base and brownish-yellow at apex; half as long as first segment of flagellum; first and second segments of flagellum almost equal in length, twice as long as wide; third segment distinctly shorter than first and second, but longer than fourth segment; segments 6-11 clearly longer than wide; apical segment conical, as long as third segment. Apical segment of tarsus deep brown.

Genitalia (fig. 15).

Length: 1-1.2 mm.

#### Material examined

Hants., Yateley, Cricket Hill, vi, vii. 1965, 1966, males and females bred from eggs of *P. lituratus* collected on gorse. Berks., Silwood Park, vi. 1965, one female beaten from broom (probably overwintered).

*Host*.—*P. lituratus* in the field. Bred in the laboratory from eggs of *A. acuminata*, *E. integriceps*, *N. pusilla*, *P. lituratus*, *P. prasina* and a few specimens from *P. bidens*. This species parasitised batches of eggs of *E. integriceps*, and to a less extent those of *P. bidens*, placed in the open at Yateley, vi, vii. 1965.

This work was carried out at the Imperial College of Science and Technology, University of London, whilst holding André Mayer Fellowships from the Food and Agriculture Organisation of the United Nations.

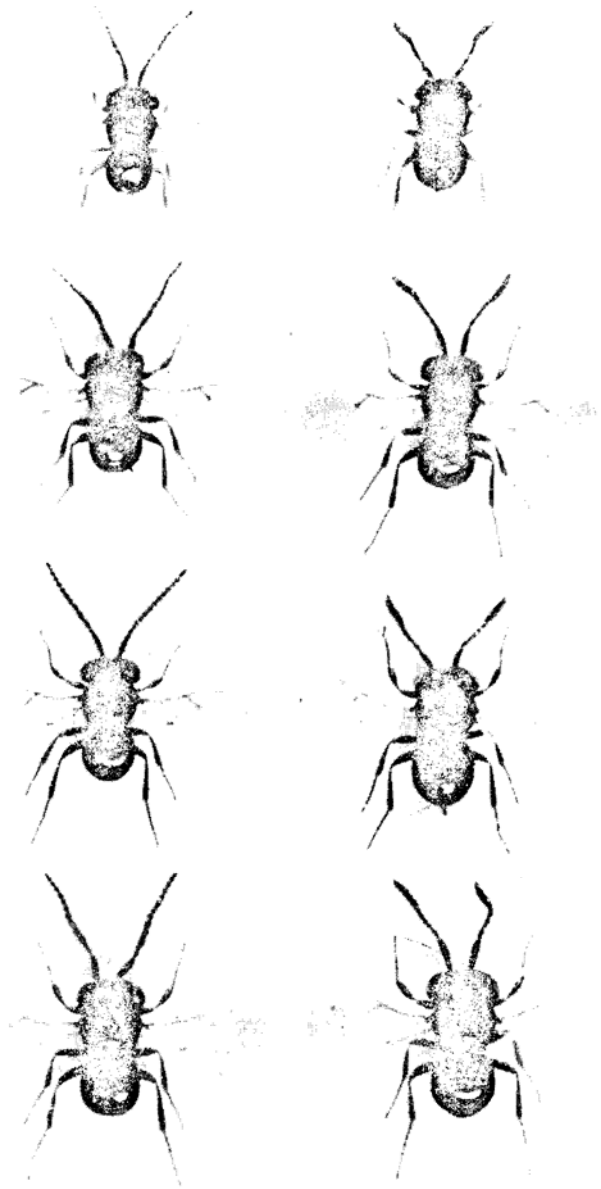
It is a pleasure to express my gratitude to: Professor O. W. Richards for research facilities in his department and his advice on taxonomic problems; Dr. N. Waloff for her unfailing interest and supervision; Mr. G. E. J. Nixon, of the Commonwealth Institute of Entomology, London, for reading the manuscript and offering valuable suggestions; Professor A. Davatchi, University of Teheran and Dr. H. E. Martin, FAO, for their helpful suggestions. The photographs for the plates were kindly taken by Mr. J. W. Siddorn at Imperial College.

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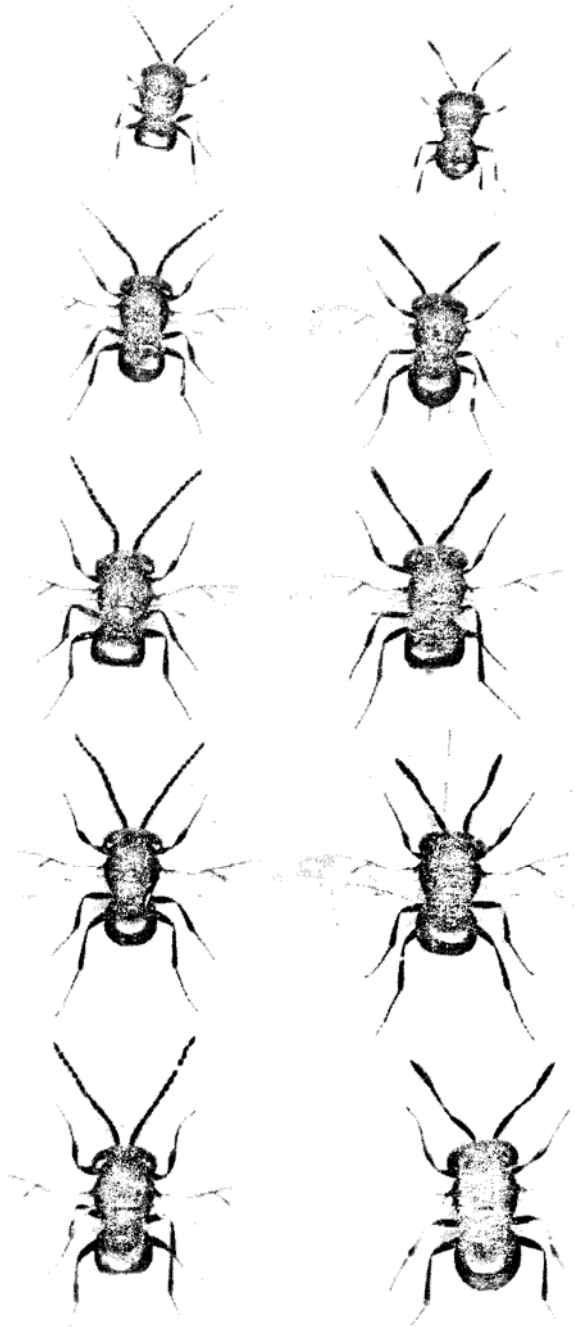
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(Manuscript received 11th May, 1967)



Four pairs of British *Asoleus* species (female on the right).

- FIG. 1.—*Asoleus waloffae* sp. n., bred from *Aelia acuminata* (L.).  
FIG. 2.—*Asoleus nixonmartini* sp. n., bred from *Piezodorus lituratus* (F.).  
FIG. 3.—*Asoleus silwoodensis* sp. n., bred from *Piezodorus lituratus*.  
FIG. 4.—*Asoleus davatchii* sp. n., bred from *Palomena prasina* (L.).  
(Scale: female of *A. waloffae* 1.0 mm. in length.)



M. Javahery

*Asolcus silwoodensis* sp. n.