

CARL F. W. MUESEBECK

*Nearctic Species of
Scelionidae
(Hymenoptera:
Proctotrupoidea)
that Parasitize the
Eggs of Grasshoppers*

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ABSTRACT

Muesebeck, Carl F. W. Nearctic Species of Scelionidae (Hymenoptera: Proctotrupeoidea) that Parasitize the Eggs of Grasshoppers. *Smithsonian Contributions to Zoology*, number 122, 33 pages, 51 figures, 1972.—All the known North American species of Proctotrupeoidea that are parasitic in the eggs of grasshoppers belong to the genera *Scelio* Latreille and *Synoditella*, new genus. This paper treats nineteen species of *Scelio*, of which ten are new, and two species of *Synoditella*. A new generic name, *Sceliocerdo*, is proposed for an Indian species, which is discussed because of its similarity to *Synoditella*. The females of *Synoditella* and *Sceliocerdo* attach themselves to female grasshoppers in order that they may be transported to the oviposition sites of their hosts.

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Introduction

The North American species of Scelionidae that develop as parasites in the eggs of grasshoppers belong to two genera. These are *Scelio* Latreille, which contains most of our known species, and *Synoditella*, new genus, to which two described North American species belong. An interesting characteristic of the latter is the phoretic behavior of the females. They attach themselves firmly to female grasshoppers in order that they may be transported to the oviposition sites of their hosts. There seems to be no record of phoresy in the case of any known species of the genus *Scelio*.

Nothing is known concerning the habits and host relationships of many of the species of *Scelio*, but all forms that have been reared develop parasitically in grasshopper eggs and it is assumed that this habit is characteristic of the group as a whole. Uvarov (1928:115) listed the species, with their hosts, that had been reported up to that time as having been reared; and Greathead (1963:488) gave a longer list of reared species of *Scelio* with literature references to the published records although the names of

the hosts were omitted. Eight of the North American species treated in this paper have been recorded as having been reared from grasshopper eggs, but for only one of these, *S. opacus* (Provancher), have some detailed biological data been published. Pickford (1964) reared this species in the laboratory, established its life history and described and figured the immature stages. Putnam (1953) had published earlier on what was probably the same species. He did not give, however, a specific name and his paper dealt principally with the extent of parasitization of grasshopper eggs in the Prairies Provinces of Canada. Noble (1935, 1938) studied an Australian species, *S. fulgidus* Crawford, in the field and laboratory and made detailed observations on field behavior, oviposition, larval development, hibernation and length of life cycle. He also considered the importance of this species as a factor in the biological control of the so-called Australian Plague Locust, *Chortoicetes terminifera* (Walker). Two Malayan species, *Scelio pembertoni* Timberlake and *S. serdangensis* Timberlake, were studied by Pemberton (1933) in connection with efforts to introduce and establish these parasites of *Oxya* eggs in Hawaii. Pemberton discussed the manner of oviposition, described and figured the egg and larva of *S. pembertoni*, and gave data on the duration of the life cycle under a variety of conditions. Many thousands of the parasites were reared

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and released in Hawaii. *Scelio pambertonii* became definitely established but the other species gradually died out. Murai (1962) summarized the information on the life history and behavior of two Japanese species, *S. muraii* Watanabe and *S. tsuruokensis* Watanabe, which he had published previously in a series of short papers, Vinokurov (1927), in connection with a discussion of grasshopper outbreaks in eastern Siberia, described oviposition by *S. javanicus* Roepke in eggs of *Valanga nigricornis* (Burmeister), and Greathead (1963:439-442) gave a brief summary of the published information on the biology and habits of *Scelio*.

Some authors (Vinokurov, 1927; Pickford, 1964) have indicated that newly hatched eggs seem to be preferred by *Scelio* spp. for oviposition, but Murai found that oviposition occurred readily in older eggs. Pemberton (1933) obtained successful oviposition in eggs that had been held in refrigeration about 30 days.

According to published observations, adults of *Scelio* live only a very short time, at least when held in the laboratory and fed honey and water. Noble (1938) indicated a maximum of 21 days for *S. fulgidus*; Pemberton (1933) found that adults of *S. pambertonii* and *S. serdangensis* seldom lived longer than three weeks, and Murai reported that laboratory longevity of *S. muraii* and *S. tsuruokensis* usually was about 10 days. To what extent these observations approach the conditions existing in nature is unknown. The longevity of *Scelio* adults may differ in different species with different types of life cycle. In January 1970, W. H. Tyson brought me a series of eleven females and one male of *S. striativentris* Kieffer, all living, which he had just then obtained from an old fungus on the side of a dead tree. Apparently these individuals were hibernating as adults. On the other hand, hibernation as first-instar larvae within the host eggs was indicated for *S. opacus* by Pickford (1964), for *S. fulgidus* by Noble (1938) and for *Scelio* sp. by Richards and Waloff (1954).

This summarizes briefly the published information on the life history and development of the species of *Scelio*. In the case of *Synoditella* nothing has been published except on the phoretic association of *S. bisulcata* (Kieffer) with various species of grasshoppers. This has been discussed by Lanham and Evans (1958, 1960).

Species of *Scelio* occur in all parts of the world

where grasshoppers live, and the different kinds are probably more numerous than is indicated by the number of published descriptions. Specimens of the genus seem not to be commonly taken in general collecting, for most insects collections—except those that contain a considerable amount of reared material—have comparatively few specimens of *Scelio*, and rearing has been largely confined to the abundant and economic species of grasshoppers. At present more species of *Scelio* are known from Australia and Africa than from other major regions of the world. Most of the Australian species have been described by Dodd (1913 and numerous later publications); those of Africa largely in two papers, one by Priesner (1951) and the other by Nixon (1958). The North American material of *Scelio* available to me for study contained nineteen species (ten of them new) and only eight species were represented by both sexes. One species, *S. pallidipes* Ashmead, is known only in the male sex and nine species are known only from females. Various authors (Dodd, 1913; Pemberton, 1933; Noble, 1935; Murai, 1962; Richards and Waloff, 1954; Pickford, 1964) stated that there was a preponderance of females in the species of *Scelio* they investigated. This condition probably does not apply to all species of the group, but it may be sufficiently general to account for the relative scarcity of males in collections.

The distribution of the two new genera appears to be very limited. Thus far *Synoditella* is known only from the United States and Mexico, and *Sceliocerdo* only from India.

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Key to the Scelionid Genera of Grasshopper-egg Parasites

1. Inner edge of antennal scape completely and sharply carinate; head from in front subtriangular; thorax strongly depressed; inner tooth of mandible very short. Known species phoretic 2
 Inner edge of antennal scape at most carinate apically; head from in front subcircular, oval or subrectangular; thorax not noticeably depressed; teeth of mandibles subequal. Species not phoretic *Scelio* Latreille
2. Maxillary palpi 2-segmented; labial palpi 1-segmented; mandible with a sharp denticle on outer edge beyond middle (Figure 51); occipital carina without teeth; lateral ocelli well removed from eyes *Synoditella*, new genus
 Maxillary palpi 3-segmented; labial palpi 2-segmented; mandible without a denticle on outer edge; occipital carina with a sharp tooth on each side at level of lower eye margins; lateral ocelli close to eyes *Sceliocerdo*, new genus

Scelio Latreille

Scelio Latreille, 1805:226. Type-species, *Scelio rugulosus* Latreille. Designated by Latreille, 1810.

Scelionus Rafinesque, 1815:125. Emendation of *Scelio* Latreille.

Serlion Say, 1820:80. Error for *Scelio* Latreille. Say mistakenly used the name for a species of the encyrtid (chalcidoid) genus *Homalotylus*.

Aleria Marshall, 1874:208. Type-species, *Aleria flavibarbis* Marshall, by monotypy.

Caloptenobia Riley, 1878:306. Type-species, *Caloptenobia ovivora* Riley, by monotypy.

Discelio Kieffer, 1908b:116, 124. Type-species, *Scelio thoracicus* Ashmead. Designated by Kieffer, 1926.

Dichacantha Kieffer, 1908b:118, 147.—Dodd, 1920:348. Type-species, *Trimorus luteus* Cameron, by monotypy and original designation.

Enneascelio Kieffer, 1910:293; 1926:347. Type-species, *Enneascelio exaratus* Kieffer, by monotypy and original designation.

Above is the currently recognized synonymy of the genus *Scelio* Latreille. Perhaps *Lepidoscelio* Kieffer, 1905, should be added as a synonym of *Scelio*, but I have seen no authentically identified material of that genus and I hesitate to suppress the name on the basis of the original description only.

Dodd (1927:129) suppressed *Discelio* as a synonym of *Scelio* and I am accepting this synonymy for the present although *S. thoracicus* Ashmead, the type-species of *Discelio*, exhibits certain distinctions that may warrant resurrection of that name after there has been an opportunity to study more material from various parts of the world and especially from the Neotropical region. The paired teeth on the middle of the metanotum are very prominent and may not be homologous with the

low bilobed flange found in occasional species of *Scelio*. Moreover, *S. thoracicus* is the only species of the group I have seen which has a complete row of long erect setae on the subcosta.

In the subfamily Scelioninae the antennae of both sexes are normally 12-segmented, but in the genus *Scelio* they are 12-segmented in the female and 10-segmented in the male. The wing venation of members of this genus is also characteristic. The subcosta does not attain the costal margin of the wing and terminates in a more or less circular stigma, which replaces the marginal vein. In addition, the subcosta is normally without the usual row of erect setae. Usually there is also a short stigmal vein although this is sometimes very faint or not at all developed. The radial vein is indicated by a fold which is usually hyaline though sometimes a little pigmented, and which sets off a long and narrow radial cell. The postmarginal vein is wanting. These unusual features of the antennae and wings are found also in the two new genera of grasshopper-egg parasites described in this paper.

Otherwise *Scelio* may be characterized as follows: head transverse or subquadrate; occiput more or less excavated; lateral ocelli close to eyes; eyes bare; maxillary palpi short, 3-segmented; labial palpi also very short and 2-segmented; mandibles rather long, curved, and bidentate, the teeth subequal; notaulices wanting or more or less indicated but rarely sharply defined; propodeum angulate laterally behind; abdomen sessile, depressed, the lateral margins acute; six tergites present in the female abdomen and eight in the male, the last two tergites in the male very short, the last sometimes visible only from behind.

Key to the North American Species of *Scelio* Latreille *

1. Frons uniformly rugose reticulate or rugose punctate except for a narrow space above insertion of antennae 2
Frons either largely smooth or more or less vertically striate on lower half 4
2. Eyes enormous, the shortest distance between them only two-thirds the eye height; temples at mideye point only one-third as wide as eyes; malar space less than one-third eye height.
S. insolitus, new species
Eyes normal; distance between eyes, width of temples and length of malar space not as above 3
3. Temples strongly receding; mesopleural impression transversely striate; legs including coxae testaceous, except that hind coxae are slightly darkened basally; second, third, and fourth tergites in female each with a large basal spot of reddish brown *S. venatus* Brues
Temples rounded; mesopleural impression punctate or rugulose, not striate; legs with at least all the coxae more or less darkened; abdomen completely black *S. ernestii* Riley
4. Lower part of frons smooth and polished, at most with some weak and short striae radiating from above attachment of mandibles and not extending to level of lower eye margins; third, fourth, and fifth abdominal sternites not longitudinally striate 5
Lower part of frons striate or aciculate at sides, the ribs extending to, or nearly to, the level of the middle of the eyes; third, fourth, and fifth abdominal sternites usually longitudinally striate, at least laterally 8
5. Head and thorax reddish yellow; temples at least 0.8 as wide as eyes and bulging.
S. rufulus, new species
Head and thorax black or blackish; temples not more than two-thirds as wide as eyes 6
6. Wings hyaline in both sexes; subcosta hyaline except at base, indistinct apically; first abdominal tergite at middle not more than 0.4 as long as second; hind coxae often darkened.
S. oedipodae Ashmead
Wings distinctly somewhat infumated, at least in the female; subcosta and stigmal vein well developed, somewhat pigmented; first tergite at middle nearly or quite half as long as second; hind coxae testaceous 7
7. Third, fourth, and fifth abdominal tergites largely longitudinally striate; malar space barely half as long as eye height *S. solus*, new species
Third, fourth, and fifth abdominal tergites finely rugulose, not striate; malar space more than half as long as eye height *S. conformis*, new species
8. Head and some areas of thorax covered with broad, white, appressed scale-like hairs.
S. squamosus, new species
Head and thorax without scale-like hairs 9
9. Shortest distance between eyes noticeably greater than eye height 10
Shortest distance between eyes subequal to or shorter than eye height 14
10. Thorax of female testaceous (male unknown); temples bulging and nearly or quite as wide as eyes *S. semirufus*, new species
Thorax black; temples not as above 11
11. First abdominal tergite medially about four-fifths as long as second; abdominal tergites 2 to 5 rather strongly longitudinally striate 12
First abdominal tergite not so long; tergites 3 to 5 rather finely rugulose aciculate 13
12. All coxae yellow; wings clear hyaline (known only in male sex) *S. pallidipes* Ashmead
Coxae more or less darkened in male; wings of both sexes somewhat darkened.
S. striativentris Kieffer
13. Notaulices not at all indicated; abdomen short and broad, just about as long as head and thorax combined. Small, the only known specimen hardly 3 mm long.
S. pumilus, new species
Notaulices indicated; abdomen considerably longer than head and thorax combined and strongly narrowed from third segment to apex *S. opacus* (Provancher)
14. Occiput completely carinately margined 15
Occiput margined only at the sides 16
15. Pronotal neck transversely striate; notaulices not indicated; lateral areas of propodeum not densely covered with pile, the sculpture apparent; second tergite entirely closely sculptured *S. singularis*, new species
Pronotal neck smooth anteriorly, rugulose posteriorly; lateral areas of propodeum so densely

- covered with pale pubescence that the sculpture is concealed; second tergite largely smooth on posterior half *S. commixtus*, new species
16. Wings clear hyaline; first abdominal tergite at middle not half as long as second; propodeum with two complete subparallel median carinae setting off a narrow median area; stigmal vein indistinct *S. hyalinipennis* Ashmead
- Wings, at least in the female, somewhat infumated; first tergite at least half as long as second medially; propodeum without a long, narrow, median area defined by carinae; stigmal vein well developed 17
17. Abdomen rather stout; fifth and six tergites twice as broad at base as long; lateral areas of propodeum not densely pubescent *S. ovivorus* (Riley)
- Abdomen relatively narrow, sharply acute at apex; fifth and sixth tergites not nearly twice as broad at base as long; lateral areas of propodeum densely covered with pale, short hairs 18
18. Tegulae yellow; pronotal shoulders rounded; fourth tergite narrowly smooth and polished down the middle; inner ribs of frontal striae curving around upper end of the median smooth and polished area *S. incertus*, new species
- Tegulae dark; pronotal shoulders subangulate; fourth tergite completely striate; ribs of inner frontal striae short and rather straight, not curving around upper end of the median smooth and polished area *S. floridanus* Ashmead

* Key based largely on the female sex since males of many species are unknown.

Scelio commixtus, new species

FIGURES 6, 14, 37, 50

Although the type-series is from British Honduras it seems advisable to include this form in a treatment of the Nearctic species since it has been reared together with *S. ernstii* Riley from the same egg pods of *Schistocerca americana* (Drury) and many occur throughout the range of that host. It somewhat resembles *S. ernstii* superficially, but it is actually very different from that species and is exceedingly similar to *S. ovivorus* (Riley). From the latter it differs in having the first tergite of the abdomen relatively shorter and broader; the second, third, and fourth tergites smooth and polished medially on the posterior half; and the sixth tergite weakly and incompletely sculptured; also in having the lateral parts of the dorsal surface of the propodeum so densely covered with pale appressed hair that the sculpture of those areas is obscured. It appears to be similar to *S. tripartitus* Kieffer, which was described from a single male from Nicaragua, but the description of that species is too incomplete to permit definite identification.

FEMALE.—Length around 4.5 mm. Head barely wider than thorax, in front view subrectangular, about 1.25 times as wide as high, in dorsal view about 1.7 times as wide as its maximum length; temples gradually receding, at mideye point about half as wide as eyes, coarsely rugose; malar space not more than 0.4 as long as eye height; shortest distance between eyes hardly as long as eye height; lower part

of frons laterally and the malar spaces coarsely striate; a rather large, smooth, and polished area medially on frons above insertion of antennae; upper half of frons, vertex, and occiput coarsely rugose punctate; occipital carina complete; first flagellar segment of antenna only a little shorter than pedicel; club about three times as long as thick.

Thorax stout; neck of pronotum not transversely striate but smooth anteriorly and rugulose posteriorly; pronotal shoulders angulate; mesoscutum coarsely longitudinally rugose reticulate; notaulices indicated; disk of scutellum coarsely reticulate punctate; propodeum very short, medially coarsely reticulate, the large lateral areas of the dorsal surface densely covered with long, pale, appressed hair which conceals the sculpture; a curved transverse ridge on propodeum setting off a large arcuate impressed area around posterior margin that is largely smooth and very shiny; posterior lateral angles of propodeum prominent, acute; the large oblique impression on mesopleuron with a series of transverse rugae that are very strong above but fade out below leaving the impression there largely smooth and shining; mesopectus coarsely rugose; subcosta complete although weak apically; stigmal vein distinct; hind coxae largely shagreened.

Abdomen at least as broad as thorax, usually broader, and usually only barely twice as long as its greatest width; first tergite less, or at least no more, than half as long medially as second and about five times as broad on posterior margin as long, coarsely longitudinally rugulose striate; second tergite longi-

tudinally rugose laterally, the middle two-thirds longitudinally striate although medially the raised lines fade out posteriorly leaving a median smooth and polished area on posterior half; third tergite at least twice as broad as long, more or less rugulose striate, but the striae on posterior half usually distinct only each side of the middle, the median posterior area being smooth; fourth and fifth tergites largely finely longitudinally rugulose striate, the fourth smooth medially behind; fifth tergite nearly twice as broad at base as long; sixth very broadly triangular, smooth or finely alutaceous anteriorly, rugulose punctate posteriorly; third, fourth, and fifth sternites more or less extensively longitudinally striate, usually smooth medially.

Black; mandibles piceous; scape and pedicel of antenna testaceous, the flagellum darkened; forewings rather strongly infumated; tegulae dark; legs, including all coxae, testaceous.

MALE.—Essentially like the female except for the antennae (Figure 50), the darkened coxae, the relatively somewhat smaller eyes, the broader and less receding temples, and the less well-defined striae on the lower frons.

HOLOTYPE.—USNM 71614.

DISTRIBUTION.—Described from 10 females, one the holotype, reared from *Schistocerca americana* (Drury) at Belize, British Honduras, in 1941 by J. F. Wood, and two females and one male collected at Middlesex, British Honduras, in 1965 by E. C. Welling. The three specimens from Middlesex are in the Canadian National Collections.

Scelio conformis, new species

FIGURES 8, 15, 33

This is exceedingly similar to *S. oedipodae* Ashmead. It differs, however, in its relatively longer first abdominal tergite, in its distinctly infumated wings with subcostal and stigmal veins well developed, and in having all coxae yellow. In addition, the head and abdomen are darker than they are generally in *S. oedipodae*.

FEMALE.—Length about 4.5 mm in the available specimens. Head rather strongly transverse, in dorsal view about 1.75 times as broad as long, in front view subcircular, nearly as wide as high; temples rounded but receding, at mideye point about two-thirds as wide as eyes; malar space more than half as

long as eye height; shortest distance between eyes slightly longer than eye height; lower part of frons smooth and polished, with only some short and weak raised lines radiating from above the mandibles; upper part of frons and vertex rugose punctate; occiput coarsely rugose punctate, somewhat more coarsely so than in *S. oedipodae*, and completely margined; pedicel of antenna nearly as long as first and second flagellar segments combined; club about three times as long as its maximum thickness.

Neck of thorax weakly transversely roughened; pronotal shoulders subangulate; mesoscutum coarsely rugose punctate, the posterior lateral corners more or less smooth and shining; notaulices indicated posteriorly; propodeum strongly rugose reticulate laterally and with a few strong longitudinal carinae medially, the posterior lateral angles prominent and acute; the large oblique impression on mesopleuron finely transversely aciculate but incompletely so, the impression being smooth and shining below; a small area immediately below the impression finely longitudinally lineolate; hind coxae smooth and polished; subcostal and stigmal veins well developed.

Abdomen about as broad as thorax but narrowing rather strongly caudad from apex of third segment; first tergite medially about half as long as second, longitudinally striate; second tergite very finely longitudinally striate; third, fourth, fifth, and sixth tergites rugulose, not at all striate even laterally; third tergite not distinctly longer than fourth; fifth about twice as broad at base as long; third, fourth, and fifth sternites smooth and shining but with numerous, though well separated, evenly spaced, small setiferous punctures.

Black; scape brownish yellow; pedicel and first flagellar segment of antenna brown, the following segments brownish black; mandibles reddish; legs, including all coxae, reddish yellow; tegulae black; forewings distinctly somewhat infumated; venter of abdomen brown.

MALE.—Unknown.

HOLOTYPE.—USNM 71615.

Known only from three female specimens taken at Plummers Island, Maryland, by K. V. Krombein, the holotype and one paratype 3 July 1959, and one paratype 28 June 1958; and another female collected at Beltsville, Maryland, 26 June 1948 by D. G. Shappiro.

Scelio ernstii Riley

FIGURES 4, 19, 34, 42

Scelio ernstii Riley, 1885:22.*Scelio fuscipennis* Ashmead, 1887:119; 1893:242, 243.*Scelio venezuelensis* Marshall, 1892:74. New synonymy.

This is very distinct from all described Nearctic species except *S. venatus* Brues, and from that it may be separated by its large size, its generally darker coxae and abdomen, somewhat coarser abdominal sculpture and its non-striate mesopleural impression. The name *ernstii* was unintentionally validated through comparison of the species with *S. ovivorus* (Riley). Riley intended to publish a description later but did not do so. His specimens are clearly identical with *S. fuscipennis* Ashmead, which name must fall as a synonym. By the kindness of Dr. S. Kelner-Pillault of the Museum National d'histoire Naturelle in Paris, I have been privileged to see specimens from the du Buysson Collection labeled "venezuelensis." Apparently these are not from the type-series, although they are part of the material collected by Simon at Caracas and presumably were identified by Marshall. They fit Marshall's description completely and are identical with the type-specimens of *S. ernstii*.

FEMALE.—Length usually 5-5.6 mm. Head not distinctly wider than thorax, in front view subcircular, in dorsal view about 1.7 times as wide as its maximum length; temples rounded but receding, at mid-eye point about 0.7 as wide as eyes; malar space about half as long as eye height and sculptured like temples and cheeks; shortest distance between eyes about equal to eye height; frons, cheeks, temples, vertex and occiput all strongly rugose reticulate, the lower frons not striate and the smooth and shiny area immediately above insertion of the antennae very narrow and small and usually with a low median keel extending upward from the elevation between the antennae; occiput carinately margined only at the sides; first segment of antennal flagellum at least as long as the long pedicel; club of antenna (last six segments) about four times as long as thick.

Neck of pronotum largely smooth and shining; pronotal shoulders sharply rectangular; mesoscutum and scutellum closely and coarsely rugose reticulate; notaulices not indicated; propodeum with a large,

curved, depressed area around posterior margin which is largely smooth and is weakly divided into cells by short longitudinal septa; lateral dorsal parts of propodeum rugulose but the sculpture of a narrow strip along each side obscured by a dense covering of pale appressed hairs; meso- and metapleura coarsely rugose, the broad oblique impression on mesopleuron punctate or rugulose punctate, not striate; subcosta complete, it and the stigmal vein well developed; radius also rather well indicated, defining a long and narrow radial cell; hind coxae largely smooth and polished above, more or less punctate below.

Abdomen about as broad as thorax and narrowing strongly beyond the third segment to the acute apex; first tergite medially nearly or quite two-thirds as long as second and coarsely longitudinally rugose or striate; second, third, and fourth tergites strongly longitudinally striate, the sixth rugulose; third tergite only slightly longer than fourth; fifth not nearly twice as broad at base as long.

Black; mandibles and scapes varying from yellow to brown; pedicel and basal flagellar segments of antenna sometimes pale but often darkened like the club; tegulae brownish to black; forewings rather strongly infumated; legs reddish yellow to piceous, the coxae always more or less darkened.

MALE.—Very similar to the female except for the very different antennae (Figure 42); the third segment of antennal flagellum greatly enlarged and broader than long, the following four segments all much narrower and shorter. The frons at its narrowest is usually a little wider than in the female and the lateral ocelli are usually a little farther from the eyes.

LECTOTYPE.—USNM 71497 (here designated). A female labeled "3609. From Dr. A. Ernst, Caracas, Venezuela, S. A. Jan. 22, '85" Lectotype of *S. fuscipennis* Ashmead (Masner and Muesebeck, 1968: 43), USNM 24544.

DISTRIBUTION.—The type-series of *S. ernstii*, consisting of 33 females and 3 males, is from Caracas, Venezuela, reportedly reared from "*Acridium peregrinum*," which probably (according to Dr. A. B. Gurney, United States Department of Agriculture specialist in Orthoptera) is the species currently known as *Schistocerca paranensis* (Burmeister). The lectotype of *Scelio fuscipennis* is from Ft. George, Florida; two males, which were labeled as part of the

type-series, are not the same species. Other material I have seen includes isolated United States specimens, all field collected, from points in Florida, Alabama, South Carolina, and Texas. Neotropical material is more abundant and, in addition to the type-series from Venezuela, includes specimens, some of them reared, from Mexico, Guatemala, British Honduras, Costa Rica, Panama, Trinidad, Peru, and Brazil. A long series from British Honduras in the National Museum of Natural History is recorded as having been reared from eggs of *Schistocerca americana* (Drury), and some specimens from Mexico, Guatemala, and Costa Rica are labeled as having been obtained from eggs of *Schistocerca paranensis* (Burmeister).

Scelio floridanus Ashmead

FIGURES 11, 22, 40

Scelio floridanus Ashmead, 1893:242, 247.

This seems to be closely related to *S. ovivorus* (Riley), from which it differs most noticeably in being more slender, with the abdomen not wider than the thorax and very strongly narrowed to the apex; the abdomen also is differently sculptured, especially on the third tergite.

FEMALE.—Length about 3.5 mm. Head in front view rather subcircular, in dorsal view about 1.6 times as wide as its maximum length; temples very coarsely rugose, slightly rounded but receding and about 0.6 as wide at mideye point as eyes; eyes large, ratio of width to height 67:75; malar space hardly 0.4 as long as eye height; shortest distance between eyes not longer than eye height; lower frons laterally, malar spaces and cheeks coarsely striate, the inner ribs of the frontal striae not curving around to meet above the median smooth and polished area above insertion of antennae; upper part of frons deeply and closely reticulate punctate; upper part of back of head strongly transversely rugose; occiput carinately margined at the sides, not distinctly so medially above; pedicel of antenna a little longer than first flagellar segment, the club (last six segments) less than three times as long as thick.

Thorax slightly narrower than head; neck of pronotum finely rugulose posteriorly, nearly smooth anteriorly; pronotal shoulders nearly rectangular; mesoscutum and disk of scutellum coarsely and deeply

reticulate punctate, the cells tending to be longitudinal; notaulices rather well indicated; propodeum coarsely rugulose medially at base, finely rugulose laterally, and toward the lateral margins thickly covered with short, pale, appressed hairs that more or less conceal the sculpture; posterior part of propodeum set off by a curved ridge, strongly impressed, smooth and shining, and with some more or less distinct short longitudinal ridges crossing it; the broad oblique impression on mesopleuron irregularly transversely striate; subcosta weak apically but complete; stigmal vein weak but distinct; hind coxae finely shagreened.

Abdomen considerably longer than head and thorax combined, at least 2.5 times as long as its maximum width, in its widest part not wider than thorax and narrowing strongly to the apex, which is very acute; tergites 1 to 5 strongly longitudinally striate, the first barely more than half as long medially as the second; the third distinctly a little longer than the fourth (in ratio of 80:70); the fifth fully as long as the second and less than twice as broad at base as long; sixth virtually an equilateral triangle, rugulose; third, fourth, and fifth sternites usually strongly longitudinally striate.

Black; scapes pale, remainder of antennae darkened; mandibles testaceous; legs, including all coxae, yellow; forewings distinctly infumated; tegulae darkened; abdomen usually brownish or piceous below.

MALE.—Essentially like the female. Eyes a little smaller; abdomen narrowing strongly caudad but fifth tergite relatively shorter and broader than in the female, and the sixth strongly transverse, not triangular; seventh tergite very short and finely rugulose punctate; third segment of antennal flagellum slightly longer than fourth, the third to seventh segments all broader than long.

LECTOTYPE.—USNM 2263 (designated by Masner and Muesebeck, 1968:43). The three remaining specimens of the type-series are headless and are apparently not the same species as the lectotype.

DISTRIBUTION.—In addition to the lectotype, which is from Jacksonville, Florida, the National Museum of Natural History has a female from Gainesville, Florida, and a number of specimens (both sexes) from California, most of them labeled only as from grasshopper eggs but others recorded as having been reared from eggs of *Melanoplus differentialis* (Thomas) and *M. sanguinipes* (Fabricius). In the Canadian National Collections there is a female from Concordia, Sinaloa, Mexico.

Scelio hyalinipennis Ashmead

FIGURES 38, 44

Scelio hyalinipennis Ashmead, 1887:119.

This appears to be most closely related to *S. oivorus* (Riley), but the lower frons is much more finely sculptured, the hind coxae are much smoother, and the wings are clear hyaline; moreover, the abdomen in the female is largely brownish yellow above and below. From those females of *S. oedipodae* in which the abdomen is testaceous or brownish *S. hyalinipennis* may be immediately distinguished by its closely aciculate lower frons.

FEMALE.—Length of available specimens ranging from 4 to 4.6 mm. Head very slightly wider than thorax, in dorsal view about 1.75 times as wide as its maximum length; temples hardly receding, at mideye point about 0.6 as wide as eyes, and coarsely rugose; malar space half as long as eye height; shortest distance between eyes about equal to eye height; lower frons, malar spaces and cheeks closely, rather finely, aciculate; the median smooth and polished area immediately above insertion of the antennae very small and narrow due to crowding by the lateral aciculate areas; upper part of frons, vertex, and occiput strongly rugose; occiput carinately margined at the sides but not distinctly so medially; pedicel of antenna a little longer than first flagellar segment, the club barely three times as long as thick.

Neck of pronotum largely finely transversely rugulose; pronotal shoulders subrectangular; mesoscutum and disk of scutellum rugose reticulate or reticulate punctate, not longitudinally so; notaulices only very weakly indicated posteriorly; propodeum with a median longitudinal impressed area extending from base to apex and defined by carinae that are slightly bowed outward; sometimes this area is divided by a rather strong, straight, median longitudinal carina; lateral areas of propodeum rugulose and not thickly pubescent, these areas defined posteriorly each side by a more or less distinct oblique ridge; the broad oblique impression on mesopleuron finely and irregularly transversely aciculate, the surface below the impression weakly longitudinally sculptured, sometimes more or less smooth anteriorly; subcosta complete and stigmal vein developed but both hyaline and rather indistinct; hind coxae smooth and polished.

Abdomen about as broad as thorax, narrowing

strongly from the base of the fourth segment to the apex, which is acute; first tergite medially not quite half as long as second, more than four times as broad on posterior margin as long down the middle and strongly longitudinally striate; second tergite closely and finely longitudinally striate; third, fourth, and fifth tergites finely longitudinally rugulose or rugulose striate; the sixth rugose; fifth tergite twice as broad at base as long; third, fourth, and fifth sternites very weakly longitudinally sculptured, sometimes smooth medially.

Head and thorax black; mandibles yellowish; antennae brown to piceous except the scapes which are brownish yellow; tegulae blackish; wings clear hyaline; legs, including all coxae, yellow; abdomen with first tergite, also the second and third tergites except narrowly along the sides, and the fourth medially, brownish yellow; apex of abdomen above black; venter testaceous.

MALE.—A single male, which was taken at the same time and place as three females of this species, is presumably *S. hyalinipennis* although it differs from the female in having the abdomen entirely black and differently sculptured and the notaulices rather well indicated; the third and fourth tergites are reticulate and the fifth and sixth closely punctate, none of the third to fifth being longitudinally sculptured as they are in the female, and the second tergite is only weakly and irregularly longitudinally sculptured on a shagreened ground; moreover, the venter of the abdomen is not at all longitudinally sculptured, even laterally, but is rather shallowly punctate there. Antennal flagellum (Figure 44) unusually short, the fourth to seventh flagellar segments twice as broad as long, the third noticeably larger than the others.

LECTOTYPE.—USNM 2856, (designated by Masner and Muesebeck, 1968:44), a female from Jacksonville, Florida. None of the remaining specimens of Ashmead's type-series is the same as the lectotype; the males are *S. opacus* (Provancher), while the female cannot be identified as any described species and it is too poor for description.

DISTRIBUTION.—In addition to the lectotype, which is from Florida, I have seen only five specimens of this species: One female from Willis, Texas, collected 16 May 1903, by J. C. Bridwell, and three females and the male described above, all of which were taken by H. F. Howden on Hilton Head Island, South Carolina, 11–23 July 1965, and are in

the Canadian National Collections. Morgan (1901) recorded *S. hyalinipennis* from eggs of *Melanoplus differentialis* (Thomas) but I suspect that the parasite in this case was *S. opacus* (Provancher).

Scelio incertus, new species

This is exceedingly similar to *S. floridanus* Ashmead, but although the differences are subtle I believe it to be a distinct species. The abdomen is less coarsely and rather less completely striate than in *S. floridanus*; the pronotal shoulders are somewhat more rounded; the lower frons is more finely striate, with the ribs extending farther up and the inner ones curving around the upper end of the median smooth area; the fourth tergite is smooth and polished down the middle; and the tegulae are yellow or brownish yellow whereas they are piceous to black in all specimens of *S. floridanus* I have seen.

FEMALE.—Length around 3.2 mm. Head distinctly a little wider than thorax, in dorsal view 1.5 times as broad as long, in front view subcircular; temples rugose, receding, at mideye point hardly half as wide as eyes; malar space about 0.4 as long as eye height; shortest distance between eyes a little less than eye height; lower frons laterally finely striate, the inner ribs meeting or crossing at upper end of the median smooth and polished space; malar space and cheeks striate; temples coarsely, vertically rugose; upper part of frons and vertex rugulose reticulate; occiput transversely rugose, carinately margined at the sides; pedicel of antenna longer than first flagellar segment, club about three times as long as thick.

Pronotal neck more or less shagreened or minutely transversely lineolate; pronotal shoulders rather evenly rounded off, not angulate; mesoscutum and disk of scutellum completely coarsely reticulate, the cells large and irregular; notaulices indicated, at least posteriorly; propodeum finely rugulose except in the arcuate impressed area at posterior margin; lateral surfaces of propodeum thickly covered with short hair that more or less obscures the sculpture; the broad oblique impression on mesopleuron finely transversely striate, the surface below it confluent punctate or rugulose punctate; hind coxae shagreened and somewhat punctate; subcosta complete but weak apically; stigmal vein developed.

Abdomen about 1.3 times as long as head and thorax combined and not wider than thorax, narrowing strongly caudad beyond the third segment; first

tergite medially only slightly more than half as long as second, coarsely longitudinally striate; second tergite more finely but completely striate; third longitudinally rugulose or rugulose striate; fourth longitudinally rugulose striate laterally but smooth down the middle; fifth weakly longitudinally rugulose striate; sixth rugulose; fifth tergite not nearly twice as broad at base as long; third, fourth, and fifth sternites smooth and polished medially, finely aciculate laterally.

Black; mandibles and scapes yellow, also all legs including the coxae; tegulae yellowish; forewings distinctly somewhat infumated except basally where they are nearly or quite hyaline; abdomen black, sometimes weakly suffused with dark brown, especially below.

MALE.—Unknown.

HOLOTYPE.—USNM 71616.

DISTRIBUTION.—The holotype and 8 female paratypes are labeled "In cotton fields, Brownsville, Texas, 1956." Another female paratype was taken 1 June 1938 in a peach orchard at Sugarland, Texas.

Scelio insolitus, new species

FIGURES 2, 17, 36

This species is remarkable for its extraordinarily large eyes and for its correspondingly very narrow temples and very short malar spaces; also for the unusually coarse sculpture of the mesonotum. It is quite unlike all other known Nearctic species.

FEMALE.—Length of holotype 3.8 mm. Head in dorsal view a little wider than thorax and about twice as wide as its maximum length, in front view subcircular; temples sharply receding from eye margins and at mideye point less than one-third as wide as eyes; malar space less than one-third as long as eye height; shortest distance between eyes only two-thirds as long as eye height; distance between lateral ocelli hardly three times the diameter of one of them; frons, malar spaces, cheeks, temples and vertex coarsely rugose reticulate, the lower frons not at all striate or aciculate; occipital carina complete, very prominent at the sides; first segment of antennal flagellum fully as long as pedicel.

Thorax short and stout; neck of pronotum with some weak transverse roughening; pronotal shoulders rectangular; mesoscutum and disk of scutellum extremely coarsely rugose reticulate; notaulices not

at all indicated; propodeum coarsely rugose medially in front, finely rugulose laterally, and with a broad and deep, smooth and shining, semicircular impression around the posterior margin; the broad oblique impression on mesopleuron not aciculate but finely rugulose; remainder of mesopleuron, as well as mesopectus and metapleuron, coarsely rugose; wings very densely hairy; subcosta complete although hyaline apically and rather obscured there by the thick covering of dark hairs; stigmal vein well developed.

Abdomen at widest point hardly as wide as thorax, narrowing strongly beyond the third segment and acute at apex; first tergite down the middle more than 0.6 as long as second, coarsely longitudinally striate; second, third, fourth, and fifth tergites all completely longitudinally striate, the third noticeably the longest; none of the tergites smooth and polished along the posterior margins; venter of abdomen completely, finely, longitudinally striate.

Body entirely deep black; antennal scapes light brown, remainder of antennae black; all coxae black; trochanters and extreme bases of femora pale, otherwise the femora blackish; tibiae and tarsi brown; wings strongly infumated except at extreme bases; tegulae black.

MALE.—Unknown.

HOLOTYPE.—In the Canadian National Collections, Ottawa.

DISTRIBUTION.—Known only from the holotype, which was collected at Paul Smiths, Franklin County, New York, 20 July 1962, by J. R. Vockeroth.

Scelio oedipodae Ashmead

FIGURES 13, 24, 41

Scelio oedipodae Ashmead, 1893:242, 245.

Scelio rufiventris Ashmead, 1893:242, 245. New synonymy.

This appears to be most closely related to *Scelio rufulus*, new species, and *S. conformis*, new species. From the former it differs especially in color and in its narrower and receding temples; from the latter it may be distinguished as pointed out in the treatment of that species. It seems that *S. oedipodae* and *S. rufiventris* are clearly the same species. They agree nicely in all essential details of structure, differing only more or less in color, and it is evident from the available material that color varies rather widely in this form.

FEMALE.—Length normally ranging from 3.6 to

4.2 mm. Head strongly transverse, as viewed from above nearly twice as broad as long, as seen from in front subcircular, only a little broader than high; cheeks not bulging; temples more or less receding, at mideye point about 0.6 as wide as eyes; malar space more than half, sometimes nearly two-thirds, as long as eye height; shortest distance between eyes a little longer than eye height; lower frons and malar space smooth and polished, with only a few weak and very short raised lines radiating from above bases of mandibles; cheeks and temples more or less vertically rugulose, the lower part of cheeks often largely smooth; upper part of frons and vertex punctate to rugulose punctate; occiput transversely rugulose and completely margined although weakly so medially; pedicel of antenna considerably longer than first flagellar segment; club fully three times as long as broad.

Neck of pronotum usually largely smooth although with some faint transverse sculpture anteriorly; pronotal shoulders weakly rounded off; mesoscutum largely rather coarsely rugulose punctate, the small lateral areas usually partly smooth and shining; notaulices well marked, especially posteriorly; disk of scutellum sculptured like the middle posterior part of mesoscutum; propodeum rugulose, usually with several prominent short carinae radiating from posterior margin and often with two subparallel median carinae enclosing a narrow median area; the large oblique impression on mesopleuron finely transversely aciculate, the area below it more or less longitudinally striate; mesopectus largely smooth and shining; hind coxae smooth and polished, though usually with a little very weak, transverse sculpture at their bases; subcosta apically indistinct or very weak; stigmal vein not distinct.

Abdomen at least as broad as thorax, usually a little broader; first tergite medially not more than 0.4 as long as second and coarsely longitudinally striate or rugulose striate; second tergite usually finely longitudinally rugulose striate, sometimes more or less granulose in part; third, fourth, and fifth tergites finely rugulose or granularly rugulose, the sixth more coarsely roughened; third tergite barely longer than fourth; fifth very nearly twice as broad at base as long; third, fourth, and fifth sternites almost entirely smooth and shining although with some scattered, faint and minute punctures medially.

Color variable, ranging from almost entirely black to largely reddish or yellowish brown; front of head,

especially on lower half, nearly always more or less reddish; occasionally the thorax on the sides, and usually the abdomen both above and below, more or less reddish or yellowish brown; scape and pedicel of antennae brownish yellow, the flagellum darkened; wings hyaline; tegulae piceous, coxae, especially the posterior pair, usually more or less darkened except when the abdomen is entirely red.

MALE.—Unknown.

Lectotype of *S. oedipodae* (Masner and Muesebeck, 1968:44), USNM 24547; holotype of *S. rufiventris*, USNM 25458.

DISTRIBUTION.—The two females of the type-series of *S. oedipodae* are labeled as having been reared from eggs of *Oedipoda* species taken at Arlington, Virginia; the male which Ashmead included in his type-series is *S. opacus* (Provancher). The holotype of *S. rufiventris* is from Fort George, Florida. In addition to the types I have seen specimens, none of them reared, from Florida, Texas, Colorado, and Montana in the United States, and from Ontario, Canada. Morgan (1901) recorded this species from eggs of *Melanoplus differentialis* (Thomas), but I have seen no specimens of it from that host and I suspect that the parasite he reared was *S. opacus* (Provancher).

Scelio opacus (Provancher)

FIGURES 9, 27, 30, 43

Acerota opaca Provancher, 1887:184.

Scelio opacus (Provancher).—Ashmead, 1893:242, 245.

Scelio calopteni Riley, in Ashmead, 1893: 242, 246.—Snodgrass, 1941:38–39, pl. 10, figs. ♀, ♂.—Pickford, 1964: 1167–1172. New synonymy.

Scelio luggeri Riley, in Ashmead, 1893:242, 246. New synonymy.

Scelio ashmeadi Viereck, 1903:74. New synonymy.

Scelio striatigena Kieffer, 1904:530; 1906:269. New synonymy.

Scelio albipennis Kieffer, 1906:270. New synonymy.

Scelio melleipes Kieffer, 1908:29, 30. New synonymy.

This seems to be decidedly the most abundant and most widespread Nearctic species of *Scelio*. I have seen many hundreds of specimens from numerous localities, ranging across Canada from Nova Scotia to British Columbia and in the United States from New Hampshire to Florida and west to the Pacific (from Oregon to southern California). It seems to be primarily a parasite in the eggs of various species

of *Melanoplus*. Material I have examined includes numerous long series from *M. sanguinipes* (Fabricius), and others from *M. femurrubrum* (DeGeer), *M. devastator* Scudder, *M. differentialis* (Thomas), and *M. bivittatus* (Say). In addition, some series from Manitoba and Saskatchewan are recorded as having been reared from eggs of *Camnula pellucida* (Scudder), and three specimens are labeled as having been obtained from eggs of *Ageneotettix deorum* (Scudder).

As indicated above six names are being suppressed as new synonyms of *S. opacus*. Although I have seen a paratype of *S. albipennis* I have been unable to obtain for study type-specimens of the other two Kieffer species. All three species, however, seem rather clearly to be *S. opacus*.

FEMALE.—Length normally ranging from 3.2 to 3.8 mm. Head slightly wider than thorax, nearly circular as seen from in front and usually about 1.6 times as wide as long in dorsal view; temples sometimes noticeably receding but usually broadly rounded, at mideye point from 0.6 to 0.75 as wide as eyes, irregularly vertically rugulose; malar space usually a little more than half as long as eye height; shortest distance between eyes ranging from 1.1 to 1.25 times eye height; lower frons laterally, malar spaces and cheeks finely striate; upper part of frons usually with well separated, very shallow punctures on a shagreened ground; vertex and occiput generally more or less like upper part of frons but sometimes virtually smooth; occiput normally completely margined although often weakly so medially; pedicel of antenna noticeably longer than first flagellar segment, club (last six segments) at least three times as long as thick.

Neck of pronotum finely transversely striate; pronotal shoulders subrectangular; mesoscutum usually finely rugulose punctate but sometimes more or less smooth anteriorly and in the posterior lateral corners; notaulices usually rather well indicated; disk of scutellum sculptured like posterior part of mesoscutum; propodeum largely rugulose, usually with two more or less complete longitudinal keels medially and a little depressed around the posterior margin, only very sparsely hairy; mesopleuron finely rugulose, the broad oblique impression finely transversely aciculate; subcosta normally complete though largely hyaline; stigmal vein indistinct; hind coxae usually a little shagreened or finely transversely lineolate outwardly and below.

Abdomen about as wide as thorax and considerably longer than head and thorax combined, strongly narrowed from the third segment to the apex where it is acute; first tergite on anterior margin usually about twice, on posterior margin about three times, as wide as long down the middle, its median length at least half that of the second tergite, which is shorter than the third or fourth and about as long as the fifth; the third barely longer than the fourth; the fifth usually, but not always, about twice as broad at base as long; first tergite coarsely longitudinally rugose or striate; the second, third, fourth, and fifth tergites very finely longitudinally rugulose aciculate on a granulose ground, the fourth and fifth often a little smooth medially; third, fourth, and fifth sternites finely longitudinally aciculate or rugulose except medially where they are usually smooth.

Black or blackish, the abdomen sometimes suffused with red or brownish yellow and the pronotal neck nearly always lighter than the mesonotum; legs yellow, rarely the hind coxae slightly darkened; antennal scapes yellowish, remainder of antennae darkened; forewings usually distinctly a little infumated although sometimes nearly or quite hyaline; tegulae brownish yellow to piceous.

MALE.—Darker and usually more coarsely sculptured than the female; antennal scapes and the legs, at least the coxae, more or less darkened; wings whitish hyaline. Third segment of antennal flagellum not enlarged as it is in many species of the genus, not longer than the fourth. Temples usually broader than in the female and the first tergite, compared with the second, relatively longer.

Lectotype of *S. opacus* (selected by Gahan and Rohwer, 1917:304) in the Quebec Provincial Museum Collection, Laval University, Sainte Foy, Quebec, Canada. The lectotypes of *S. calopteni* and *S. luggeri* (selected by Masner and Muesebeck, 1968:43 and 44, respectively) in the National Museum of Natural History and the holotype of *S. ashmeadi* in the Academy of Natural Sciences of Philadelphia. The location of the holotypes of the three species described by Kieffer is unknown.

DISTRIBUTION.—As indicated above the species occurs throughout continental United States, except Alaska, and at least throughout southern Canada.

Scelio ovivorus (Riley)

FIGURES 3, 23, 39, 49

Caloptenobia ovivora Riley, 1878:306.

Scelio famelicus (Say).—Riley, 1880:270.—Ashmead, 1887:119.

Scelio ovivora (Riley).—Riley, 1885:22.—Riley and Howard, 1885:124.—Ashmead, 1887:119; 1893:242, 244.

Scelio pallidicornis Ashmead, 1893:242, 244. New synonymy.

The identity of *Sparasion famelicum* Say (1836:276) is somewhat doubtful, but Riley's identification of the species as the form which he had described earlier as *Caloptenobia ovivora* is definitely incorrect, as he himself recognized later (1885). Although Say's species is currently being placed in *Sparasion*, in which it was originally described, I do not believe it belongs there. The author's emphasis on the "much elongated" body and his description of the antennae appear to exclude *Sparasion* but to fit *Macroteleia*. It seems quite possible that *S. famelicum* Say is the same as *Macroteleia goldsmithi* Girault (1920:180) which was originally described from Illinois. Apparently *S. ovivorus* is most similar to *S. floridanus* Ashmead, but it is normally somewhat larger, with the abdomen relatively broader and not so acute at the apex. There are also differences in the sculpture of the abdomen, the structure of the antennae and the color of the tegulae in the female. I believe *S. pallidicornis* Ashmead to be the male of *S. ovivorus*.

FEMALE.—Length normally 4.5–4.8 mm. Head a little wider than thorax (in ratio of 7:6), as seen from in front a little wider than high and from above about 1.75 times as wide as long; temples receding, at mideye point only about half as wide as eyes, and coarsely rugose; malar space less than half as long as eye height; shortest distance between eyes just about equal to eye height; lower frons laterally, malar space and cheeks coarsely striate; upper part of frons and occiput coarsely rugoso-punctate; vertex closely and coarsely punctate, sometimes confluent so; occiput margined only at the sides; pedicel of antenna only slightly longer than first flagellar segment; club (last six segments) about three times as long as broad.

Neck of pronotum minutely and faintly transversely sculptured anteriorly, rugose punctate posteriorly; pronotal shoulders subangulate; mesoscutum and disk of scutellum entirely coarsely contiguously punctate or rugoso-punctate; notaulices more or less indicated; propodeum strongly rugose, the posterior lateral angles prominent, acute; a strong

arched ridge setting off a transverse area at posterior margin of propodeum that is usually crossed by some irregular, weak, and short longitudinal ridges; the large oblique impression on mesopleuron more or less completely striate, the area below it as well as the mesosternum strongly rugulose; hind coxae largely finely shagreened or minutely granulose; subcosta complete, stigmal vein well developed.

Abdomen large, its maximum width a little greater than that of the thorax, not more than 2.3 times as long as wide; first tergite coarsely longitudinally rugose striate, its median length just about half that of the second and its apical width not more than four times its median length; second longitudinally striate or rugulose striate; third irregularly rugulose medially on basal half but longitudinally rugulose striate laterally and posteriorly; fourth and fifth tergites longitudinally striate; sixth rugulose; third tergite longer than fourth; fifth fully twice as broad at base as long; third, fourth, and fifth sternites rather coarsely longitudinally striate except narrowly down the middle.

Black; antennae dark brown to blackish, except the scapes which are usually largely yellowish; legs, including all coxae, entirely yellow; tegulae yellow or brownish yellow; forewings distinctly somewhat infumated except at their bases.

MALE.—Differing from the female especially in the antennae (Figure 49) and in the construction of some of the abdominal segments; first tergite medially more than half as long as second and fifth at least 2.5 times as broad at base as long. The antennae of the type of *S. pallidicornis* are brownish yellow and the tegulae and coxae are yellow, but other males in the available material exhibit considerable variation in the color of these parts, the antennae, tegulae, and hind coxae being sometimes darkened in varying degrees.

Lectotype of *S. ovivorus*, USNM 2800 (Masner and Muesebeck, 1968:45) Holotype of *S. pallidicornis*, USNM 24546.

DISTRIBUTION.—The type-series of *S. ovivorus* is labeled as having been reared in Massachusetts from eggs of *Dissosteira carolina* (Linnaeus); and the unique type of *S. pallidicornis* was collected at Jacksonville, Florida. Other specimens (none of them reared), which I identify as this species, are from Massachusetts, Connecticut, Pennsylvania, District of Columbia, Virginia, North Carolina, Florida, Illinois, Iowa, Arkansas, and Texas.

Scelio pallidipes Ashmead

Scelio pallidipes Ashmead, 1893:242, 244.

This species, which is known from only five male specimens, is exceedingly like *S. striativentris* Kieffer, which it resembles in the unusually long first abdominal tergite, the closely striate abdomen and the absence of notaulices, and it may prove to be the same, but I feel compelled to hold it distinct for the present, at least, because of certain minor, but apparently significant differences and the difference in distribution. All the coxae are completely yellow and the forewings are hyaline, whereas in *S. striativentris* the coxae of the males are usually more or less darkened and the forewings are distinctly infumated; moreover, the flagellar segments of the antennae are relatively shorter than in the males of *S. striativentris*. On the basis of the known material there is no overlapping of distribution of the two forms. Four of the five known specimens of *S. pallidipes* are from Florida and the fifth is from Hilton Head Island, South Carolina (at the extreme southern tip of the state); *S. striativentris*, on the other hand, appears to be a northern species, only one of the many specimens I have seen being from as far south as North Carolina and that was taken at an elevation of 1500 meters.

MALE.—Length about 3.5 mm. Head barely wider than thorax, in dorsal view about 1.6 times as wide as its maximum length, in front view broadly oval, 1.25 times as wide as high; temples a little more than half as wide as eyes at mideye point, and together with the cheeks coarsely rugose; malar space a little less than half as long as eye height; shortest distance between eyes about 1.25 times as long as eye height; lower frons and malar spaces coarsely striate; upper part of frons, vertex and occiput coarsely rugose reticulate; occiput carinately margined only on the lower part of the sides; antennae short; first flagellar segment a little longer than pedicel; third flagellar segment a little swollen, wider than long; the last four flagellar segments combined not as long as scape.

Neck of pronotum shiny, weakly transversely roughened anteriorly and laterally; pronotal shoulders virtually rectangular; mesoscutum coarsely rugose reticulate, with no indication of notaulices; propodeum rugose, coarsely so medially, more finely so laterally; an arched transverse keel setting off posterior two-fifths of propodeum, this posterior, curved, impressed area with several more or less distinct and

short longitudinal rugae; dorsum of propodeum only weakly hairy, even laterally, the sculpture not at all obscured; posterior lateral angles not prominent; the oblique impression on mesopleuron weakly, irregularly, transversely roughened; subcosta distinct basally but fading out apically; stigmal vein not distinct; hind coxae largely smooth and polished.

Abdomen very nearly as wide as thorax; tergites 1-6, except narrowly along posterior margins, rather strongly longitudinally striate, the spaces between the ribs minutely reticulate; first tergite nearly 0.9 as long medially as second, three-fifths as long as broad at base and three-sevenths as long as broad at apex; third tergite just about as long as fourth; venter of abdomen largely very finely striate on a shagreened ground.

Black; mandibles ferruginous; scape of antenna brownish yellow; rest of antenna darkened; tegulae brownish; wings clear hyaline; legs, including all coxae, yellow.

FEMALE.—Unknown.

Lectotype (Masner and Muesebeck, 1968:45), USNM 24545.

DISTRIBUTION.—The two specimens comprising the type-series are from Jacksonville, Florida. In addition to these I have seen a male in the Canadian National Collections from Hilton Head Island, South Carolina, collected 11-23 July 1965 by H. F. Howden; another in the collection of the Florida State Division of Plant Industry that was collected at Cassadaga, Florida, 11 May 1956 by H. V. Weems, Jr., and one in the collection of the Museum of Comparative Zoology, Harvard University, from Sanford, Florida, labeled as collected 4 May.

Scelio pumilus, new species

FIGURES 12, 25, 29

This is the smallest *Scelio* I have seen. Although sculpturally rather similar to *S. opacus* (Provancher) it is readily distinguishable from that species by its small size, relatively very short and broad abdomen, stouter antennal club and the absence of any indication of notaulices.

FEMALE.—Length of holotype barely 3 mm. Head in front view subrectangular, much broader than high, in dorsal view 1.6 times as broad as long and slightly broader than thorax; temples not receding but virtually parallel, as seen from above, and at mideye point about 0.8 as wide as eyes, very shiny

and rather smooth, with only some scattered, shallow punctures and a few weak vertical rugulae; malar space half as long as eye height; cheeks somewhat swollen, weakly and shortly aciculate at lower margins; shortest distance between eyes about 1.2 times as long as eye height; lower frons and malar space finely aciculate, the inner ribs curving toward each other but not meeting and leaving a smooth and polished space between them just above insertion of antennae; upper frons, vertex and occiput smooth and shining, with only some very shallow, well separated punctures; occiput carinately margined at the sides but not distinctly so medially; antennae short and stout, pedicel slightly longer than first flagellar segment, club (last six segments) only 2.5 times as long as thick.

Neck of pronotum completely transversely striate as in *S. opacus*; pronotal shoulders a little rounded; mesoscutum coarsely though shallowly reticulate except on a small area medially in front which is largely smooth and shiny with only scattered setiferous punctures; notaulices not at all indicated; disk of scutellum sculptured like posterior part of mesoscutum; propodeum rugulose laterally, narrowly impressed down the middle and smooth and shiny medially at the posterior margin, with only a few short longitudinal rugae there; the broad oblique impression on mesopleuron irregularly transversely aciculate; wings of holotype in very poor condition, but subcosta appears to be very weak and the stigmal vein not apparent; hind coxae finely shagreened.

Abdomen short and broad, just about as long as head and thorax combined and about twice as long as its maximum width; first tergite longitudinally striate, medially barely half as long as second, three times as broad at base and four times as broad at apex as long at the middle; second tergite very finely and closely longitudinally striate; third longitudinally finely rugulose aciculate, smooth and polished across apex, and a little longer than fourth; fourth tergite similarly but more weakly sculptured, broadly smooth and polished across apex and medially; fifth very weakly longitudinally aciculate on basal two-thirds and at least three times as broad on anterior margin as long; sixth rugulose; third, fourth, and fifth sternites smooth medially, more or less longitudinally striate laterally.

Black; mandibles, antennal scapes and the legs completely, pale yellow; tegulae yellowish brown;

forewings apparently a little infumated; neck of pronotum light brown; venter of abdomen piceous.

MALE.—Unknown.

HOLOTYPE.—USNM 71617.

DISTRIBUTION.—Known only from a single female labeled as having been collected in a cotton field at Brownsville, Texas, in 1956.

Scelio rufulus, new species

FIGURES 7, 26, 35, 45

From *S. semirufus*, new species, which it resembles superficially, this species differs in its very smooth lower frons, the relatively shorter first segment of the antennal flagellum, the better developed occipital carina, the different abdominal sculpture, and the usually entirely reddish body of the female (in *S. semirufus* the head and abdomen are black). Structurally *S. rufulus* is most similar to *S. oedipodae* Ashmead, from which it differs especially in color and in its unusually broad and bulging temples and cheeks.

FEMALE.—Length normally ranging from 4 to 4.3 mm. Head very slightly wider than thorax, in dorsal view about 1.65 times as broad as its maximum length, in front view subrectangular; temples and cheeks broadly rounded and bulging a little, the temples at mideye point at least 0.8 as wide as eyes and only weakly sculptured; malar space about two-thirds as long as eye height; shortest distance between eyes about 1.25 times as long as eye height; lower frons, malar spaces and cheeks smooth and shining, a few very short and very faint striae radiating from above bases on mandibles; upper part of frons, vertex, and occiput usually largely smooth but sometimes somewhat rugulose punctate; occipital carina well developed and usually complete; pedicel of antenna about as long as first and second flagellar segments combined, club a little more than three times as long as thick.

Neck of pronotum very weakly, irregularly roughened, shiny; pronotal shoulders a little rounded off, not rectangular; mesoscutum largely rugulose punctate but usually more or less smooth and shiny on the middle lobe anteriorly and on the small lateral lobes; notaulices indicated; disk of scutellum closely rugulose punctate; propodeum nearly horizontal, largely rugulose reticulate, without a transverse ridge setting off a posteriorly depressed area but usually with

two subparallel median longitudinal carinae defining an elongate impressed area; posterior lateral angles of propodeum prominent and acute; the broad, oblique impression on mesopleuron strongly and completely transversely striate; mesopectus smooth and shining; subcosta apparently complete although hyaline and very weak apically; stigmal vein usually not distinct and at most represented by a faint hyaline stub; hind coxae smooth and polished above.

Abdomen at widest point usually slightly wider than thorax; first tergite medially less than half as long as second, coarsely longitudinally rugulose; second finely longitudinally rugulose striate; third largely minutely rugulose; fourth and fifth tergites usually shagreened or finely granulose; third and fourth tergites subequal in length, the fifth twice as broad at base as long, the sixth broadly triangular; third, fourth, and fifth sternites smooth and shining, at most vaguely longitudinally sculptured laterally.

Ferruginous, the abdomen sometimes slightly darker than head and thorax; legs and tegulae concolorous with thorax; forewings hyaline or faintly infumated on apical two-thirds.

MALE.—Differs from the female in the antennae (Figure 45), in having the upper frons, temples, and vertex more densely sculptured, and in having the head, thorax, and abdomen black; the coxae and femora also are black or blackish, and the wings are clear hyaline.

HOLOTYPE.—USNM 71618.

DISTRIBUTION.—Described from 13 females (one the holotype) and 3 males reared from eggs of an unknown grasshopper in Greeley County, Kansas, 21 October 1938, by F. L. McDonald; 2 females from grasshopper eggs, Russell County, Kansas, May 1938, R. W. Portman; and 8 females and 1 male from grasshopper eggs, Smith County, Kansas, 2 October 1938, R. W. Portman. Also belonging here, although not included in the type series are: 1 female from Halsey, Nebraska, taken 30 June 1958, by R. Henzlik; 1 female collected at Phoenix, Arizona, 27 May 1938; 2 females collected in wind vane traps in Idaho, 1 at Tuttle, 1 July 1932, and 1 at Wendell, 15 October 1930, and 1 female and 2 males from Winnett, Petroleum County, Montana, collected 30 July 1969, by A. G. Hamilton. In one of the female paratypes from Smith County, Kansas, the eyes are unusually small and the lateral ocelli are removed from the eyes by more than their own diameter.

Scelio semirufus, new species

FIGURES 1, 20, 28

This seems to be most similar to *S. rufulus*, new species, which it particularly resembles in the shape of the head, with broad and somewhat bulging temples and broad frons, but it is readily distinguished from that species by its black head and abdomen, by the distinctly aciculate condition of the lower part of the frons, by the character of the abdominal sculpture and the relatively longer first tergite.

FEMALE.—Length about 4.5 mm. Head barely wider than thorax, in front view subrectangular, in dorsal view about 1.5 times as wide as its maximum length; temples not receding but rather bulging a little and at mideye point at least 0.9 as wide as eyes, sometimes nearly smooth but usually with some weak vertical rugulosity; malar space a little more than half as long as eye height; lower frons, except for a narrow, vertical, smooth, and polished strip immediately above insertion of antennae, and also the malar spaces and cheeks, finely striate; upper part of frons closely punctate; vertex also punctate but not so closely or so deeply as upper part of frons; upper part of back of head transversely rugulose; occipital carina well developed only at the sides; pedicel of antenna only a little longer than first flagellar segment, club about 3.5 times as long as broad.

Thorax stout, broadest at the roundly rectangular pronotal shoulders; pronotal neck irregularly and very weakly transversely sculptured; sculpture of mesoscutum variable; in the available specimens the scutum is sometimes entirely covered with rather large contiguous punctures but in other specimens the punctures are smaller and well separated, and in still others the scutum is largely smooth anteriorly and only finely and shallowly punctate posteriorly; notaulices not clearly indicated; disk of scutellum sculptured like posterior part of mesoscutum; propodeum coarsely rugose reticulate, the posterior lateral angles projecting prominently, acute; the broad oblique impression on mesopleuron finely transversely striate; subcosta indistinct apically; stigmal vein indistinct; hind coxae largely smooth and polished.

Abdomen about 1.3 times as long as head and thorax combined, at broadest point just about as broad as thorax, narrowing sharply caudad from

the end of the third segment, acute at apex; first tergite medially slightly more than half as long as second and coarsely longitudinally rugose striate; second, third, fourth, and fifth tergites more finely longitudinally rugulose, sixth rugulose; fifth tergite not nearly twice as broad at base as long; third, fourth, and fifth sternites smooth medially, very finely and closely, longitudinally rugulose laterally.

Head black, except the mandibles and the antennal scapes, which are reddish; thorax red, the disk of scutellum and the metanotum sometimes a little darkened; tegulae and legs concolorous with thorax; forewings noticeably infumated; abdomen brownish black to black.

MALE.—Unknown.

HOLOTYPE.—USNM 71621.

DISTRIBUTION.—Known only from a series of 13 females, one the holotype, that were reared from eggs of *Mermiria maculipennis* Bruner which had been collected in "Central S. Dakota or N. W. Nebraska" in September 1944, by R. C. Newton. Some of the specimens are not in good condition.

Scelio singularis, new species

Although this species closely resembles *S. striativentris* Kieffer it may be immediately distinguished from that form by its relatively shorter first abdominal tergite, its strongly receding temples and completely margined occiput and its larger eyes with a correspondingly narrower frons and shorter malar space. In the transversely striate neck of the thorax it is very similar to *S. opacus* (Provancher), from which it differs, however, in its more evenly and more coarsely sculptured head and thorax, absence of notaulices, coarser sculpture of the abdomen and larger eyes.

FEMALE.—Length of holotype 4 mm; of paratype 3.7 mm. Head slightly wider than thorax, as seen from above hardly 1.6 times as wide as its maximum length, in front view noticeably broader than high; temples receding, at mideye point about half as wide as eyes, strongly vertically rugose; eyes large; malar space less than half as long as eye height (in ratio of 35:80); shortest distance between eyes just about equal to eye height; lower frons, malar space and cheeks coarsely striate; upper part of frons, vertex and occiput coarsely rugose punctate;

occipital carina sharp and complete; first segment of antennal flagellum nearly as long as pedicel, the club (last six segments) more than three times as long as thick.

Neck of pronotum closely transversely striate; pronotal shoulders rectangular; mesoscutum and disk of scutellum completely coarsely rugose punctate; notaulices wanting; propodeum nearly horizontal, strongly rugose and without any noticeable hair covering, there being only a few scattered hairs toward lateral margins; posterior lateral angles of propodeum rather prominent; hind coxae largely smooth and polished; subcosta complete though hyaline apically, stigmal vein very weak and short.

Abdomen a little wider than thorax, evenly narrowed toward base and apex; first tergite about half as long medially as second, strongly longitudinally striate; tergites 2 to 5 more closely and more finely striate, the sixth rugose; third only just longer than fourth; fifth just about twice as broad at base as long; third, fourth, and fifth sternites finely longitudinally aciculate laterally, smooth and polished medially with only a few punctures there.

Black; mandibles and antennal scapes brownish; neck of pronotum black; tegulae brownish piceous; legs brownish yellow, the hind coxae slightly darker; forewings distinctly a little infumated; abdomen black above, a little suffused with brownish below.

MALE.—Unknown.

HOLOTYPE.—USNM 71619.

DISTRIBUTION.—Known only from the holotype female, which was collected at Ames, Iowa, 28 September 1963, by L. W. Asell, and which has been donated to the National Museum of Natural History by Iowa State University; and a female paratype from Benzie County, Michigan, taken 8 September 1966, by R. W. Carlson and presented to the National Museum of Natural History by Dr. Carlson.

Scelio solus, new species

Very near *Scelio conformis*, new species, but differing especially in its shorter malar space and in the more striate sculpture of the abdomen.

FEMALE.—Length of holotype 3.8 mm. Head in dorsal view about 1.75 times as broad as its maximum length, in front view broadly oval; temples rounded, gradually receding, at mideye point about

two-thirds as wide as eyes; malar space barely half as long as eye height; shortest distance between eyes just equal to eye height; lower part of frons smooth and polished, with only a few weak and very short striae above bases of mandibles; upper part of frons with large, though shallow, closely placed punctures; vertex and occiput confluent punctate or rugulose punctate; occipital carina complete; cheeks and temples largely smooth although finely vertically lineolate adjacent to eyes and with some very shallow, elongate punctures; pedicel of antenna fully as long as first and second flagellar segments combined; club (last six segments) slightly more than three times as long as thick.

Neck of pronotum very shiny and with only a little faint, transverse sculpture; pronotal shoulders broadly rounded off; mesoscutum closely and coarsely punctate, confluent so posteriorly, more or less smooth and shining in the posterior lateral angles, with only scattered punctures there; notaulices indicated posteriorly; disk of scutellum closely rugose punctate; propodeum strongly rugose and with two irregular longitudinal carinae bordering a narrow median longitudinal impression; the broad oblique impression on mesopleuron largely transversely striate, narrowly smooth and polished below, the area immediately below the impression finely longitudinally sculptured; mesospectus largely smooth and shining although with some weak punctures; hind coxae smooth and polished; subcosta and stigma very well developed.

Abdomen not broader than thorax; first tergite medially slightly less than half as long as second and strongly longitudinally striate; the second completely and finely striate; third not longer than fourth, both largely longitudinally rugulose striate; more weakly so medially; sixth rugose; third, fourth, and fifth sternites smooth and shining but with numerous, rather evenly spaced, small setiferous punctures.

Black, venter of abdomen brown; scape, pedicel, and base of antennal flagellum light brown; rest of antenna brownish piceous; legs, including all coxae, testaceous; forewings distinctly a little infumated except at bases; tegulae piceous.

MALE.—Unknown.

HOLOTYPE.—In the Canadian National Collections.

DISTRIBUTION.—Known only from the holotype, which was collected at Mount Pleasant, Florida, 1 May 1952, by G. S. Walley.

Scelio squamosus, new species

FIGURE 18

This is immediately distinguishable from all other known Nearctic species of *Scelio* by having the head and much of the thorax covered with long and broad, white, recumbent or semirecumbent, scale-like hairs. Species with similar vestiture are known, however, from South America, the Philippines and Australia.

FEMALE.—Length of holotype 3.8 mm. Head rather strongly transverse, in dorsal view about 1.75 times as broad as its maximum length, in front view subcircular; temples rugose, narrow, and receding, at mideye point not nearly half as wide as eyes; malar space just about half as long as eye height and shortest distance between eyes just equal to eye height; lower frons, except medially above insertion of antennae, finely striate up to level of middle of eyes; malar spaces and cheeks striate, upper part of frons and vertex finely rugulose, the back of the head, below lateral ocelli, somewhat transversely rugulose; sculpture of head rather obscured by the covering of broad, white, recumbent, scale-like hairs, only the narrow, smooth, and polished area just above insertion of antennae being without them; occipital carina complete although weak medially; pedicel of antenna a little longer than first flagellar segment; club more than three times as long as thick.

Thorax noticeably narrower than head; neck of pronotum strongly transversely striate; pronotal shoulders only weakly rounded; mesoscutum shallowly but rather coarsely reticulate, with some punctation or fine rugosity in the cells; notaulices wanting; disk of scutellum finely rugose reticulate; mesoscutum and scutellar disk with some broad, scale-like hairs like those on head (in the holotype some of these have been rubbed off); propodeum finely rugulose, with two weak and irregular, subparallel carinae down the middle; the broad oblique impression on mesopleuron weakly and irregularly rugulose aciculate; the surface below this impression rugulose but the sculpture somewhat obscured by a thick covering of long, white, semirecumbent broadened hairs, some of them scale-like; metapleuron rugulose, also rather thickly covered with long white hairs some of which are broad and scalelike; hind coxae shagreened; subcosta distinct only basally; stigmal vein not developed.

Abdomen barely longer than head and thorax combined and not quite as broad as thorax; median length of first tergite barely one-third the basal width of the tergite and less than half the median length of the second; third tergite longer than fourth (in ratio of 70:60), fifth shorter than second and twice as broad at base as long; first tergite rather strongly longitudinally rugose striate, the second finely and closely longitudinally aciculate on an alutaceous ground, the third, fourth, and fifth tergites weakly and irregularly longitudinally aciculate on an alutaceous or granulose surface; sixth tergite rugulose reticulate; venter of abdomen smooth medially, finely shagreened laterally.

Head black but covered with conspicuous, white, scale-like hairs; mandibles brownish; scape and pedicel of antenna brownish yellow, flagellum brown basally, the club black; dorsum of prothorax and mesothorax black; propodeum and all of the sides and the venter of thorax reddish testaceous; legs entirely testaceous; forewings a little infumated but hyaline basally; tegulae brown; abdomen black or blackish.

MALE.—Unknown.

HOLOTYPE.—USNM 71620.

DISTRIBUTION.—Known only from the holotype, which is labeled as having been collected at Gainesville, Florida, 28 January 1958, by K. W. Cooper.

Scelio striativentris Kieffer

FIGURES 5, 21, 32, 46

Scelio striativentris Kieffer, 1908a:29, 33.

This is a rather common northern species which superficially somewhat resembles the most common and most widely distributed Nearctic form, *S. opacus* (Provancher). It is easily distinguished from *S. opacus*, however, by its unusually long first abdominal tergite, the complete absence of notaulices, the more strongly striate abdomen, the well-infumated wings of the male, and by characters of the antennae of both sexes.

FEMALE.—Length around 3.8 mm. Head in dorsal view about 1.5 times as wide as long, in front view short oval, only a little wider than high; temples normally rounded or even bulging slightly, at mideye point usually about 0.8 as wide as eyes and coarsely rugose reticulate; malar space hardly half as long as eye height; shortest distance between eyes

usually about 1.15 times the eye height; lower frons laterally, malar spaces and cheeks coarsely striate, a narrow vertical area above insertion of antennae smooth and polished; upper half of frons, as well as the vertex and occiput, coarsely rugose reticulate; occiput not distinctly carinately margined except low on the sides; first segment of antennal flagellum about as long as pedicel, club (last six segments) fully three times as long as thick.

Thorax slightly narrower than head; pronotal neck sometimes largely smooth but usually finely rugulose posteriorly and more or less transversely aciculate anteriorly; shoulders nearly rectangular; mesoscutum and disk of scutellum entirely coarsely rugose reticulate, the former with no indication of notaulices; propodeum largely finely rugulose but with a curved, depressed area around posterior margin that is usually divided into a number of smooth and shiny areas by short, more or less distinct, longitudinal septa; posterior lateral angles of propodeum rather blunt; the broad, oblique impression on mesopleuron irregularly transversely striate; subcosta distinct basally, weak or indistinct apically; stigmal vein not developed or very indistinct; hind coxae largely smooth and polished.

Abdomen slightly wider than thorax, evenly narrowed toward base and apex; first tergite medially about 0.8 as long as second, closely rugose, often longitudinally so but not evenly striate; tergites 2 to 5 closely, longitudinally striate; sixth rugulose; third and fourth tergites about equal in length; the fifth twice as broad at base as long; third, fourth, and fifth sternites strongly longitudinally striate though usually smooth and very shiny medially.

Black; pronotal neck sometimes dark brown; antennae dark except the scapes which are yellowish; forewings distinctly infumated; tegulae and legs brownish yellow.

MALE.—Antenna (Figure 46) with third flagellar segment conspicuously enlarged and about as long as broad, the last four segments of flagellum combined as long as scape; the scapes and usually the legs, especially the hind coxae, more or less darkened; otherwise the male is essentially similar to the female.

DISTRIBUTION.—The male type, which was from Toronto, Canada, has not been found, but I am reasonably confident that I have correctly identified the species, which seems to occur rather commonly in Canada from Nova Scotia to Manitoba. Numerous specimens in the Canadian National Collections from

Manitoba are labeled as having been reared from eggs of *Malanoplus bivittatus* (Say). In addition I have seen many specimens from the United States including material from Vermont, New Hampshire, Massachusetts, New York, Maryland, Virginia, North Carolina (at elevation of 1500 meters), Michigan, Wisconsin, Kansas, and North Dakota. A series from Bristol, Maryland, is labeled as having been obtained by W. H. Tyson in January 1970, from an old fungus on the side of a dead tree, which suggests that the species may hibernate in the adult stage.

Scelio venatus Brues

FIGURE 48

Scelio venata Brues, 1906c:228.

Through the kindness of Dr. George W. Byers of the University of Kansas, I have had an opportunity to study the holotype of this species. Unfortunately, the abdomen of the specimen is missing, but it was rather well described by Brues. Although somewhat smaller, *S. venatus* resembles *S. ernstii* Riley very closely, and particularly in general habitus, in the coarse, non-striate sculpture of the frons, the absence of notaulices and the darkened wings. It differs from *S. ernstii* in being somewhat smaller, in its relatively wider frons and relatively narrower thorax and in having the broad mesopleural impression transversely striate and the second, third, and fourth tergites of the female partly reddish brown.

FEMALE.—Length of holotype 4.25 mm, according to Brues. Head a little wider than thorax (in ratio of 60:50), in dorsal view 1.65 times as broad as its maximum length; temples strongly receding, at mideye point about two-thirds as wide as eyes; malar space about half as long as eye height; shortest distance between eyes somewhat longer than eye height (in ratio of 90:80 in holotype); distance between lateral ocellus and eye about equal to diameter of an ocellus; frons, cheeks, malar spaces, temples, vertex, and occiput coarsely and strongly rugose reticulate, only a small area medially above insertion of antennae smooth.

Pronotal shoulders not prominent, not rectangular; mesoscutum and disk of scutellum strongly rugose reticulate, sculptured like the head; notaulices not apparent; propodeum strongly rugose, with an irregular, strongly arched transverse ridge setting off the

posterior part; mesopleuron rugulose reticulate, the broad oblique impression striate; subcosta and stigmal vein well developed; hind coxae smooth and polished.

According to the original description the "first abdominal segment striated, but little wider than long, narrowed basally; second segment two times as wide as long, the third large, a little wider than long, the fourth a trifle shorter; entire surface of abdomen finely aciculated."

Black; antenna with scape light brown and pedicel only slightly darker but the following segments dark brown to blackish; mandibles except teeth testaceous; tegulae darkened; wings infumated except basally; legs brownish yellow, the hind coxae a little darkened basally; according to Brues the abdomen has "the second, third, and fourth segments each with a large spot of reddish brown."

MALE.—The single known male is 4.2 mm long. The head is thicker than that of the female, in dorsal view about 1.5 times as wide as long, and the temples are broader and more rounded, being very nearly as wide as the eyes at the mid-eye point; the malar space is more than half as long as the eye height and the frons at its narrowest point is 1.25 times as wide as the eye height; distance from a lateral ocellus to eye slightly greater than diameter of an ocellus and more than half the distance between the median and lateral ocelli; first segment of antennal flagellum considerably longer than pedicel, the third much enlarged, thicker than the rest, as long as wide, and about as long as the fourth and fifth segments combined; median length of first abdominal tergite about two-thirds the basal width of the tergite; first and second tergites rather strongly longitudinally striate, the third, fourth, and fifth largely longitudinally rugulose, very narrowly smooth medially; third, fourth, and fifth sternites largely smooth and shining though with scattered setiferous punctures and very weak longitudinal sculpture narrowly at the sides. Coxae slightly darkened; abdomen darker than in the female holotype.

HOLOTYPE.—In the collection of the University of Kansas.

DISTRIBUTION.—Known only from the holotype, which is from "Bill William's Fork," Arizona, and the male described above, which was taken at Los Angeles, California, 29 July 1897, by A. P. Morse, and is in the collection of the National Museum of Natural History.

Doubtful Species

Scelio caloptenorum Riley

Scelio caloptenorum Riley, 1885:22.

Riley may have used this name for the species which he described in 1893 as *Scelio calopteni*, but his statement that it is intermediate in size between *S. ernstii* and *S. ovivorus* does not fit (*S. calopteni*) = *S. opacus* (Provancher), which is smaller than both of those species. In view of this discrepancy, and since no further characterization is given, I leave the name as representing a doubtful species.

Synoditella, new genus

TYPE-SPECIES.—*Sceliomorpha bisulca* Ashmead.

This genus is related to and has been confused with *Scelio* Latreille, from which it differs especially in its 2-segmented maxillary palpi and 1-segmented labial palpi; in the structure of the mandible, which has a very short inner tooth and a small, sharp accessory tooth just beyond the middle on the outer edge (Figure 51); in having the antennal scape completely and sharply carinate on the inner edge; in the subtriangular head, and in the strongly depressed body of the female. Some of its distinguishing features are presumably modifications to suit its phoretic habit.

Phoresy is apparently characteristic of the two known species of the genus. Females of both have been found attached by their mandibles to the bodies of living female grasshoppers. Rather extensive observations on the phoretic associations of *S. bisulcata* (Kieffer) have been recorded by Lanham and Evans (1958, 1960).

Synoditella bisulca (Ashmead)

(?) *Sceliomorpha bisulca* Ashmead, 1893:240.

Ashmead's type-material consisted of two female specimens, one from Texas (Belfrage Collection) and the other from Florida. They appear to represent two distinct forms. On the basis of presently available material I think it advisable to treat them as separate species although eventually the differences may prove to be merely subspecific. The lectotype, selected by Masner and Muesebeck (1968:43), is the specimen from Florida and the name *bisulca* will, accordingly, need to be retained for this form, which at present is known from only seven specimens from

Florida. The other entity is evidently much more abundant and more widely distributed although I have seen no specimens of it from Florida. The Florida specimens differ from the others in averaging slightly larger; in having all coxae yellow and the mesoscutum not striate but largely rugulose punctate and closely sculptured on the areas laterad of the notaulices as well as medially, and in the relatively longer malar space.

FEMALE.—Length of available specimens ranging from 3.6 to 4 mm. Head strongly transverse and deeply hollowed out behind, a little wider than thorax, in dorsal view about twice as broad as its maximum length, and in front view subtriangular, nearly as high as broad; malar space a little more than half as long as eye height; temples strongly receding and at mideye point less than half as wide as eyes, very shiny and with only a few weak, irregular, vertical ridges; shortest distance between eyes at least 1.3 times eye height; lower frons a little convex, and finely transversely striate, the ribs curving downward laterally; no median smooth area medially above antennae; upper part of frons and the vertex rather strongly rugulose or rugulose punctate; distance between lateral ocellus and eye distinctly greater than diameter of an ocellus and fully half the distance between lateral and median ocelli, but distance between median ocellus and compound eye four times diameter of ocellus; upper part of back of head finely transversely rugulose; occiput sharply margined at the sides; pedicel considerably larger than first flagellar segment of antenna; the club somewhat flattened and hardly 2.5 times as long as broad; clypeus with a small but distinct and very acute median denticle on the anterior margin.

Thorax noticeably flattened; pronotal neck long and largely finely rugulose; pronotal shoulders rounded, not at all angular or subangular; mesoscutum uniformly rugulose punctate or rugulose reticulate, even laterad of the shallow notaulices, which usually do not attain anterior margin of scutum; disk of scutellum flat and finely rugulose punctate; propodeum rugulose except for the large, impressed, arcuate area along posterior margin, and with two short, longitudinal median ridges at base; the large oblique impression on mesopleuron finely, transversely rugulose striate; subcosta complete and stigmal vein developed though short, the subcosta, stigma and stigmal vein all hyaline and sometimes not readily seen.

Abdomen also rather flattened; first tergite medially slightly more than half as long as second and longitudinally striate; the second to fifth tergites also longitudinally striate but very finely and irregularly so and the striae themselves minutely punctate; sixth tergite rugulose; third and fourth tergites just about equal in length.

Black or blackish; antennae brown except scapes which are yellowish; forewings a little smoky; legs, including all coxae yellow.

MALE.—Unknown.

DISTRIBUTION.—In addition to the lectotype, which is from Jacksonville, Florida, I have seen one specimen in the collection of the Museum of Comparative Zoology, Harvard University, which was taken at Fort Myers, Florida, 14 November 1911; one in the Canadian National Collections collected 29 March 1953 at Orlando, Florida; one in the collection of the University of Michigan from Ocala National Forest, Marion County, Florida, taken 27 July 1931, and three, in the same collection, from Sanford, Florida, found 3 May 1931 on specimens of the grasshopper *Radinotatum carinatum* (Walker).

Synoditella bisulcata (Kieffer)

FIGURES 10, 16, 31, 47, 51

Scelio bisulcatus Kieffer, 1904:531; 1906:269.

Scelio monticola Brues, 1906a:184.

Scelio striaticollis Brues, 1906b:222. New synonymy.

Scelio bisulcus (Ashmead).—Muesebeck and Walkley, 1951:702.—Lanham and Evans, 1958:213; 1960:84–87.

As indicated in the foregoing description of *Synoditella bisulca* (Ashmead) the two species are exceedingly similar, but the presence of certain rather constant differences in the known material suggest specific distinction. The detailed description of *S. bisulca* applies to *S. bisulcata* except as follows:

FEMALE.—Length normally 3–3.6 mm; malar space less than half as long as eye height; mesoscutum shiny and more or less longitudinally striate or rugulose striate medially, the areas laterad of the notaulices more weakly sculptured, sometimes largely smooth; disk of scutellum shiny and weakly longitudinally sculptured; rarely entire mesoscutum and scutellar disk virtually smooth. The color of the two species is similar except for the coxae. In *S. bisulcata* the coxae are darkened and range from brown or piceous to black.

MALE.—The antennae are largely yellowish and differently constructed than in the female (Figure 47); the temples are broader and less strongly receding and usually more coarsely sculptured; the thorax is less flattened and the pronotal shoulders less strongly rounded off; and the middle of the mesoscutum is usually more irregularly rugose. Finally, the wings are virtually hyaline.

HOLOTYPE.—Location unknown. The species was described from Belfrage material from Texas (probably from the same lot as the paralectotype of Ashmead's *Synoditella bisulca*). Through the kindness of Dr. G. W. Byers I have had the opportunity of examining the holotypes of *Scelio monticola* Brues and *S. striaticollis* Brues, which are in the collection of the University of Kansas.

DISTRIBUTION.—The type of *Synoditella bisulcata* is from Texas, as already mentioned. That of *Scelio monticola* is from Hamilton County, Kansas, and that of *Scelio striaticollis* was taken at Galveston, Texas. Other material I have seen is from Texas, Kansas, South Carolina, Tennessee, Michigan, Illinois, South Dakota, Arizona, California, and Mexico. Some of these specimens are recorded as having been reared from eggs of *Melanoplus* species, *M. differentialis* (Thomas), and *M. sanguinipes* (Fabricius). Others were collected from the bodies of female grasshoppers of the following species: *Melanoplus confusus* Scudder, *M. differentialis* (Thomas), *M. femurrubrum* (DeGeer), *M. keeleri luridus* (Dodge), *Dichromorpha viridis* (Scudder), and *Chortophaga viridifasciata* (DeGeer). Lanham and Evans (1958) recorded up to three specimens of *Synoditella bisulcata* on a single female grasshopper but noted that usually there was only one. The parasites were firmly attached to the grasshoppers by their mandibles, having seized the intersegmental membranes in the anterior part of the abdomen. All the parasites and their grasshopper hosts were adult females.

To my knowledge there is only one other described species of Scelionidae that is a parasite in the eggs of grasshoppers, exhibits phoresy, and is superficially very similar to the two known species of *Synoditella* treated above. This is the form described by Brues (1917a) as “?*Lepidoscelio viatrix*.” Although it is known only from India, and is therefore outside the normal scope of this paper, it seems desirable to comment on it here because of its striking similarity to the species of *Synoditella* in habitus and behavior.

In my opinion it does not belong in *Lepidoscelio* Kieffer. Although I have not seen *L. fuscipennis* Kieffer, the type-species of the genus, it was originally distinguished from *Scelio* (Kieffer, 1905:129) only by the presence on the metanotum of a transverse, bilobed, lamelliform elevation, a character which as was pointed out by Dodd (1927:129) when he suppressed *Discelio* Kieffer as a synonym of *Scelio*, is probably not of generic significance here. I have seen specimens of Brues' species and believe that it must be given a new generic name. It seems to be very closely allied to *Synoditella*, although its general resemblance is apparently due to convergence resulting from its similar phoretic association with grasshoppers. Structurally it differs in having 3-segmented maxillary palpi and 2-segmented labial palpi, in lacking an acute denticle on the outer edge of the mandible, in the presence of a distinct, sharp tooth on each side in the occipital carina at the level of the lower eye margins, and in having the lateral ocelli situated close to the compound eyes as in *Scelio*. A new generic name seems to be required.

Sceliocerdo, new genus

TYPE-SPECIES.—*Lepidoscelio viatrix* Brues, 1917a: 139.

Along with his description of *L. viatrix*, Brues wrote of the phoretic association of this species with the grasshopper *Colemania sphenarioides* Bolivar and referred to this again later the same year (1917b). Ramachandra Rao (1952) and Basavanna (1953a, 1953b) have also recorded observations of phoresy in this species. The latter (1953b) photographed a female of *Orthacris carli* Uvarov with six individuals of the parasite attached to it.

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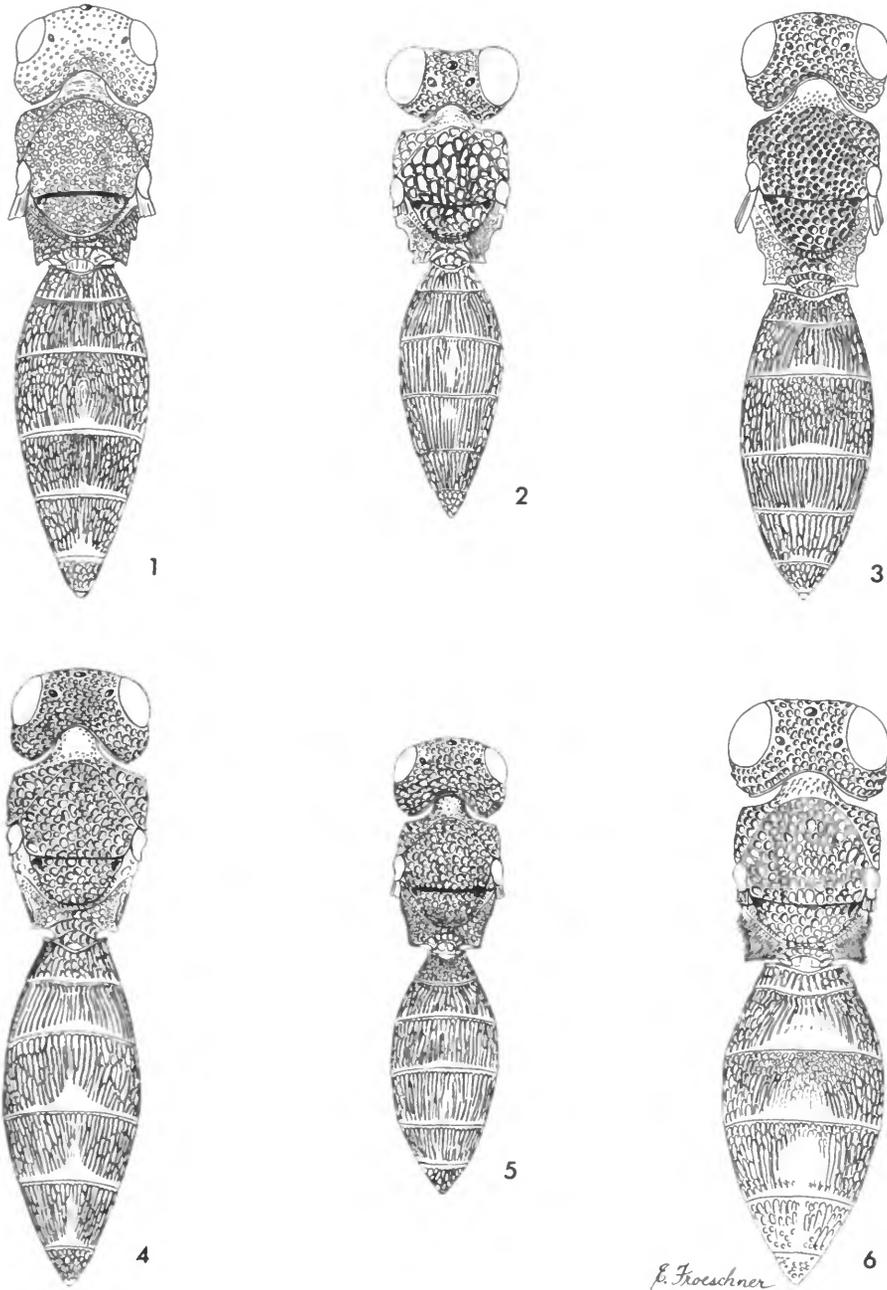
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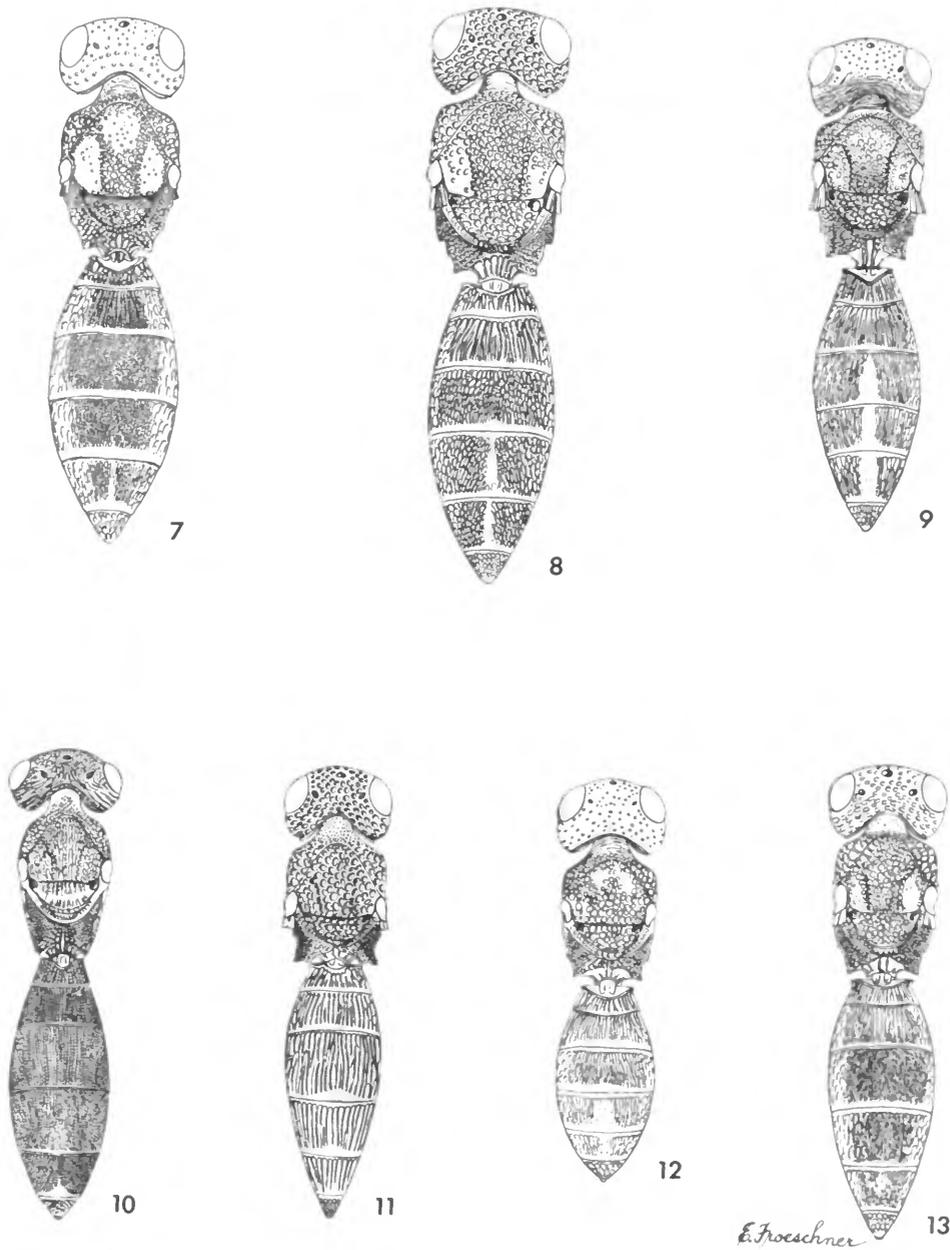
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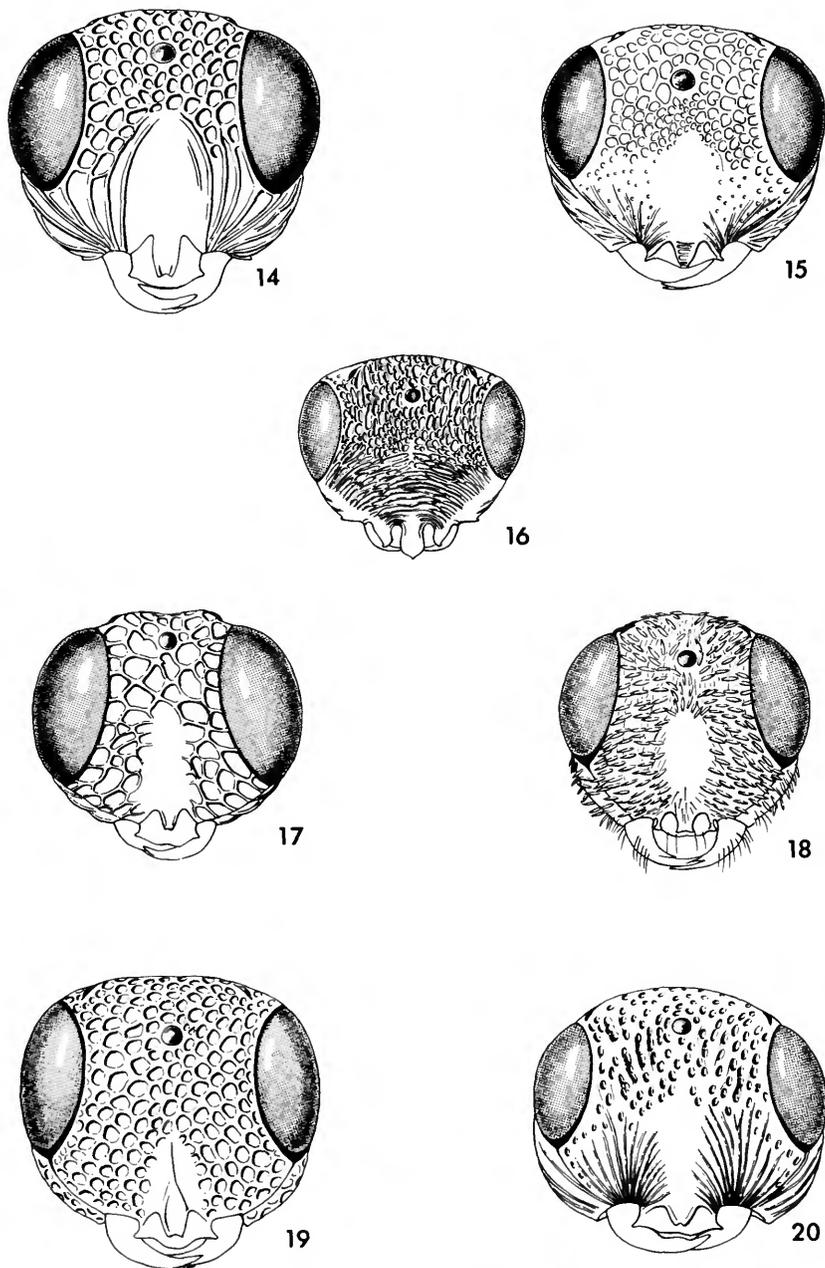
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FIGURES 1-6.—Head, thorax and abdomen, from above: 1, *Scelio semirufus*, new species; 2, *S. insolitus*, new species; 3, *S. ovivorus* (Riley); 4, *S. ernstii* Riley; 5, *S. striativentris* Kieffer; 6, *S. commixtus*, new species.

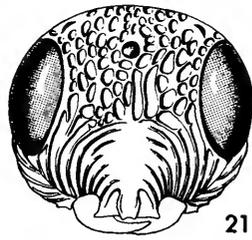


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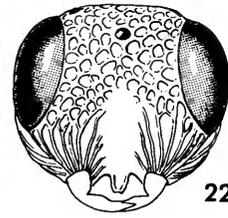


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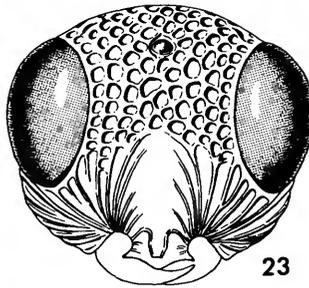
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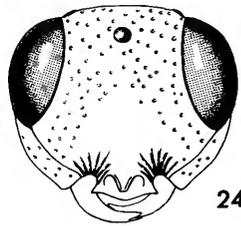
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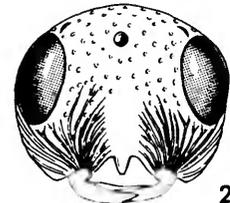
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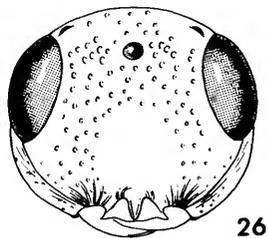
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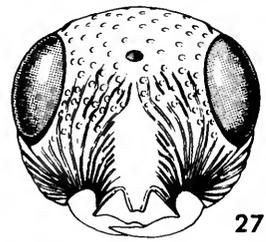
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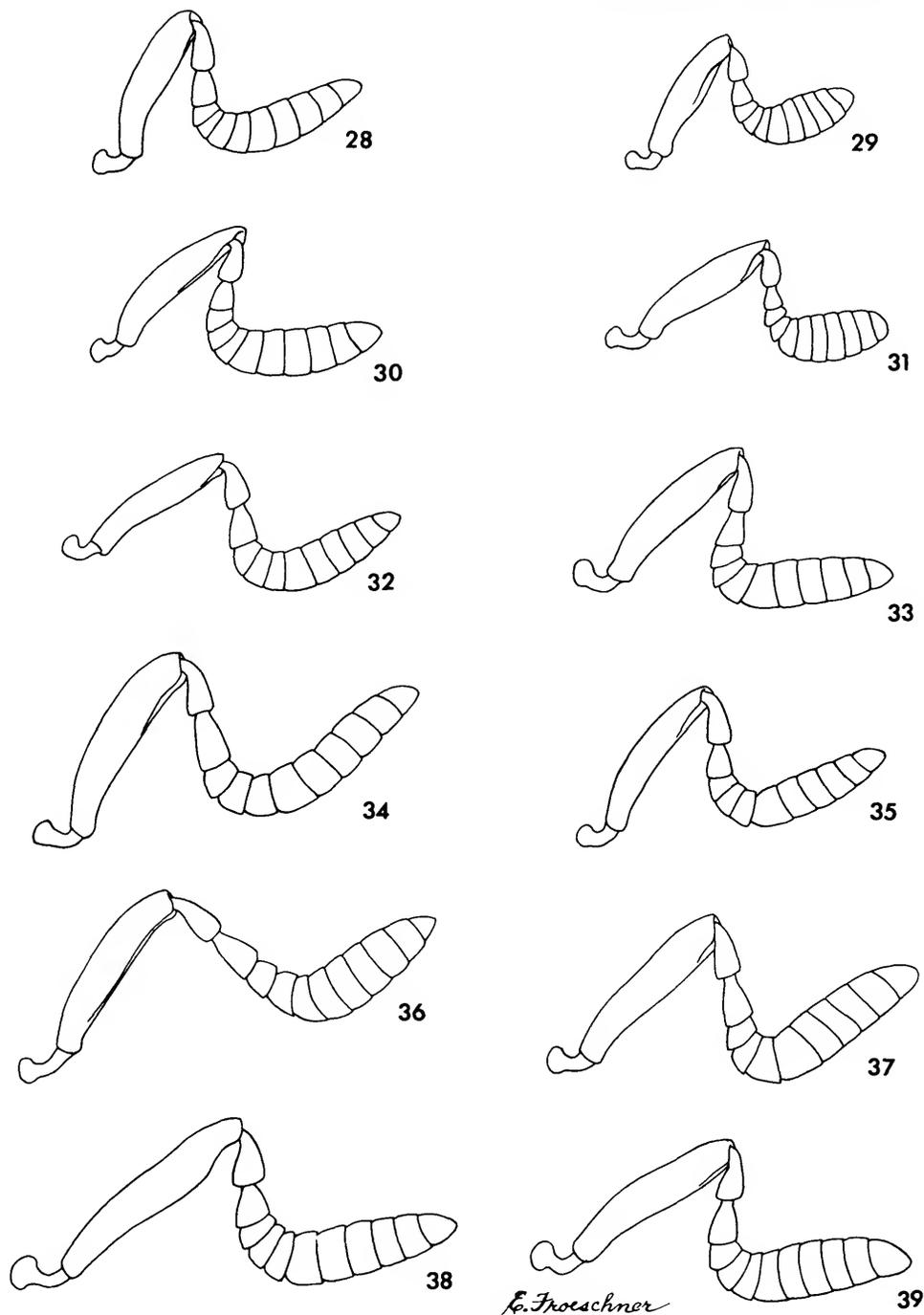
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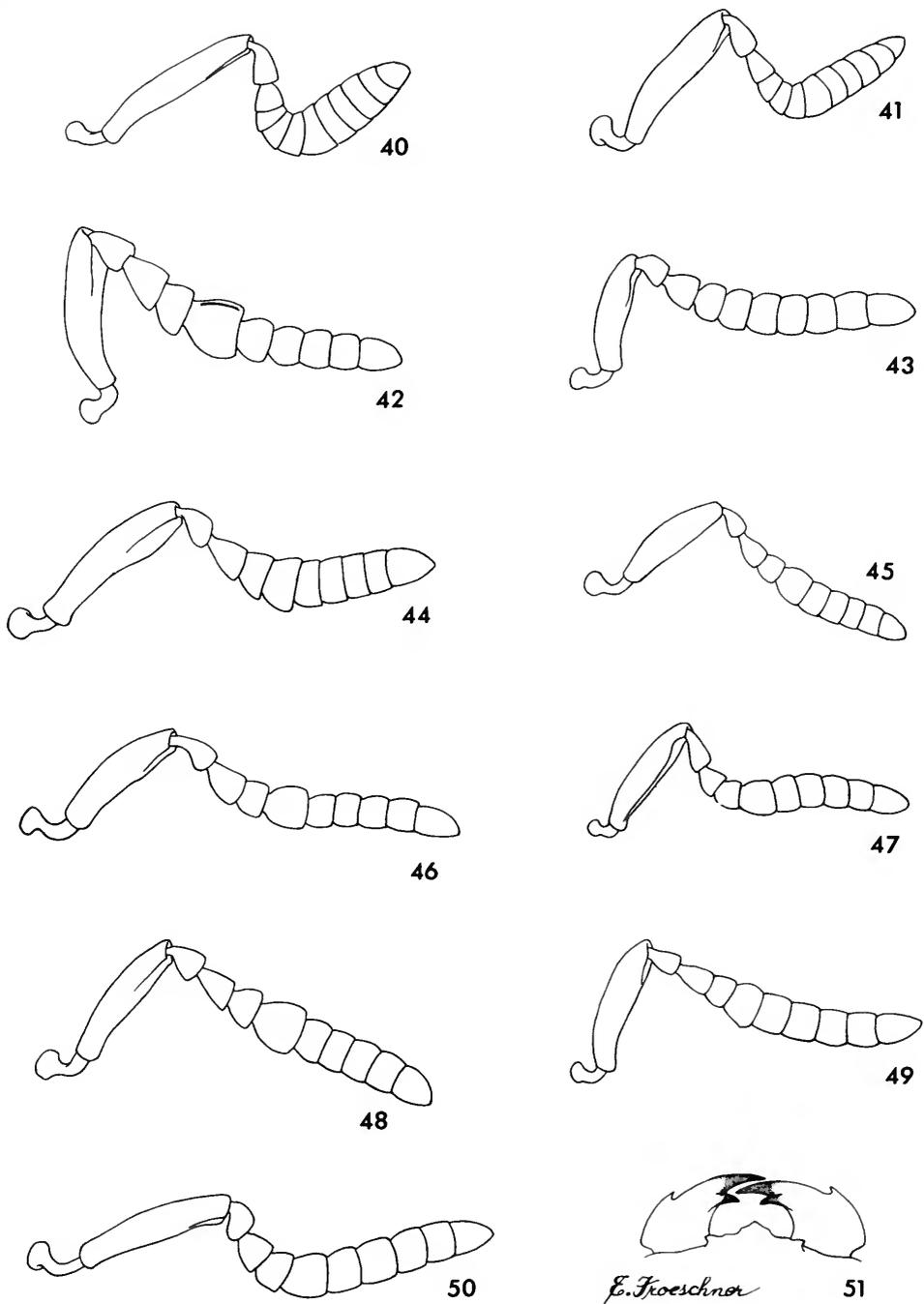
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