A Revision of *Sepedonea*, a Neotropical Genus of Snail-killing Flies (Diptera: Sciomyzidae)

AMNON FREIDBERG,
LLOYD KNUTSON,
and
JAY ABERCROMBIE

SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY · NUMBER 506

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ABSTRACT

Freidberg, Amnon, Lloyd Knutson, and Jay Abercrombie. A Revision of *Sepedonea*, a Neotropical Genus of Snail-killing Flies (Diptera: Sciomyzidae). *Smithsonian Contributions to Zoology*, number 506, 48 pages, 143 figures, 1991.—The Neotropical genus *Sepedonea* (Diptera: Sciomyzidae) is revised. Four of the 12 species (*S. incipiens*, *S. neffi*, *S. trichotypa*, and *S. veredae*) are described as new. *Sepedonea vau* Mello and Bredt is placed as a nomen nudum under *S. guianica*. A key to the adults is included, and the male and female terminalia of all species are described and illustrated. The eggs, first-, second-, and third-instar larvae, and puparia of *S. guianica*, *S. incipiens*, *S. lagoa*, *S. lindneri*, *S. telson*, and *S. trichotypa* are described and figured for the first time. These species, plus *S. guatemalana* and *S. isthmi*, are included in keys to the mature third-instar larvae and puparia. The taxonomy, biology, and geographic distribution of the genus is summarized. The taxonomic placement of the *Sepedon* group is discussed. The geographical distributions of 11 species are mapped.

The larvae of all reared species of *Sepedonea* are predators of non-operculate snails in various freshwater situations.

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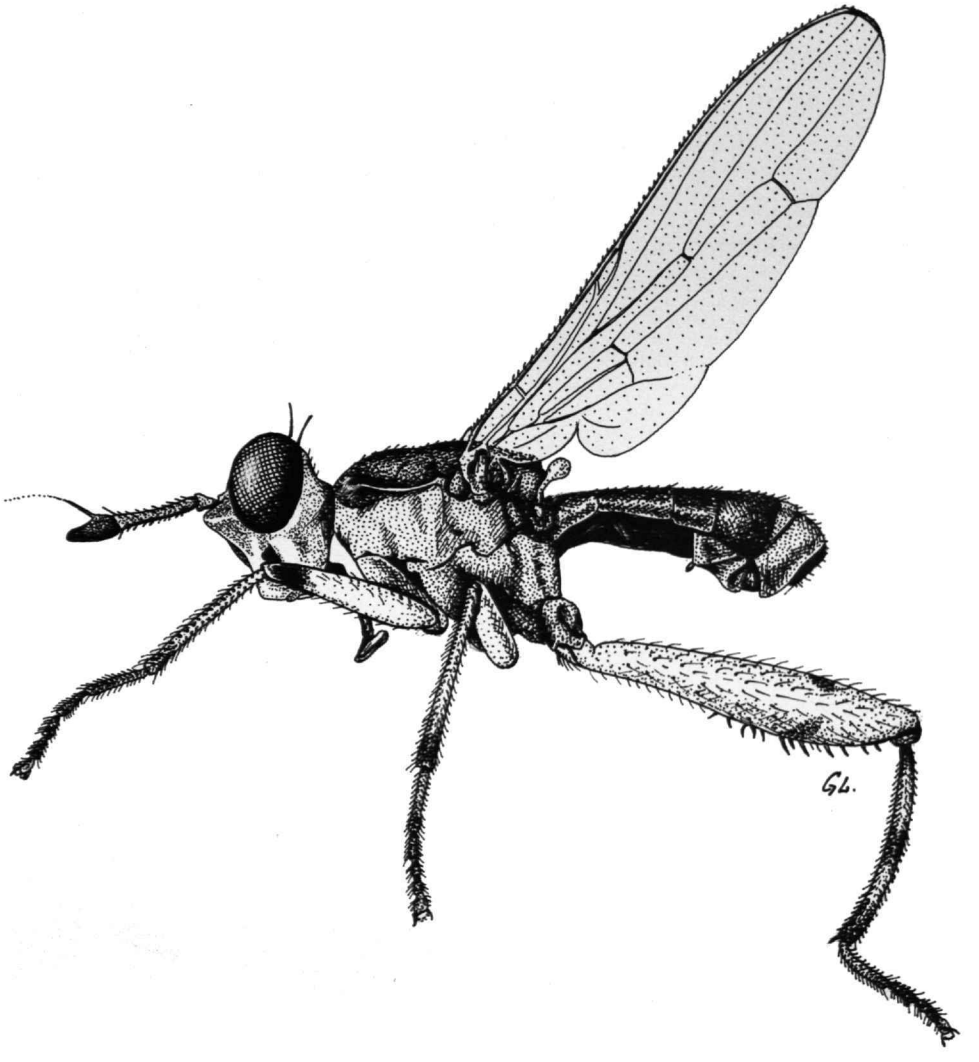

FIGURE 1.—*Sepedonea lindneri*, adult male, habitus.

A Revision of *Sepedonea*, a Neotropical Genus of Snail-killing Flies (Diptera: Sciomyzidae)

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Introduction

Among families of higher Diptera, the Sciomyzidae are fairly well established as a phylogenetically unified (Griffiths, 1972) and behaviorally diverse family (Berg and Knutson, 1978; Ferrar, 1987) that has more or less uniquely exploited a food resource—mollusks. Mollusks are not rigorously exploited by practically any other dipterans, or indeed, by any other moderately large group of insects. To understand the predatory or parasitoid behavior of Sciomyzidae on mollusks, it is essential to have a good knowledge of the systematics of the taxa involved. This information enables accurate identification of the species and an understanding of their phylogenetic relationships.

What little is known on the phylogeny of Sciomyzidae was summarized by Griffiths (1972) and Berg and Knutson (1978). In the latter paper, the authors also reviewed the biology and systematics of the family, which now includes about 550 species in 61 genera. Data on the natural history and immature stages are known for about a third of the world's species. Although most sciomyzid larvae are primarily predators or parasitoids of aquatic or terrestrial snails, a few species feed on snail egg-masses, slugs, or finger-nail clams. Some Sciomyzidae are potential agents for the biological control of snails that carry diseases (e.g. fascioliasis and schistosomiasis) (Berg and Knutson, 1978).

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With about 125 known species (at least 20 are undescribed), *Sepedon* Latreille, 1804, and related genera comprise nearly 25 percent of the family's species. The strictly neotropical genera of this group, *Sepedonea* Steyskal, 1973, and *Thecomyia* Perty, 1833, have never been revised. Our purpose in this paper is to revise the species of *Sepedonea*.

HISTORICAL REVIEW.—Steyskal (1973) proposed the modern classification of *Sepedon* and related genera (the *Sepedon* group). He included the following genera in this group: *Sepedon* Latreille, *Sepedonella* Verbeke 1950, *Sepedoninus* Verbeke 1950, *Thecomyia* Perty, and his new genera *Sepedonea* and *Sepedomerus*. He further suggested that *Sepedomyia* Verbeke, 1950, is a subgenus of *Sepedon*, together with the previously established subgenera *Mesosepedon* Verbeke, 1950, and *Parasepedon* Verbeke, 1950. In establishing the *Sepedon* group, Steyskal did not believe that (p. 143) "this group is sufficiently distinct from more typical Tetanocerini, especially from such genera as *Hedria* and *Dichetophora*, to be given the rank of tribe or even subtribe." Earlier authors had classified these genera as a tribe, subfamily, or even family (e.g., Berg and Knutson, 1978). The diagnostic characters shared by all members of the *Sepedon* group as defined by Steyskal (1973) are as follows:

1. Lunule well exposed
2. Face more or less extended ventrally
3. Ocellar setae weak or absent
4. One pair of scutellar setae (absent in the oriental *Sepedon lobifera* Hendel)
5. Subalar (vallar) setae present

In his study of the Western Hemisphere species of *Sepedon*, Steyskal (1951:272) noted that "the *S. lindneri* group [=

Sepedonea] of Central and South America is unique in having the posterior forceps fused mesally to form a 'posterior process,' but in view of the diversity of form of the male terminalia within that group and the conformity otherwise with other forms, I have not thought it wise to distinguish the group nomenclatorially." Later, however, he reversed his opinion and described *Sepedonea* (Steyskal, 1973) and designated *Sepedon lindneri* Hendel as the type species of the genus. Eight species were recognized in the genus in the catalog of Neotropical Sciomyzidae (Knutson et al., 1976). These, plus four new species described herein, are now included in the genus.

METHODS AND MATERIALS.—During the course of this study slightly over 1000 adult specimens from most major North and South American collections were examined, including the primary types of all but one previously described species. Label data for all correctly identified specimens we examined were recorded, organized according to locality (country, state or province), and are presented under the appropriate species.

The descriptive terminology essentially follows that published in the recent *Manual of Nearctic Diptera* (McAlpine, 1981 (adults); Knutson, 1987 (adults and immature stages)).

Because of the paucity of characters available for descriptions of adults, and because the key to adults contains most of the distinguishing characters, separate diagnoses are not given for each species.

ACKNOWLEDGMENTS.—Numerous individuals and institutions have contributed to this revision. Without their cooperation and assistance, much of the study could not have been completed. We are grateful for their time and thoughtful consideration.

We thank the following curators and institutions for lending specimens:

BMNH	British Museum (Natural History), London, England (Mr. B.H. Cogan, Dr. B.R. Pitkin)
CUI	Cornell University, Ithaca, New York, USA. (Dr.C.O. Berg)
IOC	Instituto Oswaldo Cruz, Rio de Janeiro, Brazil (Dr. L.M. Deane, Dr. D.V. Ferreira, Dr. A.P.A. Lunas Dias)
IZAM	Instituto de Zoologia Agricola, Maracay, Venezuela (Dr. Carlos Julio Rosoles)
MNRJ	Museu Nacional, Rio de Janeiro, Brazil (Dr. Hugo de Souza Lopes)
MZUSP	Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil (Dr. Nelson Papavero)
OSU	Ohio State University, Columbus, Ohio, USA. (Dr. Charles A. Triplehorn)
SMNS	Staatliches Museum für Naturkunde, Ludwigsberg, Federal Republic of Germany (Dr. B. Herting)
USNM	Collections of the United States National Museum in the National Museum of Natural History, Smithsonian Institution, Washington, DC, USA. (Dr. W.N. Mathis)

We thank W.N. Mathis, F.C. Thompson, and R.E. Orth for reviewing the manuscript. The advice of the master sciomyzidologist, G.C. Steyskal, was appreciated throughout the study. We also thank Mary Lou Cooley, Systematic Entomology Laboratory, IIBIII, for completion of the illustrations prepared by AF, and for preparing the plates. We are also grateful to Linda Heath Lawrence for handling some graphic aspects.

Most specimens of *Sepedonea* available for this study were collected by C.O. Berg and his students and coworkers while conducting life-cycle studies in Central and South America. Most of these specimens are in the Department of Entomology, Cornell University. We feel that when systematists conduct a taxonomic study, they should, if at all possible, place specimens, especially paratypes of new species, in various collections in pertinent geographical areas, to serve as reference material. Hence, we appreciate the cooperation of Cornell University for allowing us to place paratypes and other specimens from the Cornell material in several collections. Whenever possible specimens were placed in the following collections in addition to those listed above: Universidade Federal do Paraná, Curitiba, Brazil; Universidad Nacional de Colombia, Medellin, Colombia; Universidad de Panama, Panama; Fundación M. Lillo, Tucumán, Argentina.

Family SCIOMYZIDAE

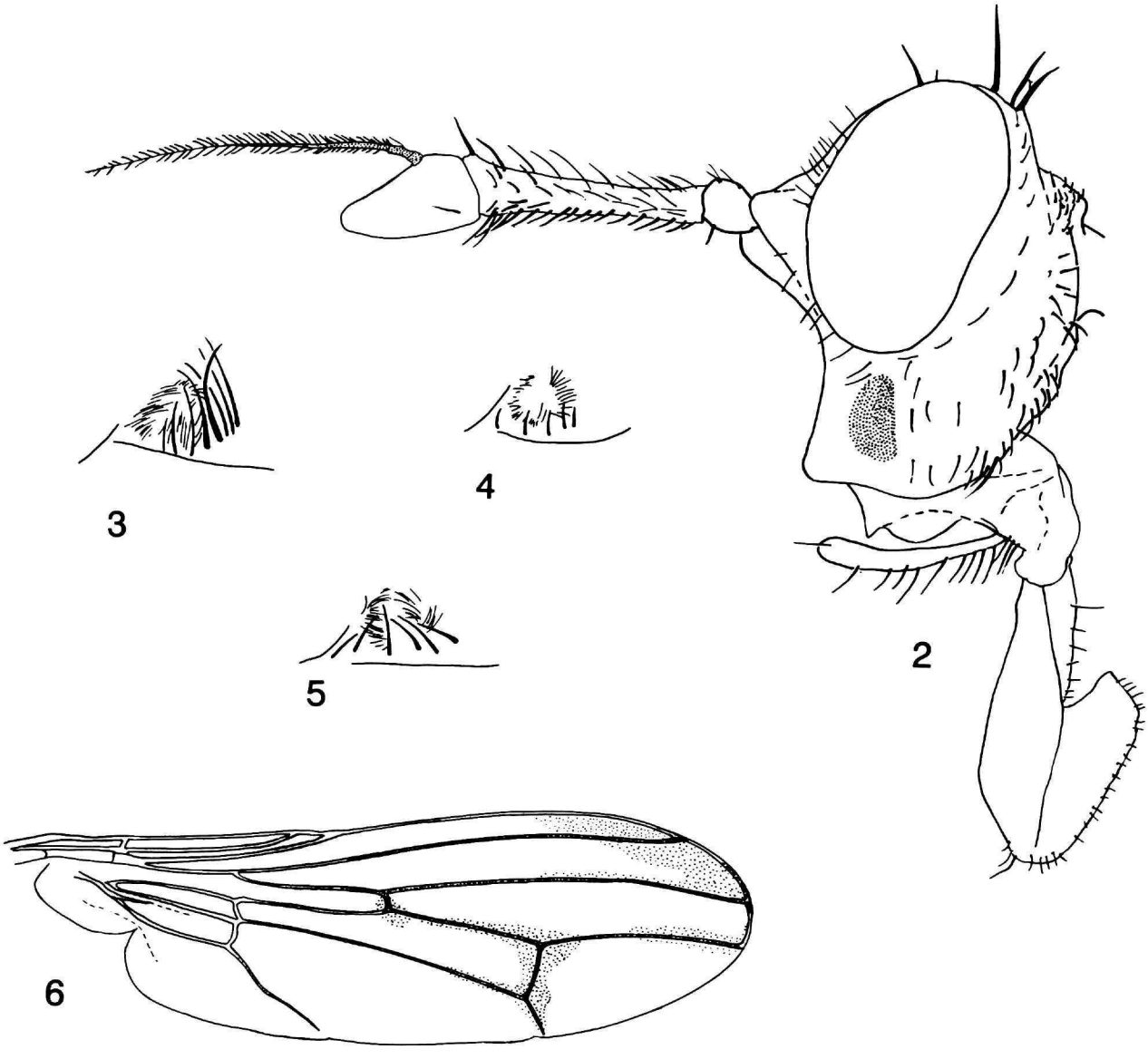
Sciomyzidae are small to moderately large acalyptrate Diptera, often rather slender, ranging from 1.8 to about 12 mm in length. The antenna is usually porrect, and the pedicel is usually elongate. Two orbital setae are usually present, but sometimes only one. The wings are usually longer than the abdomen and are hyaline, slightly spotted, or heavily patterned. The costa (C) is unbroken and the subcosta (Sc) is complete and free from R1 distally. The abdomen is moderately long and cylindrical. The general color varies from yellowish to shiny black, but often is grayish or brownish.

Sciomyzidae are best recognized by the above characters and by the close association of most species with aquatic or otherwise damp and shaded habitats. Adults often rest on emergent vegetation.

Genus *Sepedonea* Steyskal, 1973

Sepedonea Steyskal, 1973:145 [type species: *Sepedon lindneri* Hendel, by original designation].—Steyskal and Knutson, 1975:276 [generic key].—Knutson et al., 1976:10 [catalog].—Knutson and Bredt, 1976:113 [review].—Knutson and Valley, 1978:198 [review].

DESCRIPTION.—The following is a brief characterization of



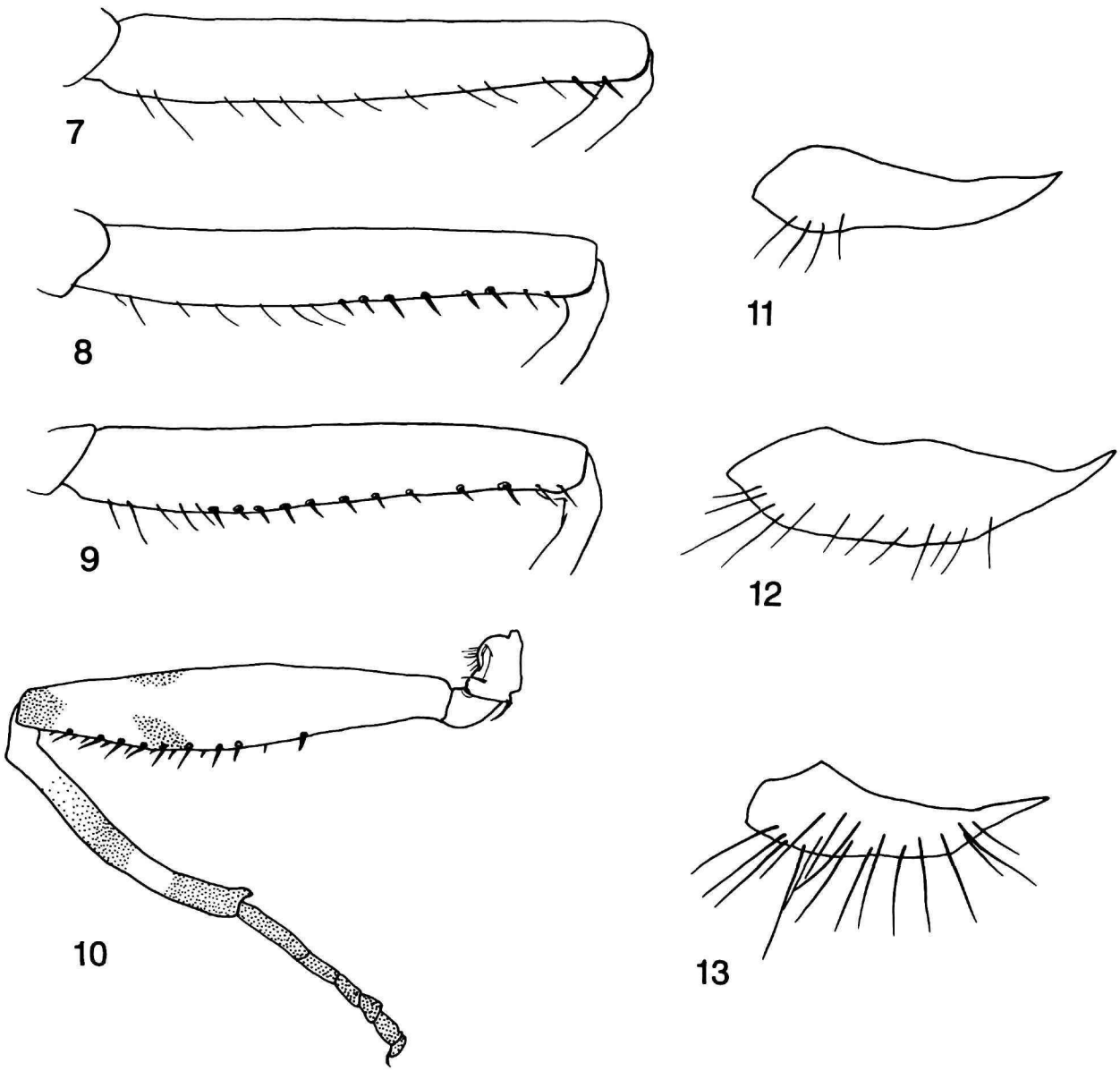
FIGURES 2–6.—*Sepedonea* spp., various parts: 2, *S. lagoa*, head in profile; 3–5, left posterior spiracle: 3, *S. trichotypa*; 4, *S. lindneri*; 5, *S. guatemalana*; 6, *S. isthmi*, wing.

the various life stages of *Sepedonea* (first- and second-instar larvae are not included):

Adult: Elongate, generally brown, *Sepedon*-like flies (Figure 1).

Head (Figure 2): One (posterior) pair of orbital setae, occasionally anterior orbital setae weakly developed; postocellar setae well developed; frons largely dull yellow with slender, shiny, frontal vitta; lacking round black spots on orbit a short distance ventral to antenna; face with dark brown spot on each ventral corner; orbit, face, and gena spotted by silvery microtomentum; antenna with pedicel 3.5–5 times as long as wide, with setulae as long as diameter of pedicel; first flagellomere with distinct, elongate, sensory pit near base; ventral part of head not forming a tube into which the proboscis may be withdrawn; palpus well developed.

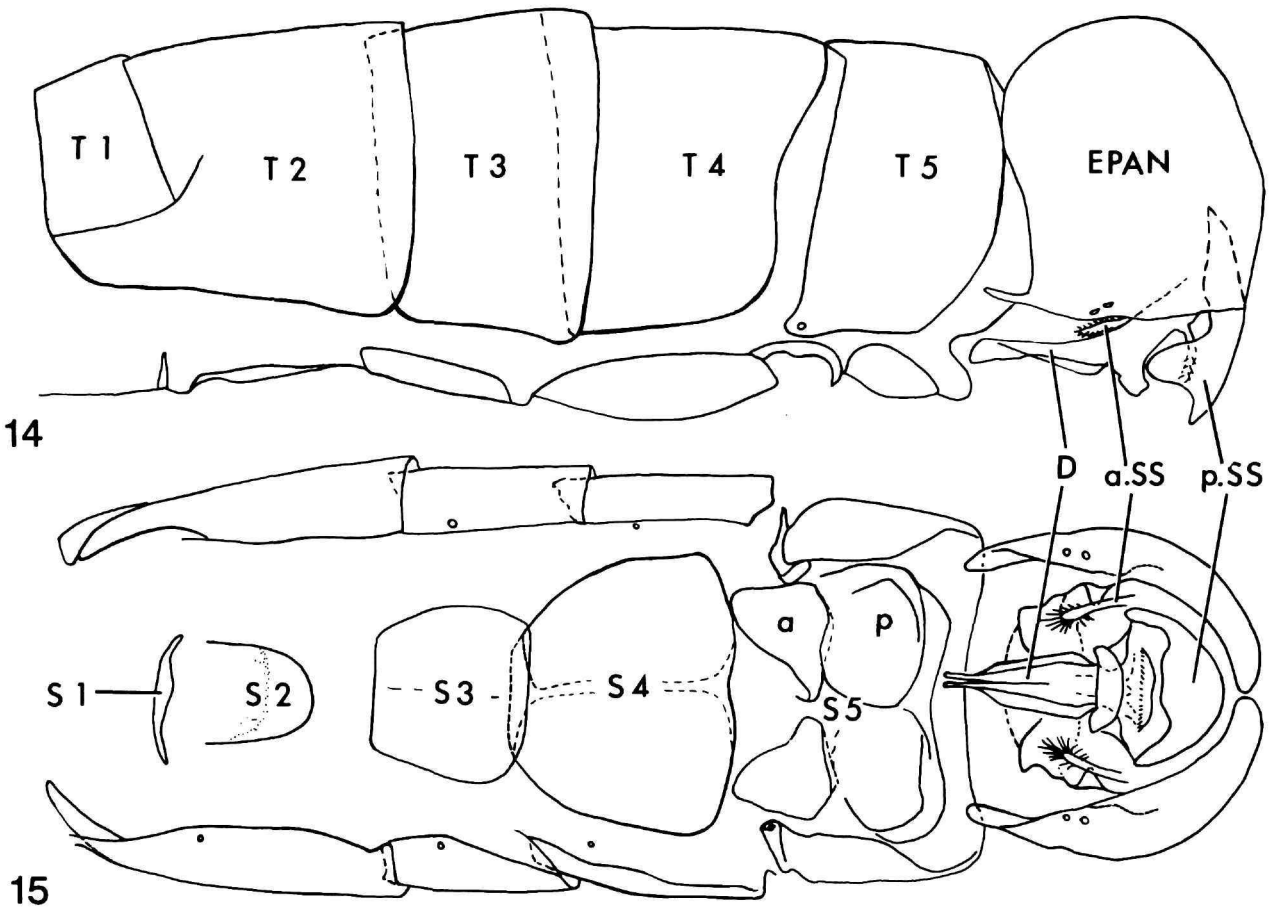
Thorax: Scutum with brownish gray microtomentum;

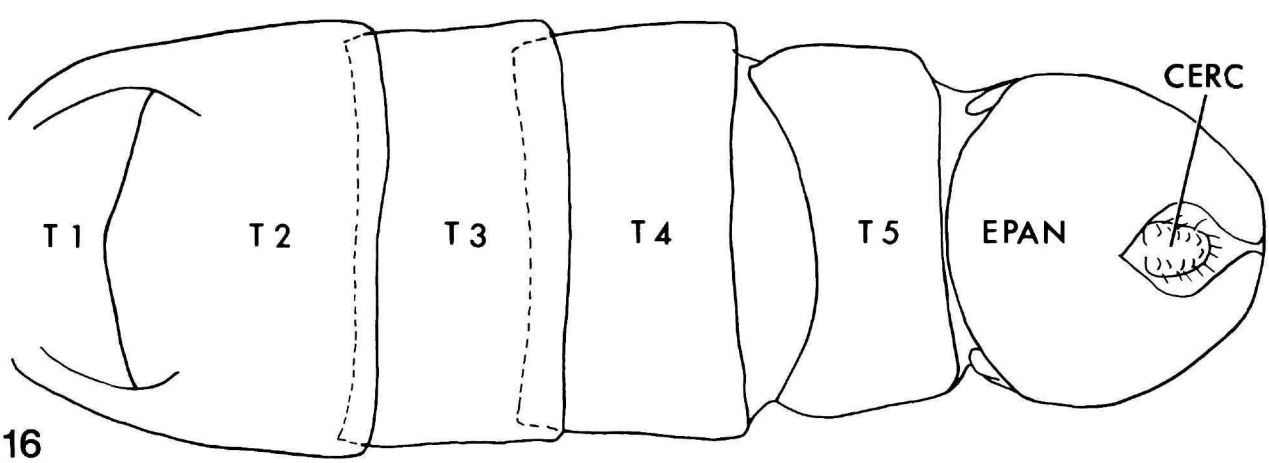


FIGURES 7-13.—*Sepedonea* spp., legs: 7-9, right midfemur, posterior view: 7, *S. guianica*; 8, *S. telson*; 9, *S. isthmi;* 10, *S. telson*, right hindleg, anterior view; 11-13, right hindcoxa, posterior view: 11, *S. lindneri*; 12, *S. trichotypa*; 13, *S. canabravana*.

pleura and coxae with silvery microtomentum, dense on pleura; pleura with numerous setulae; posterior spiracle (Figures 3-5) with a varying number of setulae of various lengths; postcoxal bridge divided by membranous area; forefemur with at least 1 outstanding dorsal seta; midfemur with large anterior seta near midlength, usually with a posteroventral row of spines (Figures 7-9) extended to varying degrees from apex toward base; hindfemur (Figure 10) often with dorsal and/or lateral, preapical dark marks (these marks are somewhat variable intraspecifically and the least reliable of the characters used for identification); hindcoxa posteriorly (Figures 11-13) with a varying number of setulae of varying length; wing (Figure 6) without spots, except sometimes with slight infuscations about crossveins; crossvein dm-cu straight, at right angle with penultimate section of vein CuA1.

Abdomen (Figures 14-19): with light gray microtomen-





FIGURES 14–16.—*Sepedonea isthmi*, male abdomen: 14, lateral view; 15, ventral view; 16, dorsal view. (a = anterior plate of sternum 5 (left-hand half); a.SS = anterior surstylus; CERC = cercus; D = distiphallus; EPAN = epandrium; p = posterior plate of sternum 5 (left-hand half); p.SS = posterior surstyli; S 1–5 = sternum 1 through 5; T 1–5 = tergum 1 through 5.)

tum; male posterior surstyli fused to form a median structure (Figures 14–15); female sterna 6–8 fused to form a synsternum (Figures 17–18).

Egg: Eggs of *Sepedonea* are remarkably uniform from species to species (Figures 94, 96), and are very similar to those described for *Sepedon sphegea* (Fabricius), *S. spinipes* (Scopoli), and *Sepedomerus macropus* (Walker). Some eggs of *S. telson* differ from other species in having a dorsal depression anteriorly in the central area between the dorsal longitudinal ridges. It is not present in all individuals, however, so it is unreliable as a distinguishing character. Neff and Berg (1966) found the same structure in eggs of *Sepedomerus macropus* but not in others.

The known eggs of eight species of *Sepedonea* treated here can be divided roughly into 2 groups on the basis of size, a somewhat arbitrary division that is nonetheless reliable in most instances. One group, that includes *S. incipiens*, *S. lindneri*, and *S. trichotypa*, has eggs which range from 0.90 to 1.12 mm long. *Sepedonea incipiens* is the only species in this group with eggs as large as 1.12 mm; only one specimen of 10 examined reached this length. Other species in the first group (*S. lindneri* and *S. trichotypa*) have eggs with lengths of 0.90–1.06 mm. The second group, which includes *S. guatemalana*, *S. guianica*, *S. isthmi*, *S. lagoa*, and *S. telson*, has eggs ranging from 1.12 to 1.40 mm in length. *Sepedonea lagoa* is the only species in the second group with eggs as small as 1.12 mm; of 17 individuals examined, 5 were 1.12 mm long and the remainder were considerably longer. Other species in the second group have eggs with lengths of 1.16–1.24 mm (*S. guianica* and *S. telson*), 1.26–1.40 mm (*S. guatemalana;* Neff and Berg, 1966) and 1.28–1.38 mm (*S. isthmi;* Knutson and Valley, 1978). The micropyle is subterminal in all eight species.

Larva: The third-instar larva of *S. guianica*, *S. incipiens*, *S. isthmi*, *S. lagoa*, *S. lindneri*, *S. telson*, and *S. trichotypa* has smooth posterior stigmatic tubes that are distinctly scalloped basally (Figure 131). Neff and Berg (1966) reported that in *S. guatemalana* (as well as in species of *Sepedomerus* and *Sepedon*), surfaces of the stigmatic tubes are tuberculate or papillose; hence, the tubes may appear scalloped basally because of these projections.

All third-instar larvae of *Sepedonea* except *S. lagoa* have a prominent middorsal stripe and dorsolateral V-shaped marks anteriorly. Larvae of *Sepedomerus* and *Sepedon* do not have dorsolateral markings.

Dorsolateral patch of setulae occur on segments 5–11, except in *S. guatemalana*, *S. guianica*, and *S. isthmi*, which lack them on segment 11. All species of *Sepedomerus* and some of *Sepedon* have dorsolateral patches of setulae on segments 5–10.

Larvae of *Sepedonea*, *Sepedomerus*, and *Sepedon* all possess 5 pairs of lobes on the posterior spiracular disc (Figures 127–130, 135).

The most reliable character to separate larvae of *Sepedonea* from *Sepedomerus* and *Sepedon* is the dorsalmost accessory tooth of the cephalopharyngeal skeleton. In all 3 genera, the accessory teeth are directed mesally (Neff and Berg, 1966; Knutson and Valley, 1978) (Figures 107, 109–110). However, in *Sepedonea* the dorsal tooth is larger and darkly sclerotized; the remaining teeth are smaller and only lightly sclerotized. In *Sepedomerus* and *Sepedon* the accessory teeth are subequal in size and evenly sclerotized, usually lightly.

Puparium: As pointed out by Neff and Berg (1966) for *Sepedon*, most external features of puparia are more useful for species recognition than for distinguishing the genus from other Tetanocerini. The same is true of *Sepedonea*. No characters of the puparia themselves are as dependably diagnostic for the genus *Sepedonea* as the dorsalmost accessory tooth of the third-instar larva, as discussed above. This may be examined by removing the third-instar larval cephalopharyngeal skeleton from the inner surface of the ventral cephalic cap.

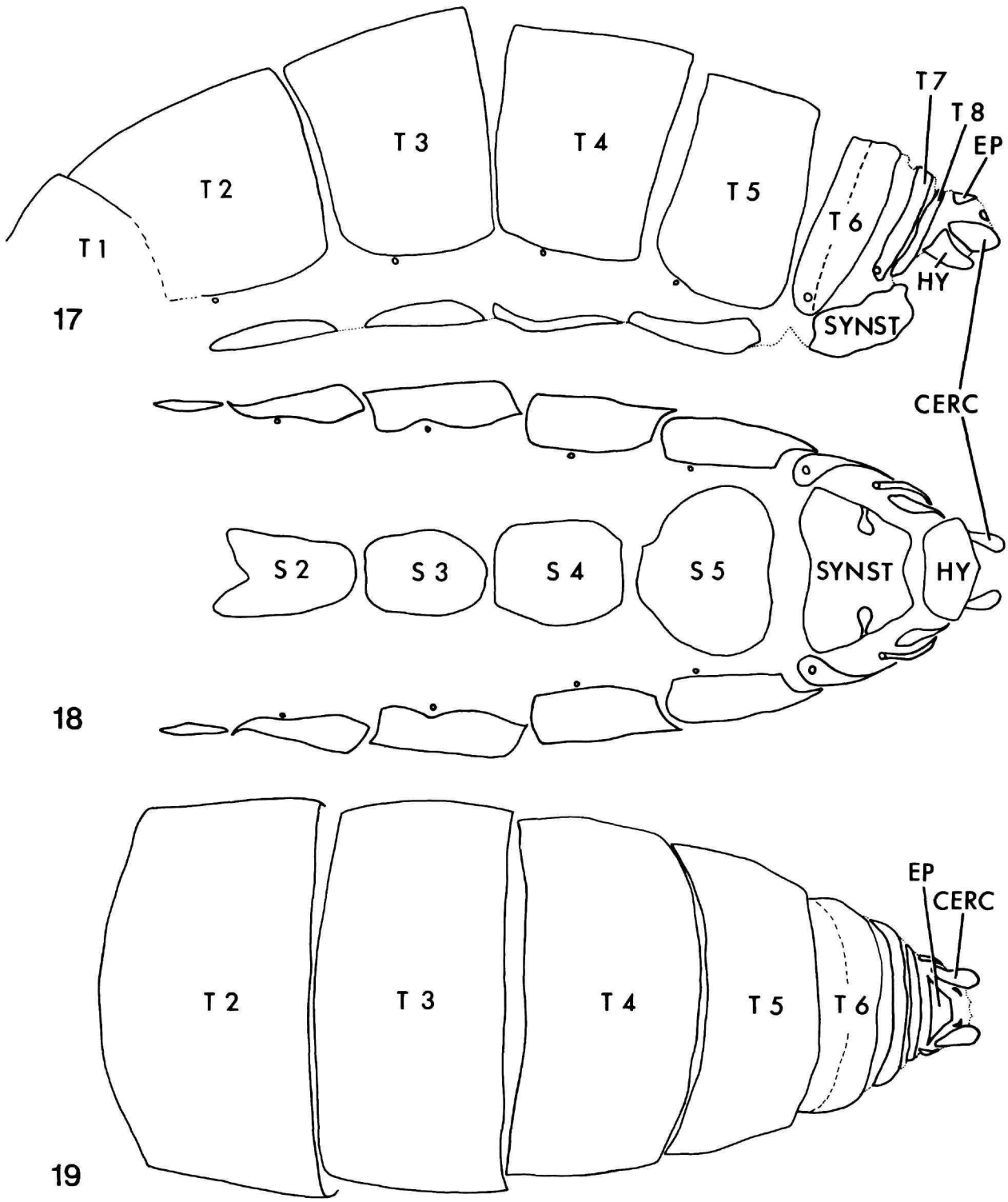
All puparia of *Sepedonea* except *S. lagoa* have more or less prominent dorsolateral V-shaped marks anteriorly (Figures 95, 97–100). The puparium of *S. lagoa* lacks dorsolateral V-shaped marks; it also is considerably different in shape and has prominent ventral lobes on the posterior spiracular disc (Figure 101).

NATURAL HISTORY.—Behaviorally, the reared species of *Sepedonea*, like almost all species of the *Sepedon* group, are typical predators of non-operculate snails in various freshwater situations (Figures 20–21). There is biological information available on all species except *S. neffi* and *S. veredae*. References to the biology and descriptions of immature stages of the reared species are included in the synonymy of the species. The immature stages described in the present paper were all previously described by Abercrombie (1970) in his Ph.D. dissertation. Mello and Bredt (1978) presented information on the monthly variation in abundance of four species of *Sepedonea* (*S. barbosai*, *S. canabravana*, *S. telson*, and "*S. vau*" (= *S. guianica* (Steyskal)) and *Sepedomerus bipuncticeps* (Malloch) in Brazil.

DISCUSSION.—The monophyly of *Sepedonea* is established by the following synapomorphies: (1) face with dark brown spot on each ventral corner; (2) forefemur with at least one outstanding dorsal seta; (3) male with posterior surstyli fused to form a median structure; and (4) female sterna six through eight are fused to form a synsternum.

Sepedonea is strictly neotropical and appears to be most closely related to *Sepedon*, the species of which are found in all major zoogeographical regions. *Sepedon* is primarily distinguished from *Sepedonea* as follows: the face lacks spots in the ventral corner; the forefemur lacks an outstanding dorsal setae; the male surstyli are well separated; and the female sterna six through eight are separate (in *Sepedonea* they form a synsternum). No species of *Sepedonea* has an hydrostatic sperm pump as found in some Afrotropical and Oriental species of *Sepedon*.

The species of *Sepedonea* are very similar externally, and identifications are most reliably based on the terminalia, especially those of the males. Various external characters and the female terminalia are useful in the identification of certain species, and both external and terminalia characters are used in the key to species.



FIGURES 17-19.—*Sepedonea veredae*, female abdomen: 17, lateral view; 18, ventral view; 19, dorsal view. (CERC = cercus; EP = epiproct; HY = hypoproct; S 2-5 = sternum 2 through 5; SYNST = synsternum; T 1-8 = tergum 1 through 8.)

FIGURES 20–21.—Habitats that are collecting sites for species of *Sepedonea*. 20, Rio Preto, 70 km northeast of Brasília, Goiás, Brazil; November 1974; collecting site for *S. canabravana*, *S. guianica*, and *S. isthmi*. 21, Lago de Pedra, west of Rio Cana Brava, 160 km northeast of Brasília on Brasília–Fortaleza Highway (BR-020), Goiás, Brazil; October 1974; collecting site for *S. barbosai*, *S. canabravana*, and *S. telson*.

Key to Adults of *Sepedonea*

1. Midfemur posteroventrally with 8–15 spines extended 2/3 distance to base (frequently, the basad spines becoming weak and hardly distinguishable from apical setulae in the same row) [Figure 9]; hindfemur without preapical dark marks; wing usually with crossveins r-m and dm-cu distinctly clouded, especially at junction with vein M [Figure 6]. Male terminalia: posterior margin of sternum 4 smoothly curved, without protuberances; posterior surstylus with median lobe triangular, large; with lateral lobes curved anterad. Female synsternum: posterior margin slightly concave (Panamá, Trinidad, Venezuela, Colombia, Bolivia, Brazil) . . . . . *S. isthmi*

   Midfemur posteroventrally usually with less than 8 spines, extended no more than 1/2 distance to base; other characters variable 2

2. Hindfemur with more or less discrete, usually dark, dorsal preapical mark [Figure 10] 3

   Hindfemur without dark, dorsal preapical mark, although this area may be diffusely reddened 5

3. Dorsal mark on hindfemur elongate. Male terminalia: posterior margin of sternum 4 straight, with 1 pair of approximate posterior tubercles; a subequal ventral pair at ends of interior apodome and just anterior to posterior pair, and a larger ventral pair lateral of these; posterior surstyli with median lobe moderately developed and with large lateral lobes moderately curved anterad. Female synsternum: posterior margin distinctly projected in middle, with apical 1/3 distinctly narrowed; in lateral view with apical 1/3 attenuate, pointed, and with posterodorsal shoulder (Brazil) . . . . . *S. telson*

   Dorsal mark on hindfemur rounded; male and female terminalia different 4

4. Setulae near posterior thoracic spiracle numerous, long and black, obscuring spiracular opening similar to Figure 3. Male terminalia: posterior margin of sternum 4 sclerotized, straight, with median projection bearing a pair of tubercles, posterior surstyli with median lobe low and rounded; lateral lobe moderately curved anterad. Female synsternum: apically with 3 subequal tubercles (Brazil and Argentina) . . . . . *S. incipiens*, new species

   Setulae near posterior thoracic spiracle fewer and shorter, not obscuring spiracular opening [Figure 4]. Male terminalia: posterior margin of sternum 4 deeply emarginate, with pair of small, posteromesally directed protuberances; posterior surstyli with median lobe emarginate ventrally, with lateral lobe slightly curved anterad. Female synsternum: posterior margin emarginate, with 2 large lateral lobes (Brazil, Paraguay, Argentina) . . . . . *S. lindneri*

5. Hindfemur with lateral preapical marks 6

   Hindfemur without preapical marks 8

6. Mesonotum yellowish; hindcoxa posteriorly with row of long setulae, mostly longer than setulae on dorsum of abdomen [Figure 12]. Male terminalia: posterior margin of sternum 4 straight, with short, truncate median lobe that is slightly bifid at apex; posterior surstyli with median lobe short, with lateral lobe strongly curved anterad. Female synsternum: short, about 1.6 times as wide as high, in lateral view with distinct ventral convexity, with dorsal margin receding gradually (forming broad apical point), with more or less distinct shoulder (Brazil and Argentina) . . . . . *S. trichotypa*, new species

   Mesonotum grayish black; hindcoxa with or without long setulae; male and female terminalia different 7

7. Hindcoxa posteriorly with dense, long setulae [Figure 13]. Male terminalia: posterior margin of sternum 4 more or less straight, with median lobe; posterior surstyli with median lobe triangular. Female synsternum: posterior margin

apically with rather inconspicuous median convexity and lateral shoulders; in lateral view ventral surface almost straight; posterior margin with apex and shoulder short and rounded (Brazil) . . . . . *S. canabravana*

Hindcoxa posteriorly with a few short setulae only as in Figure 11. Male terminalia: posterior margin of sternum 4 gently emarginate, with median lobe; posterior surstyli with median lobe large and lateral lobes short and narrow. Female synsternum: gradually pointed apically, in lateral view with ventral convexity, posterior margin without ridge (Venezuela, Brazil) . . . . *S. neffi*, new species

8. Hindcoxa posteriorly with row of setulae that are longer than setulae on dorsum of abdomen as in Figure 12; crossvein r-m clouded at junction with vein M; setulae near posterior thoracic spiracle moderately strong. Male terminalia: posterior margin of sternum 4 straight, with median, hooklike process; posterior surstyli without median lobe, lateral lobe acuminate, strongly curved anterad. Female synsternum: posterior margin with broad, straight apex; in lateral view ventral surface gently convex and posterior margin with small ridge (Brazil) . . . . . *S. barbosai*

Hindcoxa posteriorly with long setulae restricted mesally as in Figure 11; crossvein r-m clouded or not; setulae near posterior thoracic spiracle weak; male and female terminalia different 9

9. Mesonotum usually yellowish; wing uniformly hyaline. Male terminalia: posterior margin of sternum 4 gently concave, without protuberances; posterior surstyli with median lobe undeveloped, with lateral lobe strongly curved anterad. Female synsternum: posterior margin very slightly concave; posterodorsal ridge projecting beyond posterior margin (Brazil) . . . . . *S. veredae*, new species

Mesonotum grayish black; wing usually clouded 10

10. Setulae near posterior thoracic spiracle moderately strong as in Figure 5. Male terminalia: posterior margin of sternum 4 deeply emarginate, with pair of posteriorly directed protuberances; posterior surstyli with median lobe rounded. Female synsternum: posterior margin distinctly projecting in middle; in lateral view with ventral surface more or less straight and with distinct posterior ridge (Surinam, Guiana, Venezuela, Colombia, Brazil, Argentina) . . . . . *S. guianica*

Setulae near posterior thoracic spiracle weak as in Figure 4. Male and female terminalia different 11

11. Wing distinctly clouded, especially around distal half of vein R2+3; crossvein r-m slightly clouded. Male terminalia: posterior margin of sternum 4 concave; posterior surstyli in form of narrow, elongate, anteriorly directed rod. Female synsternum: posterior margin pointed apically; with large light depression centrally; in lateral view with distinct ventral and posterior shoulders (Costa Rica, Surinam, Brazil) . . . . . *S. lagoa*

Wing not clouded, or clouded only around end of longitudinal veins; crossvein r-m not clouded. Male terminalia: posterior margin of sternum 4 slightly convex with short median, triangular lobe and pair of large mammilliform to lobelike, ventrally directed protuberances; posterior surstyli without median lobe, with lateral lobe long, strongly curved anterad. Female synsternum: posterodorsal margin straight; in lateral view without shoulders, but with posterior ridge projecting slightly beyond posterior margin (Mexico, Guatemala, Nicaragua, Costa Rica) . . . . . *S. guatemalana*

Key to Mature Third-instar Larvae of *Sepedonea*

1. Dorsolateral patches of setulae found only on segments 5–10 2

Segments 5–11 each bearing a prominent dorsolateral patch of setulae 4

2. Middorsal stripe incomplete; stigmatic tubes tuberculate or papillose . . . . . *S. guatemalana*

Middorsal stripe complete; stigmatic tubes smooth, scalloped basally [Figures 127–130, 135] 3

3. Lateral tubercles on segments 5–10 bearing short setulae and/or a single seta . . . . . ***S. isthmi***

Lateral tubercles on segments 5–10 with no setulae or setae . . . . . ***S. guianica***

4. Middorsal stripe and dorsolateral V-shaped marks lacking [Figures 106, 107, 115, 118, 127, 132] . . . . . ***S. lagoa***

With middorsal stripe and dorsolateral V-shaped marks anteriorly 5

5. Posterior spiracular plates black as in Figures 129 and 130 6

Posterior spiracular plates not black as in Figures 128 and 131 7

6. Epipharyngeal sclerite small, lightly sclerotized as in Figure 117 . . . . . ***S. incipiens,*** new species

Epipharyngeal sclerite larger, darkly sclerotized as in Figure 119 . . . . ***S. telson***

7. Hypopharyngeal sclerite wide as in Figure 115; ventral arch as in Figure 112 . . . . . ***S. lindneri***

Hypopharyngeal sclerite long and narrow [Figure 114]; ventral arch as in Figure 111 . . . . . ***S. trichotypa,*** new species

Key to Puparia of *Sepedonea*

1. No dorsolateral marks [Figure 101]; elongate . . . . . ***S. lagoa***

With at least 2 dorsolateral V-shaped marks anteriorly; roughly barrel-shaped . . 2

2. Found in Mexico, ranging southward to Costa Rica . . . . . ***S. guatemalana***

Found in South America and/or Panamá 3

3. Ground color light, with black markings as in Figures 95 and 97 4

Ground color dark, with light markings as in Figures 98–100 6

4. Short, less than 5 mm long . . . . . ***S. lindneri***

Longer, ranging from 5.2 to 6.0 mm in length 5

5. Labial sclerite gently arcuate, lying loosely on median projection of hypopharyngeal sclerite as in Figure 115 . . . . . ***S. isthmi***

Labial sclerite strongly arcuate, lying wrapped around median projection of hypopharyngeal sclerite [Figures 97 and 116] . . . . . ***S. guianica***

6. Anterior segments slightly upturned from longitudinal body axis; small, usually under 4.5 mm [Figure 100] . . . . . ***S. incipiens,*** new species

Anterior segments parallel to longitudinal body axis; usually larger, above 4.5 mm [Figures 98–99] 7

7. Two very prominent, light-colored dorsolateral V-shaped marks anteriorly [Figure 99]; hypopharyngeal sclerite long and narrow [Figure 114] . . . . . ***S. trichotypa,*** new species

Usually 3 inconspicuous dorsolateral V-shaped marks anteriorly, sometimes almost completely obscured [Figure 98]; hypopharyngeal sclerite wide, as in Figure 115 . . . . . ***S. telson***

Sepedonea barbosai Knutson and Bredt

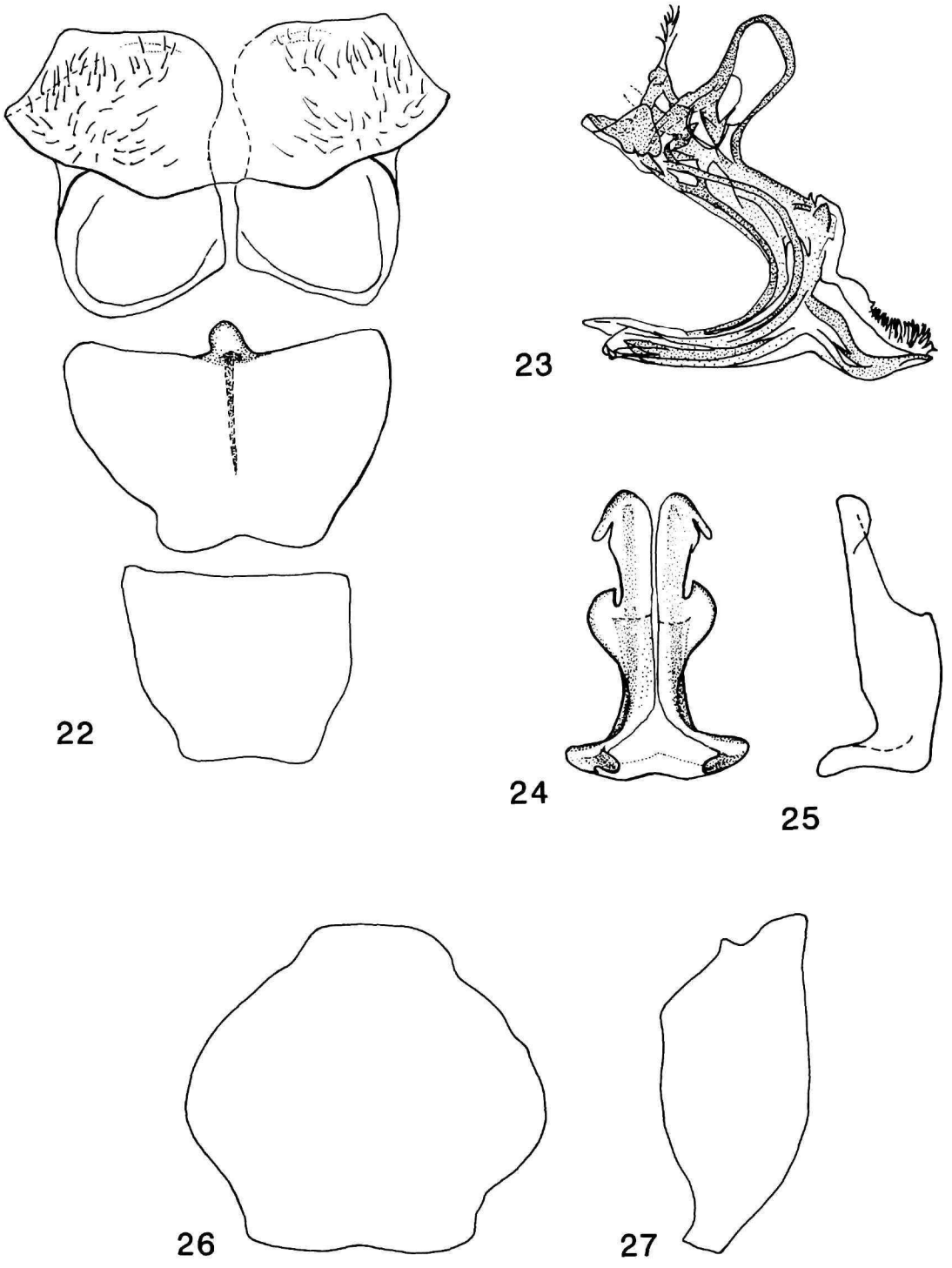
FIGURES 22–27, 139

Sepedonea barbosai Knutson and Bredt, 1976:114.—Bredt and Mello, 1978:767 [biology].—Knutson and Valley, 1978:198 [review].—Mello and Bredt, 1978:1459 [phenology].

ADULT.—*Head*: Lateral facial spot usually small.

Thorax: Mesonotum grayish black; postpronotum yellowish; setulae near posterior spiracle moderately dense and strong. Legs: Midfemur posteroventrally with 6–8 spines, not extended beyond half distance to base; hindcoxa posteriorly with row of long setulae that are longer than setulae on dorsum of abdomen; hindfemur lacking dark preapical marks. Wing: Brownish with anteroapical margin and crossvein r-m clouded; length 5.5 mm.

Abdomen: Male terminalia: Posterior margin of sternum 4 straight, with median, hooklike process (Figure 22); anterior plate of sternum 5 strongly concave, without fingerlike projections (Figure 22); distiphallus (Figure 23) strongly



FIGURES 22–27.—*Sepedonea barbosai*: 22, male, sterna 3–5; 23, distiphallus, lateral view; 24, posterior surstyli, anterior view; 25, same, lateral view; 26 female, synsternum, ventral view; 27, same, lateral view.

curved, with sinuous posteroventral process; anterior surstylus moderately elongate; posterior surstyli without median lobe (Figure 24), and with lateral lobe acuminate and strongly curved anterad (Figure 25). Female synsternum: In ventral view posterior margin with broad, straight apex (Figure 26); in lateral view ventral surface gently convex and posterior margin with small ridge (Figure 27).

TYPE SPECIMENS.—*Holotype* ♂: BRAZIL. GOIÁS: Cana Brava, 160 km NE Brasília, 9 January 1974, D. Barbosa, MZUSP.

Allotype: same data, but 30 October 1974, [abdomen dissected], MZUSP.

Paratypes: BRAZIL. GOIÁS: Cana Brava, 160 km N Brasília, 23 October 1974, Knutson and Bredt, 1♂; 30 October 1974, Knutson and Bredt, 4♂, USNM.

OTHER SPECIMENS EXAMINED.—None.

ADDITIONAL RECORDS FROM LITERATURE.—BRAZIL. DISTRITO FEDERAL: Brasília, Lagoa Paranoa, 5 November 1974, Knutson and Bredt (Knutson and Bredt, 1976). Highway L 2 Norte, Brasília, 5 November 1974, Mello and Bredt. GOIÁS: Lagoa do Piripiri, Formosa, 30 October 1974, Mello and Bredt. Lagoa do Golfe, Formosa, 11 February 1974, Mello and Bredt. Lagoa das Pedras, Formosa, 9 January 1974, January-December 1975, January-February, and June-November 1976, Mello and Bredt (Bredt and Mello, 1978; Mello and Bredt, 1978).

IMMATURE STAGES.—Unknown.

REMARKS.—The similarity between *S. barbosai* and *S. canabravana* in both the male and female terminalia suggests a close relationship between the two species. Both species have a similar distribution, in central Brazil, that is the most restricted of any species of *Sepedonea* (Figures 139, 140).

Sepedonea canabravana Knutson and Bredt

FIGURES 13, 28-33, 140

Sepedonea canabravana Knutson and Bredt, 1976:114.—Bredt and Mello, 1978:767 [biology].—Knutson and Valley, 1978:198 [review].—Mello and Bredt, 1978:1459 [phenology].

ADULT.—*Head*: Lateral facial spot rather elongate.

Thorax: Mesonotum grayish black, postpronotum yellowish; setulae near posterior spiracle dense and strong. Legs: Midfemur posteroventrally with 5-6 spines, not extended beyond half distance to base; hindcoxa (Figure 13) posteroventrally with 2 irregular rows of long setulae that are longer than setulae on dorsum of abdomen; hindfemur with dark lateral preapical marks, posterior mark larger and darker than anterior mark. Wing: Brownish yellow with anteroapical margin, crossveins r-m and dm-cu clouded; length 5-5.5 mm.

Abdomen: Male terminalia: Posterior margin of sternum 4 more or less straight, with large, median hooklike lobe (Figure 28); anterior plate of sternum 5 with 2 fingerlike projections (Figure 28); distiphallus (Figure 29) moderately curved, with short posteroventral spur; anterior surstylus small; posterior surstyli with short, triangular, median lobe (Figure 30) and with lateral lobe moderately curved anterad (Figure 31). Female synsternum: In ventral view posterior margin apically with rather inconspicuous median convexity and lateral shoulders (Figure 32); in lateral view ventral surface almost straight; posterior margin with apex and shoulder short and rounded (Figure 33).

TYPE SPECIMENS.—*Holotype* ♂: BRAZIL. GOIÁS: Rio Preto, 70 km NE Brasília, 21 October 1974, L. Knutson [abdomen dissected], MZUSP.

Allotype: BRAZIL. GOIÁS: Rio Preto, 30 km NE Brasília, 7 November 1974, Bredt and Knutson [abdomen dissected], MZUSP.

Paratypes: BRAZIL. GOIÁS: Rio Preto, 30 km NE Brasília, 7 November 1974, Bredt and Knutson, 1♂. Lagoa de Pedra, W Rio Cana Brava, 160 km NE Brasília, Brasília-Fortaleza Hwy. (BR-020), 25 April 1974, D. Barbosa, 1♂, (This is erroneously reported as "Lagoa Preta" in Knutson and Bredt, 1976), USNM.

OTHER SPECIMENS EXAMINED.—None.

ADDITIONAL RECORDS FROM LITERATURE.—BRAZIL. GOIÁS: Rio Preto, DF 06, Formosa, 15 September 1975, Mello and Bredt. Lagoa das Pedras, Formosa, 25 April 1974, January-December 1975, January-December 1976, Mello and Bredt (Bredt and Mello, 1978; Mello and Bredt, 1978).

IMMATURE STAGES.—Unknown.

REMARKS.—See remarks under *S. barbosai*.

Sepedonea guatemalana (Steyskal)

FIGURES 5, 34-39, 140

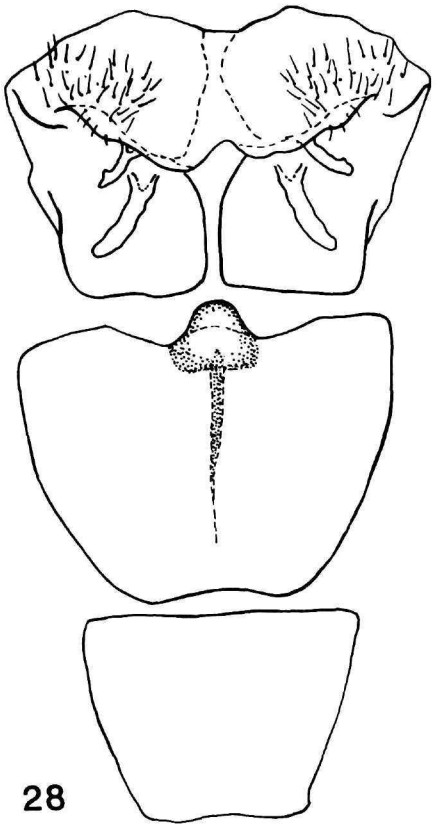
Sepedon guatemalana Steyskal, 1951:293.—Neff and Berg, 1966:41 [biology and immature stages].

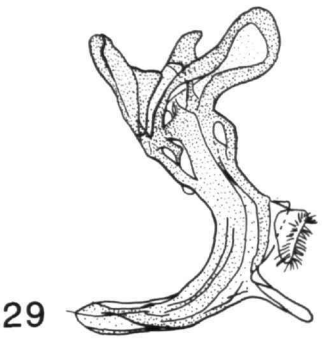
Sepedonea guatemalana.—Steyskal 1973:145 [list].—Knutson et al., 1976:11 [catalog].—Knutson and Valley, 1978:198 [review].

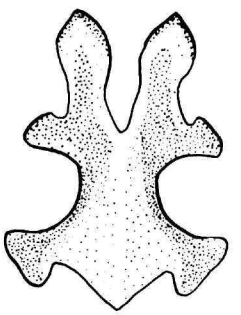
ADULT.—*Head*: Lateral facial spot small to large.

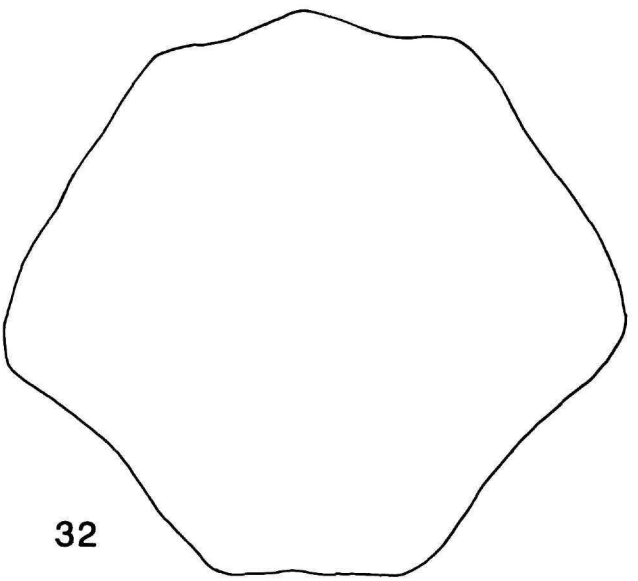
Thorax: Mesonotum grayish black; postpronotum yellowish; setulae near posterior spiracle weak and sparse (Figure 5). Legs: Midfemur posteroventrally with 3-6 spines; hindcoxa posteriorly with long setulae restricted mesally, with or without short setulae laterally; hindfemur without dark preapical marks. Wing: Grayish; crossveins r-m and dm-cu not clouded; length 4.5-6 mm.

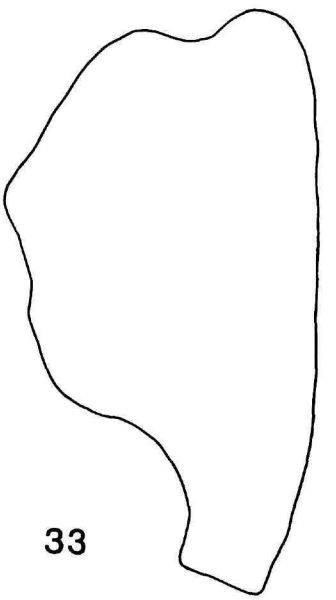
Abdomen: Male terminalia: Posterior margin of sternum 4 slightly convex, with short, median lobe and pair of large, mammilliform, ventrally directed protuberances (Figure 34); anterior plate of sternum 5 without fingerlike processes (Figure 34); distiphallus (Figure 35) slightly curved, with rather long ventral process and hairy epiphallus; anterior surstylus very small or indistinct; posterior surstyli without median lobe (Figure 36), and with lateral lobe long, strongly curved anterad (Figure 37). Female synsternum: In ventral view posterior margin straight (Figure 38), in lateral view with



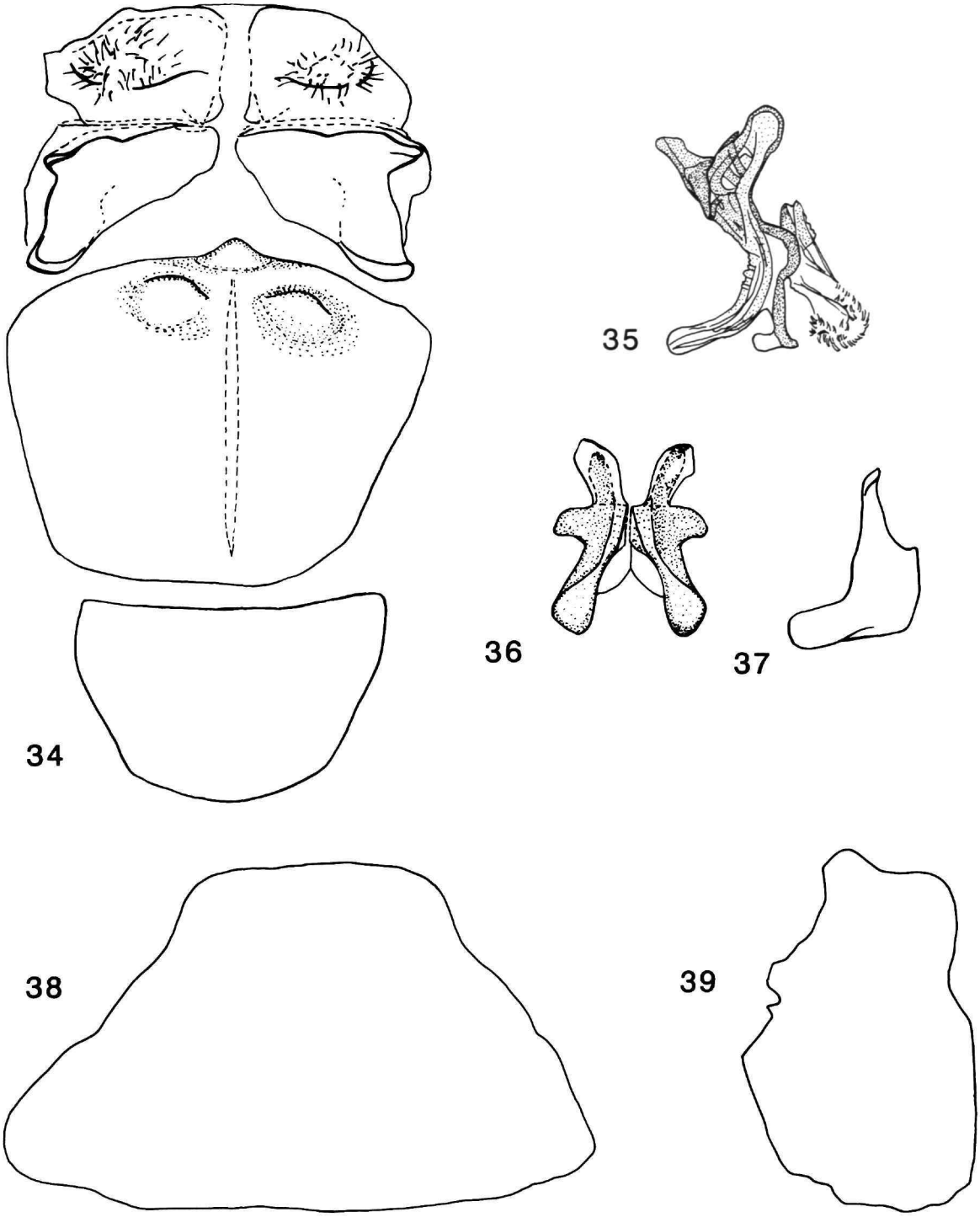








FIGURES 28–33.—*Sepedonea canabravana*: 28, male, sterna 3–5; 29, distiphallus, lateral view; 30, posterior surstyli, anterior view; 31, same, lateral view; 32, female, synsternum, ventral view; 33, same, lateral view.



FIGURES 34-39.—*Sepedonea guatemalana*: 34, male, sterna 3-5; 35, distiphallus, lateral view; 36, posterior surstyli, anterior view; 37, same, lateral view; 38, female, synsternum, ventral view; 39, same, lateral view.

shallow ventral depression, and with posterior ridge projecting slightly beyond posteroventral margin (Figure 39).

TYPE SPECIMEN.—*Holotype* ♂: GUATEMALA. Los Amates, 18-28 February 1905, Ja[me]s. S. Hine, [red label], OSU.

OTHER SPECIMENS EXAMINED.—HONDURAS. FRANCISCO MORAZAN: Zamorano, nr. Tegucigalpa, 19, 20 November 1987, L. Knutson, 37♂, 1♀. MEXICO. CHIAPAS: Las Cruces, 16 July 1958, S.E. Neff, 12♂, 5♀ (field collected), 7♂, 4♀ (laboratory reared). NICARAGUA. Managua, April 1943, 1♂, D. Gilail, USNM.

ADDITIONAL RECORDS FROM LITERATURE.—NICARAGUA. Chinandega, Baker, 1♂ (Steyskal, 1951). GUATEMALA. SANTA ROSA: 2.1 km E Barbarena (1,341 m), 23 July 1958, 2♂, 1♀. COSTA RICA. SAN JOSE: San Antonio-Desamparados (1,160 m), 16 June 1964, 4♂, 1♀ (both Neff and Berg, 1966).

IMMATURE STAGES.—See Neff and Berg, 1966.

REMARKS.—This species is found from Chiapas (Mexico) to Costa Rica (Figure 140) and thus is the northernmost representative of the genus and the only species not occurring in South America. With a lack of accepted phylogeny for the genus, this distribution may either suggest that the species has evolved relatively late or, conversely, that it is an early offshoot of the genus and a sister group to all remaining species. The shape of the posterior surstyli, which are only weakly fused, supports the latter possibility. Neff and Berg (1966) studied the immature stages.

Sepedonea guianica (Steyskal)

FIGURES 7, 40–45, 97, 110, 113, 116, 126, 135, 138, 141

Sepedon guianica Steyskal, 1951:295.
Sepedonea guianica.—Steyskal, 1973:145 [list].—Knutson et al., 1976:11 [catalog].—Knutson and Valley, 1978:198 [review].
Sepedonea vau.—Mello and Bredt, 1978:1459 [nomen nudum; phenology].

ADULT.—*Head*: Lateral facial spot large.

Thorax: Mesonotum grayish black; postpronotum brownish; setulae near posterior spiracle moderately strong and dense. Legs: Midfemur posteroventrally usually without spines but with setulae only, sometimes setulae near apex of femur distinctly stronger than basal setulae (Figure 7), and in some Brazilian specimens there are 3-6 spines, not extending beyond half distance to base; hindcoxa posteriorly with short setulae, mainly restricted mesally; hindfemur usually without dark preapical marks. Wing: Grayish, with crossveins r-m and dm-cu not clouded, or brownish and clouded anteroapically and over the crossveins; length 5-6 mm.

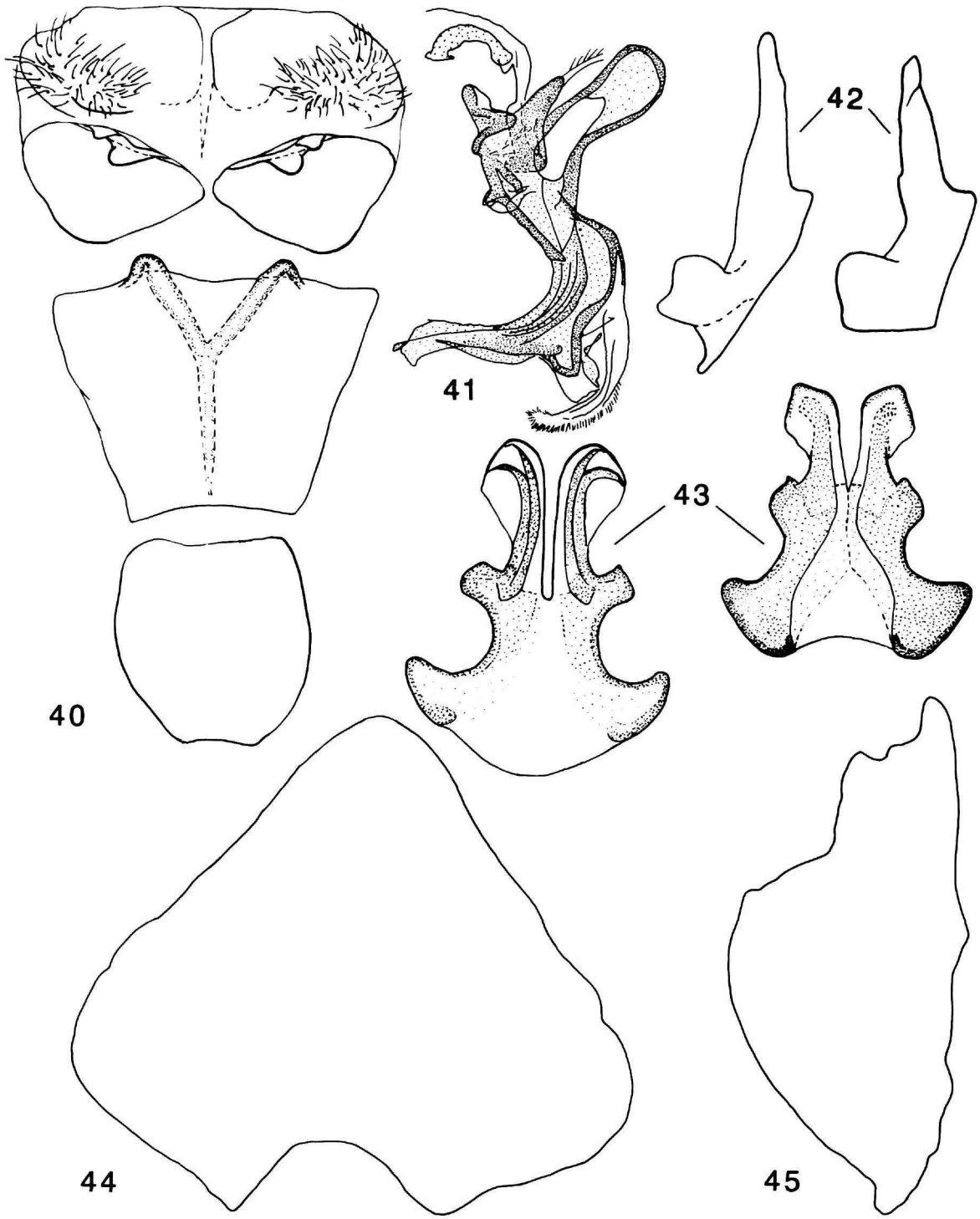
Abdomen: Male terminalia: Posterior margin of sternum 4 deeply emarginate, with pair of posteriorly directed protuberances (Figure 40); anterior plate of sternum 5 with wide, indented flange at posteromesal margin (Figure 40); distiphallus (Figure 41) sinuous, with posteroventral angle covered by large flat, hairy epiphallus; anterior surstylus indistinct; posterior surstyli with (Figure 42*a*) or without (Figure 42*b*) median lobe; median lobe, when present, rounded; posterior surstyli with lateral lobe moderately strongly curved anterad (Figure 43*a*, *b*). Female synsternum: In ventral view posterior margin distinctly projecting in middle (Figure 44); in lateral view with ventral surface more or less straight, and with posterior ridge distinctly projecting (Figure 45).

TYPE SPECIMEN.—*Holotype* ♂: Comoro Is., Maroni, Guyane, Purch. E. Le Moult, B.M. 1933-189, Type H. T. [round label with red margin], [red label], BMNH. This locality refers to an island in the Maroni River (= Marowijne River), which is the border between Surinam and Guiana. The river is about 150 km in length, and the exact location is not known.

OTHER SPECIMENS EXAMINED.—COLOMBIA. VALLE DEL CAUCA: Morga, 20 km SE Univ., 22-25 June 1964, C.O. Berg, 16♂, 12♀. 6.5 km SE Cali (Navarro), 11 June 1969, Karl R. Valley, 1♂ (field collected), 1♂, 1♀ (laboratory reared). 14 June 1969, Karl R. Valley, 2♂, 2♀, 1 puparium. 5 km SE Cali, near Navarro, 11 June 1969, Karl R. Valley, 1♀. VENEZUELA. COJEDES: L. Taguanes, near Tinaquillo, 13 April 1972, L. Knutson, 1♂. BRAZIL. MINAS GERAIS: Lagoa Santa, near Belo Horizonte, 18 January 1977, L. Knutson, 11♂, 6♀. 17 km N Belo Horizonte, 18-23 July 1964, C.O. Berg, 4♀ (field collected), 1 puparium (laboratory reared). Jockey Club, 23 August 1966, C.O. Berg, 1♂, 15 September 1966, C.O. Berg, 2♀. Serra Verde, 30 km E Belo Horizonte, 22 August 1974, A. Bredt, 1♂, 10 October 1974, A. Bredt, 1♂. PARANÁ: Praia do Leste, 4 May 1967, Berg and Abercrombie, 3♂, 17 May 1967, Berg and Abercrombie, 1♂, 1 puparium. 4, 17 May 1967, Berg and Abercrombie, 3♂ (field collected), 4♂, 10♀ (laboratory reared). 61 km S Curitiba, Rio Varzea, 16 May 1967, Berg and Abercrombie, 2♂. SÃO PAULO: São Vicente, Parque Bitaru, 29 May 1967, Berg and Abercrombie, 1♂, 1♀ (field collected), 8 eggs (laboratory reared). Rio Claro, 14 January 1977, L. Knutson, 1♂. São José do Rio Preto, 27 July 1966, N. Papavero, 9♂. GOIÁS: Rio Preto, 70 km NE Brasília, 7 November 1974, Bredt and Knutson, 1♂. ESPIRITO SANTO: Baixo Guandu, October 1970, P.C. Elias, 1♂. ARGENTINA. TUCUMÁN: Monteros, 7 February 1967, Berg and Abercrombie, 1♂, (all USNM).

ADDITIONAL RECORDS FROM LITERATURE.—BRAZIL. PARAÍBA: Campina Grande, 2 August 1975, Mello and Bredt. DISTRITO FEDERAL: Núcleo Bandeirantes, 11 November 74, Mello and Bredt. Highway L 2 Norte, Brasília, 9 January 74, Mello and Bredt. Riberao Extrema, DF 21, 6 February 1974, Mello and Bredt. MINAS GERAIS: Hipódromo Serra Verde, Santa Luzia, 24 August 1974, Mello and Bredt. GOIÁS: Rio Preto, DF 06, Formosa, 19 June 1974, Mello and Bredt. Lagoa das Pedras, Formosa, 9 January 1974, January-May, July-October, December 1975, January-February, April, June, July, October-December 1976, Mello and Bredt (all from Mello and Bredt, 1978).

IMMATURE STAGES.—*Egg*: White. Length 1.20-1.24 mm (average = 1.24); greatest width 0.32-0.44 mm (average =



FIGURES 40–45.—*Sepedonea guianica*: 40, male, sterna 3–5; 41, distiphallus, lateral view; 42, posterior surstyli, anterior view, two variations; 43, same, lateral view, two variations; 44, female, synsternum, ventral view; 45, same, lateral view.

0.40). Larger than *S. incipiens*, but otherwise very similar in shape, ridging, reticulation, and subglobular ends. (Based on 9 specimens: Praia do Leste, Paraná, Brazil).

First-instar Larva: White. Integument transparent. Length 1.2–2.9 mm (average = 1.9); greatest width 0.3–0.7 mm (average = 0.4). Cephalopharyngeal skeleton 0.28–0.31 mm long; mandible 0.05–0.06 mm long, with 3 component parts; very similar to that of other *Sepedonea*. Indentation index 29–38. Segment 1 bilobed anteriorly, each lobe bearing a sensory papilla. Segments 2–4 each with 1 seta dorsolaterally, 1 laterally, and 1 ventrally, all quite small. Segments 5–10 each with dorsolateral patch of setulae; segment 11 with single seta dorsolaterally; segments 5–11 each with lateral tubercle group arrangement as in other *Sepedonea*; none with setae; main ventral tubercle group with 4 tubercles in transverse row, each bearing short, stout setae. Posterior spiracular disc with 5 pairs of lobes: ventral pair subconical, quite wide basally; ventrolateral pair two-segmented, basal section truncate, distal section digitiform; lateral, dorsolateral, and dorsal lobes low, rounded, each bearing 1 long seta distally; annulation of ventral lobes and distal section of ventrolateral lobes mostly obscured by very long setulae; center of disc glabrous. Two stigmatic tubes, each bearing a spiracular plate with a B-shaped spiracular slit and 4 transparent, irregularly branched float setulae, larger in proportion to size of disc than in second- or third-instar larvae. Anal proleg small, inconspicuous, hookless. (Based on 15 specimens: 4 from Praia do Leste, Paraná, and 11 from Parque Bitaru, São Vicente, São Paulo, both in Brazil).

Second-instar Larva (Figure 126): Light brown. Integument diaphanous. Length 2.8–5.3 mm (average = 3.9); greatest width 0.6–1.1 mm (average = 0.8). Cephalopharyngeal skeleton 0.49–0.52 mm long, with paired mandibles 0.09–0.10 mm in length, each with 3 mesally directed accessory teeth; very similar to others in *Sepedonea*. Ventral arch connected posterolaterally on each side to mandibles. Parastomal bars of epipharyngeal sclerite connected to fused hypopharyngeal-pharyngeal sclerite; the latter light to dark brown with small clear areas near dorsal margin of dorsal cornu; ventral window indistinct in light ventral cornu. Indentation index 31–35. Segment 1 as in first-instar larva. Seta arrangement of segments 2–4 as in first-instar larva. Segments 5–10 each with dorsolateral patch of setulae; segment 11 with single seta dorsolaterally. Segments 5–11 each with lateral tubercle group of 3 contiguous tubercles in a vertical row, the middle 1 slightly anterior to other 2; dorsal and ventral tubercles of lateral tubercle group of segment 11 with single seta each and middle tubercle with group of small, stout setae; main ventral tubercle group of 4 tubercles in a transverse row. Posterior spiracular disc with 5 pairs of lobes, very similar to that of *S. telson*; ventral pair subconical; ventrolateral pair two-segmented; lateral pair low, rounded; dorsolateral pair even less conspicuous; dorsal pair somewhat larger, broadly rounded. Two stigmatic tubes arising from center of disc, each bearing a spiracular plate (Figure 126) with a stigmatic scar, 3 rather small spiracular slits, and 4 large, prominent, irregularly branched, semitransparent float setulae each with glandular pore at base. Anal proleg scarcely larger than a main ventral tubercle when viewed laterally; without hooks. (Based on 12 specimens: Praia do Leste, Paraná, Brazil).

Third-instar Larva (Figures 110, 113, 116, 135, 138): Length 8.2–9.3 mm (average = 8.7); greatest width 1.8–2.3 mm (average = 2.0). Light to dark brown, with dark brown middorsal stripe and dorsolateral V-shaped marks prominent anteriorly; laterally, a less prominent, broken, irregular lateral stripe; quite similar to *S. trichotypa*. Integument opaque. Cephalopharyngeal skeleton length 0.74–0.82 mm, with paired mandibles (Figure 110), each with 4–6 large, sharply pointed accessory teeth, directed mesally; hook strongly decurved; entire sclerite 0.08–0.16 mm long; ventral arch (Figure 113) with 20–25 denticles directed anteriorly; connected posterolaterally with both mouth-hooks; hypopharyngeal and labial sclerites (Figure 116) uniquely shaped among *Sepedonea*; former free from tentoropharyngeal sclerite; epipharyngeal sclerite very similar to that of *S. telson* and *S. trichotypa*, with parastomal bars fused to tentoropharyngeal sclerite; latter light to dark brown, lacking small clear areas in dorsal cornu and with ventral window very indistinct. Indentation index 31–33. Segment 1 as in first-instar larva. Seta arrangement of segments 2–4 as in first-instar larva. Segment 2 with 2 anterior spiracles (Figure 138), each 0.13–0.14 mm long and bearing 6 or 7 papillae distally. Segments 5–10 each with dorsolateral patch of setulae with short setulae; segment 11 with single dorsolateral seta; lateral tubercle group on segment 11 with dorsal and ventral ones bearing single seta each; other lateral tubercles setaless; segments 5–11 each with main ventral tubercle group of 4 tubercles in a transverse row, followed posteriorly by 2 rows of much smaller intrasegmental tubercles arranged in transverse rows. Segment 8 with posterior spiracular disc (Figure 135) of 5 lobes: ventral pair quite wide at base, tapered sharply distally; ventrolateral pair basically similar to those of other species of *Sepedonea*; lateral pair rather acute; dorsolateral pair very low and inconspicuous; dorsal pair each with tuft of setulae distally, lobes broadly rounded. Entire disc moderately setulose, with glabrous center, with 2 separate stigmatic tubes, each scalloped basally, and each with a stigmatic scar, 3 spiracular slits, and 4 irregularly branched float setulae on a spiracular plate much lighter in color than *S. incipiens* and *S. telson*. Anal proleg larger than in other species of *Sepedonea* but still relatively inconspicuous and hookless. (Based on 8 specimens: Praia do Leste, Paraná, Brazil).

Puparium (Figure 97): Light brown with dark brown stripes along middorsal line and dorsolaterally on anterior segments, strongest on segments 6 and 7. Integument opaque. Length 5.2–5.7 mm (average = 5.4); greatest width 2.2–2.3 mm (average = 2.2). Barrel-shaped, with ends of cephalic caps projecting anteriorly slightly dorsal to the longitudinal body axis and slightly upturned. Anterior spiracles protruding from

anterolateral corners of dorsal cephalic cap. Lateral tubercle group of segments 5–11 visible as strongly contrasting dark areas; main tubercles of ventral tubercle group persisting as 4 less noticeable light spots in a transverse row. Dorsolateral patches of setulae of segments 5–10 with setulae appearing appressed to puparium surface. Posterior end sharply upturned, stigmatic tubes forming an angle of 100–110 degrees with longitudinal body axis. Lobes of posterior spiracular disc shrunken. Anal plate invaginated; anal proleg lacking. Quite similar to *S. telson* and *S. trichotypa*, but much lighter, color pattern being dark-on-light rather than light-on-dark as in *S. telson* and *S. trichotypa*. (Based on 5 specimens; Praia do Leste, Paraná, Brazil).

REMARKS.—This species, which occurs widely from northern to central South America, is especially well represented in eastern Brazil, but is practically lacking in the entire Amazon basin (Figure 141). Most specimens from Brazil differ from the specimens originating farther in the north, including the holotype, in having the midfemur distinctly spinose, in usually having dark lateral preapical marks on the hindfemur, in the darker and clouded wing, and in the posterior surstyli, which lack a median lobe. However, the overall similarity between the two groups of specimens, the male and female terminalia in particular, suggests that these differences merely represent intraspecific variation.

Sepedonea incipiens, new species

FIGURES 46–51, 94, 100, 104, 108–109, 117, 123, 129, 134, 139

ADULT.—*Head*: Lateral facial spot moderately large.

Thorax: Mesonotum usually grayish black; postpronotum brownish yellow; setulae near posterior spiracle very strong and dense. Legs: Midfemur posteroventrally with 3–5 spines, not extended beyond half distance to base; hindcoxa posteriorly with short setulae, restricted to mesal area; hindfemur with dark posteroventral and anteroventral preapical marks and with dark or light dorsal preapical marks. Wing: Yellowish, with anteroapical margin and crossveins r-m and dm-cu more or less distinctly clouded; length 4–5 mm.

Abdomen: Male terminalia: Posterior margin of sternum 4 straight, with median projection bearing a pair of tubercles (Figure 46); anterior plate of sternum 5 with triangular, anterolaterally directed flange (Figure 46); distiphallus (Figure 47) slightly curved, with short, slightly curved posteroventral spur; anterior surstylus indistinct; posterior surstyli with median lobe low and rounded (Figure 48) and with lateral lobe moderately curved anterad (Figure 49). Female synsternum: In ventral view posterior margin with 3 subequal tubercles (Figure 50); in lateral view ventral surface straight, posterior margin with apex and shoulders short and rounded (Figure 51).

TYPE SPECIMENS.—*Holotype* ♂: ARGENTINA. BUENOS AIRES: 28 km SW Buenos Aires, 15–16 April 1967, J. Abercrombie, USNM. [Label: J. Abercrombie field trip #6729].

Allotype: BRAZIL. GUANABARA: Inst. Oswaldo Cruz, 6 June 1967, Berg and Souza-Lopes. [Label: J. Abercrombie Biol. Note #67118].

Paratypes: ARGENTINA. BUENOS AIRES: 28 km SW Buenos Aires, 15–16 April 1967, J. Abercrombie, 1♂, USNM. BRAZIL. GUANABARA: Inst. Oswaldo Cruz, 6 June 1967, Berg and Souza-Lopes, 1♂, 1♀ (field collected), 14♂, 14♀ (laboratory reared), USNM; 6 April 1967, Berg and Souza-Lopes, 2♀, USNM; 7 April 1967, Berg and Souza-Lopes, 1♂, USNM. SÃO PAULO: São Paulo, Inst. de Botânica, July 1964, Berg and Papavero, 1♂, MZUSP. 15 July 1964, N. Papavero, 1♂, MZUSP. September 1964, N. Papavero, 1♂, MZUSP; São Paulo, Inst. Bot. Serv. Agric., 11–13 July 1964, Berg and Papavero, 1♂, USNM. São Paulo, Parque D. Pedro II, 11 July 1964, Berg and Papavero, 1♂, MZUSP. São Paulo, 17 April 1967, C.O. Berg, 1♂, USNM; 26 May 1967, J. Abercrombie, 1♂, USNM. 7 June 1967, J. Abercrombie, 1♂, USNM. RIO GRANDE DO SUL: São Leopoldo, 3, 11 May 1967, Berg and Abercrombie, 3♂, USNM.

OTHER SPECIMENS EXAMINED.—BRAZIL. SÃO PAULO: São Vicente, 12 larvae (laboratory reared).

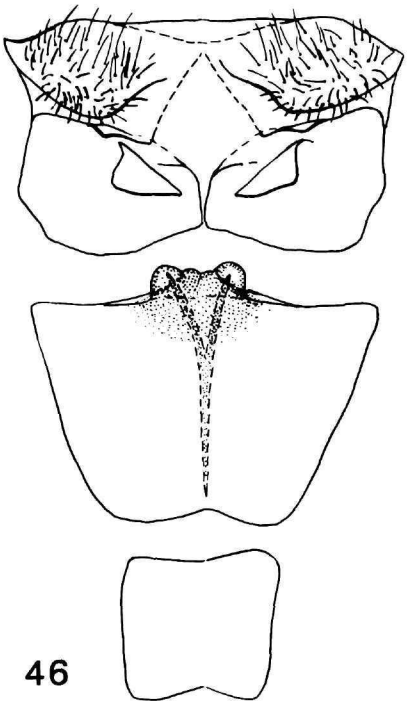
ADDITIONAL RECORDS FROM LITERATURE.—None.

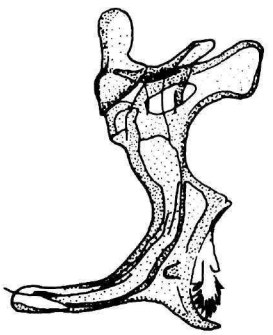
ETYMOLOGY.—The specific epithet, *incipiens*, was a manuscript name given by George Steyskal, but nobody, including him, can say why.

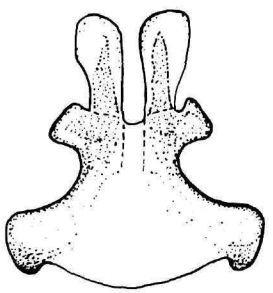
IMMATURE STAGES.—*Egg* (Figure 94): White. Length 0.90–1.12 mm (average = 1.00); greatest width 0.28–0.38 mm (average = 0.34). Elongate-ovoid, tapered at both ends. Two prominent, subparallel dorsal ridges flanked laterally by another salient ridge on each side; all 4 visible dorsally. Area between ridges and lateral and ventral surfaces reticulate in irregular hexagonal pattern, more variable laterally and ventrally. Hexagons elongated at both ends in areas between ridges. Micropyle shielded dorsally by subglobose tubercle with minute punctations appearing hexagonal under high magnification (×400). Posterior end rounded, subglobose, with punctations as on anterior end. (Based on 10 specimens: Instituto Oswaldo Cruz, Rio de Janeiro, Guanabara, Brazil).

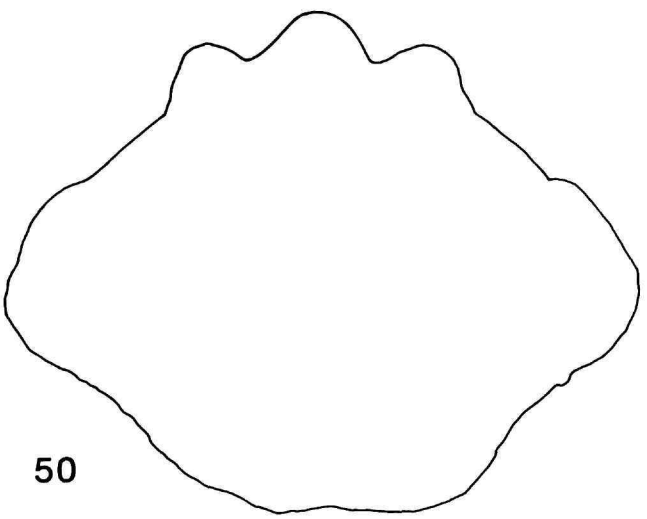
First-instar Larva: White. Integument transparent. Length 1.7–2.8 mm (average = 2.2); greatest width 0.3–0.7 mm (average = 0.5). Cephalopharyngeal skeleton length 0.29–0.30 mm. Indentation index 24–29. Very similar to *S. lindneri* in size, general appearance, seta and tubercle arrangement, mouthparts, and posterior spiracular disc. (Based on 5 specimens: São Vicente, São Paulo, Brazil).

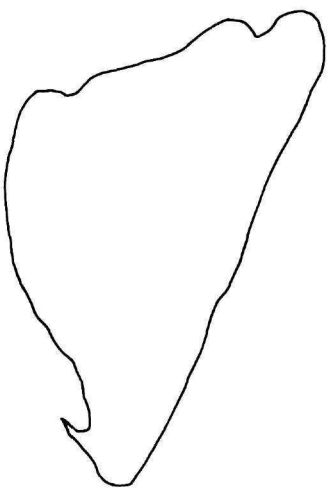
Second-instar Larva (Figures 104, 123): Light brown; integument diaphanous. Length 3.2–4.4 mm (average = 3.8); greatest width 0.5–1.0 mm (average = 0.7). Cephalopharyngeal skeleton (Figure 104) 0.44–0.49 mm long, with paired mandibles 0.07–0.10 mm in length, each with 4 mesally directed accessory teeth and 2 holes, 1 near center and the other near dorsal margin. Mandibles fused posteroventrally with lateral edges of ventral arch; latter with 17–19 small, rounded











FIGURES 46–51.—*Sepedonea incipiens*: 46, male, sterna 3–5; 47, distiphallus, lateral view; 48, posterior surstyli, anterior view; 49, same, lateral view; 50, female, synsternum, ventral view; 51, same, lateral view.

denticles directed anteriorly. Epistomal and hypopharyngeal sclerites fused with paired tentoropharyngeal sclerite; latter light brown, with ventral cornu very light, thus obscuring ventral window; dorsal cornu with small hyaline areas near dorsal margin. Indentation index 27–30. Segment 1 bilobed anteriorly, each lobe with a sensory papilla. Segment 2 bearing 1 dorsolateral seta and an anterior spiracle on each side. Segment 3 with 1 dorsolateral seta and 1 on each side. Segment 4 with 1 seta dorsolaterally, 1 ventrally, and 1 on each side. Segments 5–11 each with prominent dorsolateral patch of setulae (sometimes only 1 large seta on segment 11); lateral tubercle group of 3 contiguous tubercles more or less in a vertical row, dorsal and ventral tubercles each bearing a seta; main ventral group of 4 tubercles (some with short, stout setae) in a transverse row, followed posteriorly by 2 transverse rows of much smaller intrasegmental tubercles. Posterior spiracular disc (Figure 123) with 5 pairs of lobes: ventral pair short, subconical; ventrolateral pair two-segmented, basal portion truncate and distal portion digitiform; lateral lobes rather large, smoothly rounded; dorsolateral lobes very small, inconspicuous; dorsal lobes low, rounded. Two stigmatic tubes each with spiracular plate, stigmatic scar, 3 spiracular slits, and 4 semi-transparent, irregularly branched float setulae. Anal proleg very inconspicuous, same size as a main ventral tubercle when viewed laterally; no hooks. (Based on 8 specimens: 3 from Instituto Oswaldo Cruz, Rio de Janeiro, Guanabara, and 5 from São Vicente, São Paulo, both in Brazil).

Third-instar Larva (Figures 108, 109, 117, 129, 134): Light brown, with dark brown stripes dorsally and dorsolaterally; integument diaphanous. Length 3.8–7.5 mm (average = 6.1); greatest width 0.8–1.5 mm (average = 1.2). Cephalopharyngeal skeleton (Figure 108) length 0.66–0.74 mm, with paired mouth-hooks, each with 3 or 4 accessory teeth directed mesally; mandible (Figure 109) 0.13–0.15 mm long; ventral arch with 21–23 small, rounded denticles on anterior edge, connected posterolaterally with both mandibles; hypopharyngeal sclerite free from tentoropharyngeal sclerite; parastomal bars of epipharyngeal sclerite (Figure 117) connected to paired tentoropharyngeal sclerite and continued posteriorly in latter structure as salient black lines; tentoropharyngeal sclerite light brown, with ventral window obscured in light ventral cornu. Indentation index 28–31. Segment 1 as that in second-instar larva. Segment 2 with 1 seta dorsolaterally, 1 ventrally, and an anterior spiracle (Figure 134) on each side; latter 0.12–0.13 mm long with 4–6 papillae and bulbous posteriorly at junction with trachea. Segment 3 with 1 seta dorsolaterally, 1 ventrally, and 1 on each side. Segment 4 with 1 seta dorsolaterally, 1 ventrally, and 2 on each side; lateral and ventral setae borne on small tubercles. Segments 5–11 each with conspicuous dorsolateral patch of setulae; tubercle arrangement as in second-instar larva, except lateral tubercles not always with setae. Posterior spiracular disc (Figure 129) with 5 pairs of lobes: ventral pair fairly short, tapered; ventrolateral lobes truncate basally with digitiform distal section; lateral lobes acute; dorsolateral lobes very low, inconspicuous; dorsal lobes broadly rounded, low. Disc moderately setulose. Two stigmatic tubes brown when viewed laterally, each with darkly sclerotized spiracular plate, stigmatic scar, 3 spiracular slits, and 4 irregularly branched, subopaque float setulae. Anal proleg as in second instar larva. (Based on 5 specimens: 3 from Instituto Oswaldo Cruz, Rio de Janeiro, Guanabara, and 2 from São Vicente, São Paulo, both in Brazil).

Puparium (Figure 100): Light to dark brown, with greatest contrast dorsally and dorsolaterally; integument opaque. Length 3.8–4.5 mm (average = 4.2); greatest width 1.8–2.0 mm (average = 1.95). Barrel-shaped, with ends of cephalic caps projecting anteriorly dorsal to the longitudinal body axis and slightly upturned from it. Anterior spiracles protruding from anterolateral corners of dorsal cephalic cap. Lateral tubercles and main ventral tubercles of segments 5–11 persisting as conspicuous light areas, giving puparium a blotched appearance. Posterior end sharply upturned, with posterior surface at right angle to longitudinal body axis. Stigmatic tubes forming an angle of 110–120 degrees with longitudinal body axis. Lobes of posterior spiracular disc shrunken. Anal plate a light-colored invagination on posterior wall. Anal proleg lacking. Very similar to *S. lindneri*, but much darker, color pattern being light-on-dark rather than dark-on-light as in *S. lindneri*. (Based on 5 specimens: Instituto Oswaldo Cruz, Rio de Janeiro, Guanabara, Brazil).

REMARKS.—This species has a distribution very similar to that of *S. trichotypa* (Figures 139, 143). The two species also share many morphological characters, including very similar terminalia. They can be reliably distinguished, however, by the shape of the male's sterna 3–5 and the female's synsternum.

Sepedonea isthmi (Steyskal)

FIGURES 6, 9, 14–16, 52–57

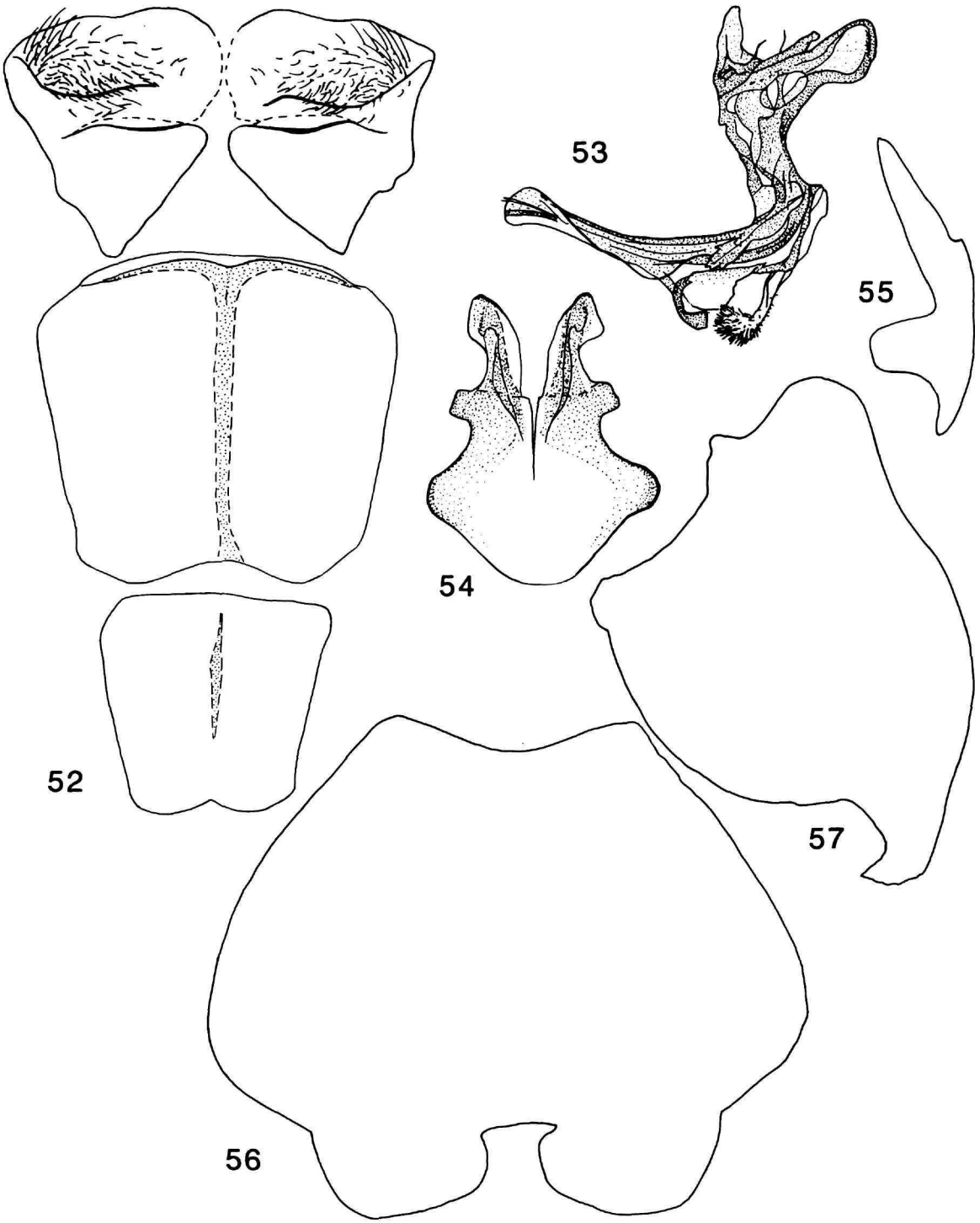
Sepedon isthmi Steyskal, 1951:291.

Sepedonea isthmi.—Steyskal, 1973:145 [list].—Knutson et al., 1976:11 [catalog].—Knutson and Valley, 1978:197 [biology and immature stages].

ADULT.—*Head*: Lateral facial spot large.

Thorax: Mesonotum grayish black; postpronotum dorsally concolorous with mesonotum, ventrally more yellowish; setulae near posterior spiracle moderately dense and strong. Legs: Midfemur posteroventrally with 8–15 spines extended $^1/_2$–$^2/_3$ distance to base (Figure 9); hindcoxa posteriorly with row of setulae, long setulae restricted mesally; hindfemur lacking dark preapical marks. Wing (Figure 6): Distinctly clouded anteroapically and over crossveins r-m and dm-cu; length 5–6 mm.

Abdomen: Male abdomen as in Figures 14–16. Male terminalia: Posterior margin of sternum 4 slightly convex, without protuberances (Figure 52); anterior plate of sternum 5 without fingerlike processes (Figure 52); distiphallus (Figure



FIGURES 52-57.—*Sepedonea isthmi*: 52, male, sterna 3-5; 53, distiphallus, lateral view; 54, posterior surstyli, anterior view; 55, same, lateral view; 56, female, synsternum, ventral view; 57, same, lateral view.

53) elongate, gently curved and somewhat flattened, with broad, recurved epiphallus posteroventrally; anterior surstylus large, elongate; posterior surstyli with large, triangular median lobe (Figure 54), and with lateral lobe rather pointed, curved anterad (Figure 55). Female synsternum: In ventral view posterior margin gently concave (Figure 56); in lateral view with distinct ventral convexity, broadly rounded posteroventral margin and small posterior ridge (Figure 57).

TYPE SPECIMENS.—*Holotype* ♂: PANAMÁ. "Canal Zone": Corazal, 1 March 1912, Aug. Busck, no. 60905, USNM.

Allotype: same data as holotype.

Paratype: "Canal Zone": Juan Mina, 2 September 1923, R.C. Shannon, 1♂, USNM.

OTHER SPECIMENS EXAMINED.—PANAMÁ. La Jagua Hunt Club, 32 mi. ENE Balboa, 1 July 1969, Karl R. Valley, 1♂. TRINIDAD. Curepe, nr. Port-of-Spain, 4-5 May 1972, L. Knutson, 15♂, 16♀, 25 eggs, 5 puparia. Caroni River, 12 October 1916, Harold Morrison, 1♂. VENEZUELA. ARAGUA: Cata, W. Maracay, 17 April 1972, L. Knutson, 1♂. Pto. de Cata, N Maracay, 17 April 1972, L. Knutson, 7♂, 1♀. Ocumare, 28 km NW Maracay, 14 March 1971, C.O. Berg, 3♂. CARABOBO: Valencia, 16 March 1971, C.O. Berg, 1♀. Embalse de Guataparo, W Valencia, 13 April 1972, L. Knutson, 1♂. Valle Seco, January 1940, P. Anduze, 1♂. COJEDES: L. Taguanes, near Tinaquillo, 13 April 1972, L. Knutson, 3♀. COLOMBIA. VALLE DEL CAUCA: Morga, 20 km SE of Univ., 22-25 June 1964, C.O. Berg, 4♂, 3♀. 1.7 km W Cali Puerto, 14 June 1969, Karl R. Valley, 3♂, 2♀, 1 larva. 5 km SE Cali near Navarro, 11 June 1969, Karl R. Valley, 2♂. 6.5 km SE Cali (Navarro), 11 June 1969, Karl R. Valley, 13♂, 14♀, 3 puparia (field collected), 7♂, 1♀ (laboratory reared). BRAZIL. AMAZONAS: Paraná da Cigana, Parintins, November 1959, Exp. Perm. Amaz., 1♂, 1♀. GOIÁS: Rio Preto, 70 km NE Brasília, 7 November 1974, Bredt and Knutson, 1♂. GUANABARA: Inst. Oswaldo Cruz, 6 April 1967, Berg and Souza-Lopes, 1♀. SÃO PAULO: São Vicente, Parque Bitaru, 29 May 1967, Berg and Abercrombie, 1♂ (all USNM).

ADDITIONAL RECORDS FROM LITERATURE.—BOLIVIA. BENI: Rurrenabaque (175 m), 10-23 October 1956, L.E. Pena, 1♂. BRAZIL. PARÁ: Breves, Ilha do Marajo, September 1969, Exp. Perm. Amaz., 1♀. ESPIRITO SANTO: Itaguacu, October 1970, P.C. Elias, 1 adult. VENEZUELA. COJEDES: La Piedrita, 16 February 1911, S. Brown, 1♀. TRINIDAD. Princess Margaret Highway, 9 km W Port-of-Spain, 4-5 May 1972, Bennett, Yaseen, and Knutson, 8♂, 2♀ (Knutson and Valley, 1978).

IMMATURE STAGES.—See Knutson and Valley, 1978.

REMARKS.—This species is widespread over most of South America (as far south as the Tropic of Capricorn) and Panamá. Because the material we studied is essentially the same as that studied by Knutson and Valley, the reader is refered to their map (Knutson and Valley, 1978, Fig. 1). The species is easily distinguished from all other congeners by the extensively spinose midfemur.

Sepedonea lagoa (Steyskal)

FIGURES 2, 58-63, 101-103, 106-107, 115, 118, 120, 127, 132, 140

Sepedon lagoa Steyskal, 1951:293.

Sepedonea lagoa.—Steyskal, 1973:145 [list].—Knutson et al., 1976:11 [catalog].—Knutson and Valley, 1978:198 [review].

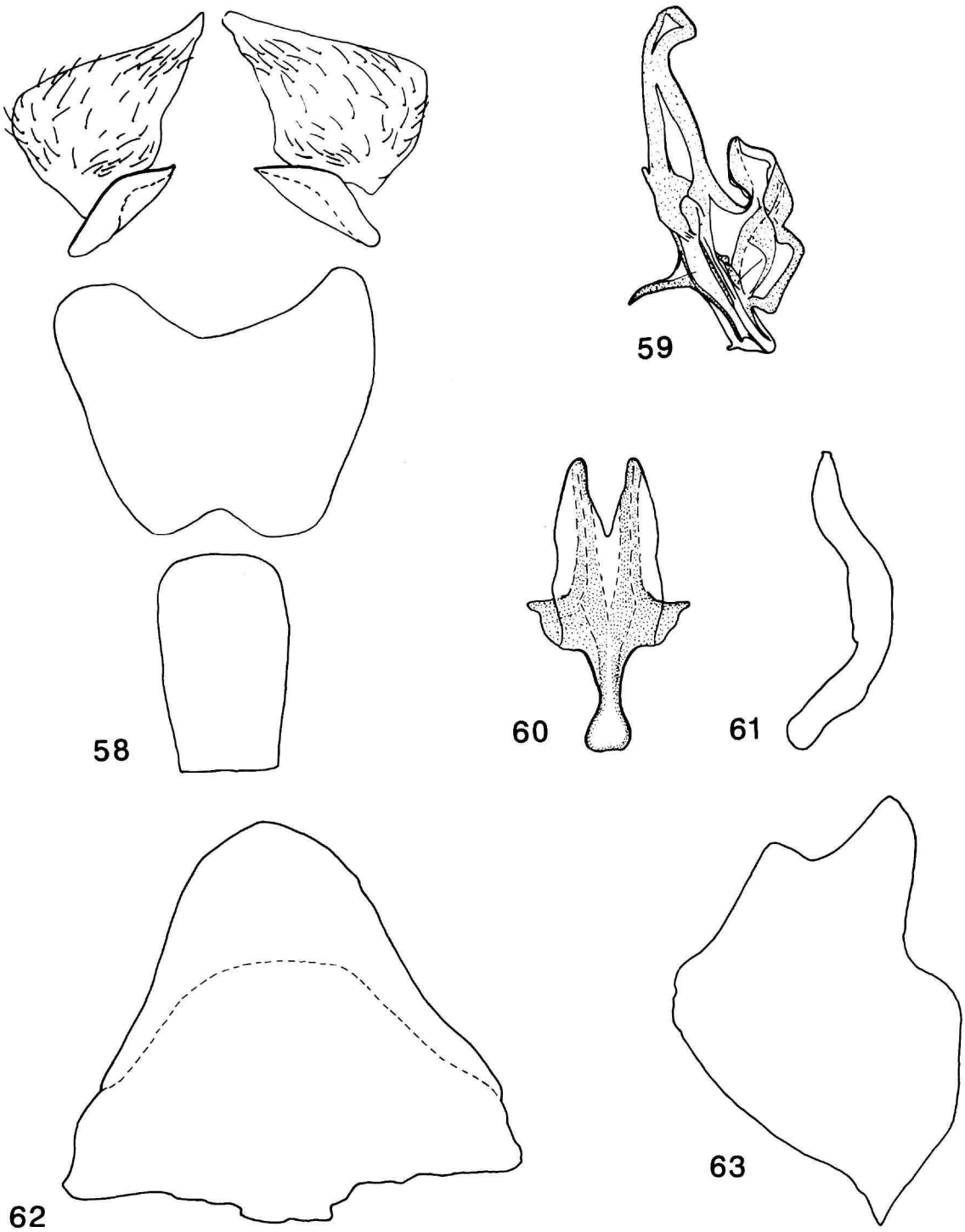
ADULT.—*Head*: Lateral facial spot small.

Thorax: Mesonotum grayish black; postpronotum brownish or yellowish; setulae near posterior spiracle weak and sparse. Legs: Midfemur posteroventrally with 5-8 spines, not extended beyond half distance to base; hindcoxa with setulae mainly restricted posterodorsally; hindfemur lacking dark preapical marks. Wing: Brownish, clouded anteroapically and slightly over crossveins r-m and dm-cu; length 5.5-6.5 mm.

Abdomen: Male terminalia: Posterior margin of sternum 4 concave, without protuberances (Figure 58); anterior plate of sternum 5 reduced to small sclerite (Figure 58); distiphallus (Figure 59) straight, short and robust, with anterodorsal spur; anterior surstylus indistinct; posterior surstyli (Figures 60, 61) in form of an elongate, slightly broadened apically, anteriorly directed rod. Female synsternum: In ventral view gradually narrowing posteriorly, with large, rounded, light (weakly sclerotized) depression at posterior half (Figure 62); in lateral view with distinct ventral depression and posterior shoulder (Figure 63).

TYPE SPECIMEN.—*Holotype* ♂: BRAZIL. Minas [Gerais], Lagoa Santa, 19 January [19]39, Martins, Lopes, Mangabeira, IOC. The holotype was kindly loaned to us by Dr. Orlando V. Ferreira. The specimen was damaged enroute: we glued the head, both wings and several leg parts to a small piece of paper beneath the pinned specimen. The postabdomen is missing. We prepared the remaining part of the abdomen. The characteristic sternum 5 allows us to identify the specimens listed below as conspecific with the holotype.

OTHER SPECIMENS EXAMINED.—BRAZIL. RIO GRANDE DO SUL: São Leopoldo, 3, 11 May 1967, Berg and Abercrombie, 1♂. SANTA CATARINA: 4 km E Corupa, 3 May 1967, Berg and Abercrombie, 4♂, 1♀. PARANÁ: Praia do Leste, 4 May 1967, Berg and Abercrombie, 2♀. 4, 17 May 1967, Berg and Abercrombie, 2♂. Rio Iguassu at Araucaria, 1♂ (laboratory reared). Rio Iguassu, S Laranjeiras, 29 April 1967, Berg and Abercrombie, 3♂, 1♀. Sapitandura, nr. Morretes, 7 November 1986, Carvalho, Knutson, and Marinon, 1♂. 6 km S Morretes, 4, 17 May 1967, Berg and Abercrombie, 21♂, 4♀. 19 km W Guarapuava, Rio Coutinho, 28 April 1967, Berg and Abercrombie, 11♂, 6♀ (field collected), 4♂, 8♀ (laboratory reared), 5 eggs. MINAS GERAIS: Serra Verde, 30 km E Belo Horizonte, 1♂ (laboratory reared). 35 km N Belo Horizonte, Lagoa Santa, 18-23 July 1964, C.O. Berg, 1♂. 17 km N Belo Horizonte, 18-23 July 1964, C.O. Berg, 3♂. Belo Horizonte, July 1964, C.O. Berg, 1♂, 1♀. Juiz de Fora, 10 June 1967, C.O. Berg, 2♀. MATO GROSSO: Pucone, Rod. Transpantaneira, km. 17, 16 February 1986, N. Papavero, 1♂. SÃO PAULO: São Paulo, Inst.



FIGURES 58-63.—*Sepedonea lagoa*: 58, male, sterna 3-5; 59, distiphallus, lateral view; 60, posterior surstyli, anterior view; 61, same, lateral view; 62, female, synsternum, ventral view; 63, same, lateral view.

Bot. Secr. Agric., 13 July 1964, Berg and Papavero, 2♂. 11-13 July 1964, Berg and Papavero, 2♀. 18 August 1964, N. Papavero, 1♂. September 1964, N. Papavero, 2♂, 1♀. Mogi das Cruzes, 11-13 July 1964, Berg and Papavero, 7♂. 15 August 1964, N. Papavero, 2♂, 1♀. Rio Claro, 14 January 1977, L. Knutson, 4♂, 2♀. Barueri, 18 July 1955, K. Lenko, 1♂. 20 July 1955, K. Lenko, 1♂. AMAZONAS: Paraná da Cigana, Parintins, November 1969, Exp. Perm. Amaz., 4♂. SURINAM. SURINAME: Paramaribo, 4 September 1943, David G. Hall, 1♂. PERU. HUANUCO: 1 km S Tingo Maria, 6 February 1984, W.N. Mathis, 2♀. COSTA RICA. San José, Farm La Caja, 20 January, H. Schmidt, 1♂. All USNM.

ADDITIONAL RECORDS FROM LITERATURE.—BRAZIL. MINAS GERAIS: Hipódromo Serra Dourada, 6 October 1974, Mello and Bredt (Mello and Bredt, 1978).

IMMATURE STAGES.—*Egg*: White. Length 1.12-1.24 mm (average = 1.17); greatest width 0.20-0.36 mm (average = 0.28). Very similar to that of *S. incipiens*, but longer. Differing also in its subglobular anterior end, in dorsal view, with small depression or notch on anterior border. (Based on 17 specimens: Rio Coutinho, 19 km west of Guarapuava, Paraná, Brazil).

First-instar Larva (Figures 102, 103, 120): White; integument transparent. Length 1.6-2.4 mm (average = 1.9); greatest width 0.3-0.4 mm (average = 0.35). Cephalopharyngeal skeleton (Figure 102) length 0.31-0.33 mm; mandible (Figure 103) 0.04-0.06 mm long; epistomal and hypopharyngeal sclerites fused to paired tentoropharyngeal sclerite; latter light brown, with very light ventral cornu, making rim of ventral window indistinct; indentation index 37-39. Segment 1 bilobed anteriorly, each lobe with a sensory papilla. Segment 2 with 1 dorsolateral and 1 lateral seta. Segments 3 and 4 each with a lateral seta, often bifid on segment 4. Segments 5-11 each with a prominent dorsolateral patch of setulae, very dense, with setulae reaching 0.2 mm in length; transverse row of shorter, less dense setulae extended across middorsal line, joining dorsolateral patches of setulae; lateral tubercle group of 3 contiguous tubercles, the middle one slightly anterior to the other 2, each with a seta; main ventral tubercle group of 4 small tubercles in a transverse row. Posterior spiracular disc (Figure 120) with 4 pairs of lobes: ventral pair conical, annulate; ventrolateral pair two-segmented, basal section broad, truncate, distal section digitiform, annulate; lateral lobes rather acute, each with a single long seta at distal end; dorsolateral lobes lacking; dorsal lobes very low, rounded; entire disc covered with long setulae. Two spiracular plates each borne on a stigmatic tube and each with a B-shaped spiracular slit and 4 irregularly branched float setulae, proportionately longer than in later instars and covering the face of the entire disc. Anal proleg small, bearing tiny spinules, no hooks. (Based on 19 specimens: Rio Coutinho, 19 km west of Guarapuava, Paraná, Brazil).

Second-instar Larva: Light brown; integument diaphanous. Length 3.3-3.8 mm (average = 3.6); greatest width 0.5-0.8 mm (average = 0.6). Cephalopharyngeal skeleton 0.53-0.55 mm long, with paired mandibles 0.09-0.11 mm in length, each with 3 mesally directed accessory teeth, dorsal tooth strongest and heaviest and others lightly sclerotized; each also with a small hole dorsad of teeth and a lobelike projection on the dorsal margin. Epistomal and hypopharyngeal sclerites fused to paired tentoropharyngeal sclerite; latter with dark center line, extended posteriorly from point of juncture with parastomal bars, with obfuscation anterodorsally; ventral cornu very light, obscuring ventral window; dorsal cornu with small hyaline areas near dorsal margin. Indentation index 31-33. Segment 1 bilobed anteriorly, each lobe with sensory papilla. Segment 2 bearing 1 anterior spiracle on each side, 1 seta dorsolaterally, 1 ventrally, and 1 laterally. Segment 3 with same seta pattern. Segment 4 with 1 seta dorsolaterally, 1 ventrally, and 2 on each side. Segments 5-11 as in first-instar larva. Posterior spiracular disc with 5 pairs of lobes: ventral pair conical, tapered; ventrolateral pair as in first-instar larva, except larger and more hirsute; dorsolateral, lateral, and dorsal lobes low, rounded protuberances; entire disc very setulose; 2 stigmatic tubes each bearing a spiracular plate, each with 3 oblong-ovoid spiracular slits, outer 2 somewhat arcuate, 1 stigmatic scar, and 4 irregularly branched, semitransparent float setulae. Anal proleg small, about size of main ventral tubercle when viewed laterally; hookless. (Based on 5 specimens: Rio Coutinho, 19 km west of Guarapuava, Paraná, Brazil).

Third-instar Larva (Figures 106, 107, 115, 118, 127, 132): Light brown; integument opaque. Length 7.3-10.7 mm (average = 9.0); greatest width 1.5-2.3 mm (average = 1.8); the largest larva of *Sepedonea* seen in this study. Cephalopharyngeal skeleton (Figure 106) 0.91-0.95 mm long. Mandible with 3 or 4 accessory teeth directed mesad; dorsal tooth darker and more heavily sclerotized but approximately equal in size to others; mandible (Figure 107) 0.17-0.18 mm in length, with small hole dorsal to teeth and with dorsal projection. Ventral arch connected posterolaterally on each side with mandibles, bearing 17-21 rounded denticles anteriorly. Hypopharyngeal sclerite (Figure 115) free from tentoropharyngeal sclerite but parastomal bars of epipharyngeal sclerite (Figure 118) connected to paired tentoropharyngeal sclerite and continued posteriorly as dark lines. Tentoropharyngeal sclerite as in second-instar larva. Indentation index 33-35. Segments 1-4 as in second-instar larva, except segment 4 with only 1 ventral seta in center. Segments 5-11 each with prominent dorsolateral patch of setulae, flanked closely by smaller, lateral patch of setulae; lateral tubercle group of same arrangement as in second-instar larva; dorsal and ventral tubercle often without a seta; middle tubercle usually bearing patch of tiny setulae; main ventral tubercle group as in second-instar larva, except outermost tubercles each bearing small, stout seta; 2 transverse rows of small, low, intrasegmental tubercles between main ventral tubercle groups. Posterior spiracular disc (Figure 127) with 5 pairs of lobes: ventral pair subconical near base, but tapered sharply distally; ventrolateral lobes as in second-instar

larva except larger and more hirsute, retaining hint of annulation on distal segment despite shagginess; lateral lobes somewhat acute; dorsolateral and dorsal lobes low, broadly rounded. Entire disc thickly clothed with setulae. Two stigmatic tubes scalloped basally, each bearing spiracular plate distally. Latter each with 3 spiracular slits, 1 stigmatic scar, and 4 irregularly branching, dark, subopaque float setulae. Anal proleg small, hookless. Anterior spiracles (Figure 132) large, conspicuous, protruding from each side of segment 2 at right angles to tracheal trunk, and bearing 8 papillae. Length 0.15–0.17 mm. (Based on 6 specimens: Rio Coutinho, 19 km west of Guarapuava, Paraná, Brazil).

Puparium (Figure 101): Black; opaque. Length 5.2–6.2 mm (average = 5.8); greatest width 1.7–2.7 mm (average = 2.1); the largest puparium of any *Sepedonea* reared in this study. Subcylindrical, elongate, with ends of cephalic caps projecting anteriorly on a line almost on and parallel with the longitudinal body axis. Anterior spiracles protruding from anterolateral corners of dorsal cephalic cap. Lateral and ventral tubercles indistinct, existing chiefly as discrepancies in the smoothness of the integument; dorsolateral patches of setulae on segments 5–11 persisting as elongate-oval black spots visible dorsally—no actual setulae on surface. Posterior end upturned 140–150 degrees from longitudinal body axis, bearing 2 separate, subshiny stigmatic tubes. Lobes of spiracular disc shrunken but ventral lobes remaining rather prominent. Anal plate marked by invagination; anal proleg lacking. (Based on 5 specimens: Rio Coutinho, 19 km west of Guarapuava, Paraná, Brazil).

REMARKS.—This is a widespread South American species that extends as far north as Costa Rica (Figure 140). It is unique among all congeners in having sternum 5 with anterior plates reduced, a straight distiphallus and an elongate median lobe of the posterior surstyli. Knutson collected *S. guianica* at Lagoa Santa, the type locality for *S. lagoa*, but did not find *S. lagoa* at that locality.

Sepedonea lindneri (Hendel)

FIGURES 1, 4, 11, 64–69, 95, 105, 112, 122, 128, 133, 142

Sepedon lindneri Hendel, 1932:99.—Steyskal, 1951:275 [key], 291 [review].
Sepedonea lindneri.—Steyskal, 1973:145 [list; designation as type species].—Knutson et al., 1976:11 [catalog].—Knutson and Valley, 1978:198 [review].

ADULT.—*Head*: Lateral facial spot small or large.

Thorax: Mesonotum usually grayish black, sometimes yellowish; postpronotum yellowish; setulae near posterior spiracle weak and sparse (Figure 4). Legs: Midfemur posteroventrally with 4–7 spines; hindcoxa with setulae restricted to mesal 1/3 to 1/2 (Figure 11); hindfemur with dark lateral and rounded dorsal preapical spots. Wing: Grayish hyaline, with indistinct clouds on crossveins r-m and dm-cu; length 4–5 mm.

Abdomen: Male terminalia: Posterior margin of sternum 4 deeply emarginate, with membrane "covering" emargination, and with pair of small, posteromesally directed protuberances (Figure 64); anterior plate of sternum 5 with fingerlike process (Figure 64); distiphallus (Figure 65) bent at right angle, with long, apically recurved ventral process; anterior surstylus short; posterior surstyli with median lobe emarginate ventrally (Figure 66), and with lateral lobe slightly curved anterad (Figure 67). Female synsternum: In ventral view emarginate posteriorly, with 2 large lateral lobes (Figure 68); in lateral view with ventral surface rather straight, posterior margin rather broadly rounded, with narrow ridge (Figure 69).

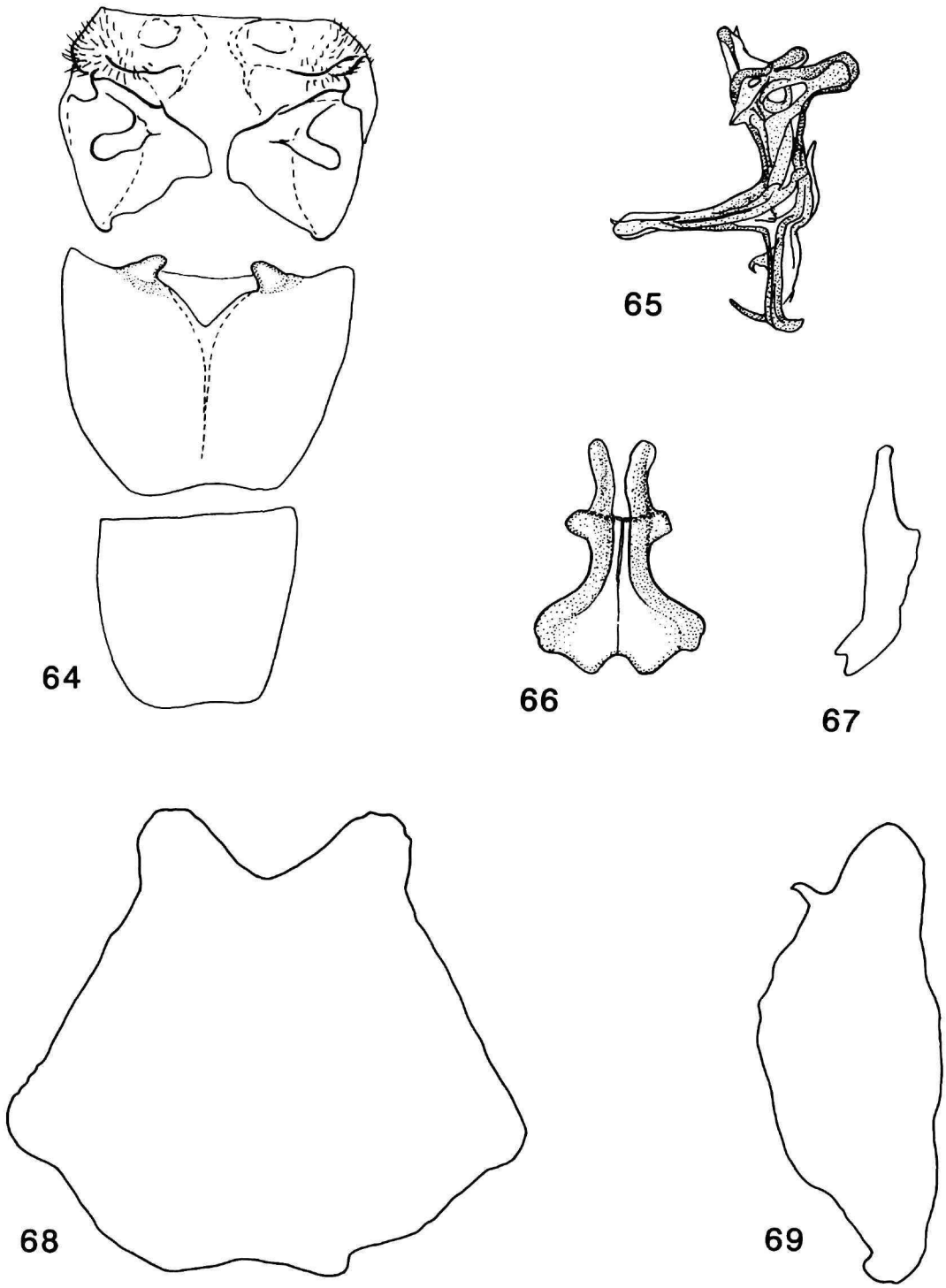
TYPE SPECIMENS.—We have studied Hendel's type material, which consists of three specimens collected during the Chaco Expedition of 1925–1926 (San José, Argentina, October 1925, Lindner, ♀; Tapikiole, Argentina, December 1925–January 1926, Lindner; and Trinidad bei Asuncion, Paraguay, August 1925, ♂), all in SMNS. The male from Trinidad bei Asuncion, which bears a label in E. Lindner's handwriting, is designated as the lectotype and the other two specimens are designated as paralectotypes.

OTHER SPECIMENS EXAMINED.—ARGENTINA. BUENOS AIRES: 28 km SW Buenos Aires, 7–8 July 1964, C.O. Berg, 5♂, 5♀ (field collected), 16♂, 11♀ (laboratory reared), 46 eggs. 7–8 December 1966, C.O. Berg, 1♂, 2♀. 15–16 April 1967, J. Abercrombie, 2♂. Tigre, 8 February 1920, Cornell Univ. Expedition, 1♀. CORRIENTES: Corrientes, 23 February 1927, R.C. Shannon, 1♀. MISIONES: Iguazu, 4–10 October 1947, R.C. and E.M. Shannon, 1♂. CHACO: Mahallé, June 1964, 1♀. Presidéncia Roque Saénz Pena, 15 September–15 November 1974, M. Graciela Arias, 5♂, 5♀. TUCUMÁN. Cuidad Universitaria, 5 February 1967, Berg and Abercrombie, 2♂. PARAGUAY. LA CORDILLERA: San Bernardino, K. Fiebrig, 1♂. BRAZIL. RIO GRANDE DO SUL: 87 km S Porto Alegre, 10 May 1967, Berg and Abercrombie, 1♂. São Leopoldo, 3, 11 May 1967, Berg and Abercrombie, 2♂, 1♀. SANTA CATARINA: 5 km W Lajes, 6 May 1967, Berg and Abercrombie, 1♂, 1♀.

ADDITIONAL RECORDS FROM LITERATURE.—ARGENTINA. LA RIOJA: "Patquila", January 1932, K.J. Hayward. "San José C. Paz", Ogloblin, 1♀ (Steyskal, 1951). Patquia, 25 February 1944, K.J. Hayward, 1♂; 25 March 1944, K.J. Hayward, 1♂. FORMOSA: Clorinda, November 1947, J. Morel, 1♂ (Steyskal, in litt.). BRAZIL. RIO GRANDE DO SUL: Morretes, Canoas, 19 December 1974, Mello and Bredt (Mello and Bredt, 1978a).

IMMATURE STAGES.—*Egg*: White. Length 0.90–1.04 mm (average = 0.97); greatest width 0.16–0.34 mm (average = 0.25). Very similar to *S. incipiens* but slightly smaller. (Based on 19 specimens: 28 km southwest of Buenos Aires, Buenos Aires, Argentina).

First-instar Larva (Figure 122): White; integument transparent. Length 1.8–2.9 mm (average = 2.2); greatest width 0.4–0.8 mm (average = 0.5). Metapneustic. Cephalopharyngeal skeleton 0.29–0.30 mm long; mandible 0.04–0.06 mm in length, with 3 component parts; epistomal and hypopharyngeal sclerites fused to paired tentoropharyngeal sclerite; latter light brown, with L-shaped obfuscation anterodorsally, and very



FIGURES 64–69.—*Sepedonea lindneri*: 64, male, sterna 3–5; 65, distiphallus, lateral view; 66, posterior surstyli, anterior view; 67, same, lateral view; 68, female, synsternum, ventral view; 69, same, lateral view.

light ventral cornu, thus obscuring ventral window. Indentation index 24–29. Segment 1 as in *S. lagoa*. Segments 2–4 each with 1 seta dorsolaterally, 1 ventrally and 1 on each side. Segments 5–11 each like those of *S. lagoa* in dorsolateral patches of setulae and ventral and lateral tubercle groups, except that only dorsal and ventral tubercles of lateral tubercle group with setae. Posterior spiracular disc (Figure 122) with 5 pairs of lobes: ventral pair long, annulate, regularly tapered; ventrolateral pair two-segmented with truncate basal portion and digitiform distal portion; lateral pair short, small, annulate, bearing seta at tip; dorsolateral pair each also with end seta and very low, rounded; dorsal pair inconspicuous, low. Setulae arranged in concentric circles on disc, considerably less setulose than disc of *S. lagoa*. Two stigmatic tubes, each with spiracular plate bearing a B-shaped spiracular slit and 4 rather large, irregularly branched, transparent float setulae. Anal plate somewhat darker in color than surrounding integument. Anal proleg anterior to anal plate; small, inconspicuous, hookless. (Based on 7 specimens: 28 km southwest of Buenos Aires, Buenos Aires, Argentina).

Second-instar Larva (Figure 105): Light brown; integument diaphanous. Length 2.7–5.8 mm (average = 3.9); greatest width 0.5–1.0 mm (average = 0.7). Cephalopharyngeal skeleton 0.43–0.49 mm long, with paired mandibles 0.08–0.11 mm in length, each with 3 or 4 mesally directed accessory teeth with the dorsal tooth strongest and heaviest; each also with small hole dorsad of teeth and with lobelike projection on dorsal margin (Figure 105). Ventral arch fused to mandibles posterolaterally on both sides. Epistomal and hypopharyngeal sclerites fused to paired tentoropharyngeal sclerite; latter light brown with darker raylike pattern extended dorsally and ventrally from black line extended posteriorly the length of the sclerite from point of juncture with parastomal bars; ventral window obscured in very light ventral cornu; dorsal cornu with small hyaline areas near dorsal margin. Indentation index 29–31. Segment 1 as that in *S. lagoa*. Segments 2 and 3 each with 1 seta dorsolaterally and 1 on each side. Segment 4 with 1 seta dorsolaterally and 2 on each side. Segments 5–11 each as in first-instar larva except that tubercles of main ventral tubercle group bearing either a single, short, stout seta or a group of such setae. Posterior spiracular disc with 5 pairs of lobes, very similar to that of *S. incipiens*; ventral pair elongate, tapered, subconical, annulate; ventrolateral pair two-segmented as in *S. incipiens*, distal portion appearing annulate; lateral, dorsolateral, and dorsal lobes very low, rounded protuberances. Entire disc moderately hirsute. Two stigmatic tubes, each with a spiracular plate bearing 3 oblong-ovoid spiracular slits, 1 stigmatic scar, and 4 darkly transparent, irregularly branched float setulae. Anal proleg inconspicuous, somewhat darker in color than surrounding integument; hookless. (Based on 15 specimens: 28 km southwest of Buenos Aires, Buenos Aires, Argentina).

Third-instar Larva (Figures 112, 128, 133): Light brown, with dark brown middorsal stripe and 2 irregular, broken dorsolateral stripes. Integument subopaque. Length 5.0–8.3 mm (average = 6.5); greatest width 1.0–1.8 mm (average = 1.3). Cephalopharyngeal skeleton 0.67–0.75 mm in length, with paired mandibles, each with 3 or 4 accessory teeth directed mesally; very similar to that of *S. incipiens*; mandible 0.13–0.15 mm long. Ventral arch (Figure 112) connected posterolaterally on each side with mandibles; bearing 19–25 small, rounded denticles. Hypopharyngeal sclerite free from tentoropharyngeal sclerite but parastomal bars of epipharyngeal sclerite connected to paired tentoropharyngeal sclerite and continued posteriorly as dark lines throughout its length. Tentoropharyngeal sclerite as in second-instar larva. Indentation index 29–30. Segments 1–3 as in *S. lagoa*, except smaller (length: 0.10–1.12 mm) and narrower anterior spiracles with only 4 or 5 papillae. Segments 4–11 each with prominent lateral tubercle group of 3 continguous tubercles, middle one lying slightly anterior to dorsal and ventral ones; latter 2 each almost always having a seta, the middle one rarely; conspicuous main ventral tubercle group of 4 tubercles lying in a transverse row, followed posteriorly by 2 rows of much smaller intrasegmental tubercles; prominent dorsolateral patch of setulae on each side flanked mesally by much smaller patch of setulae on each side of middorsal line; segment 4 with 1 dorsolateral seta. Posterior spiracular disc (Figure 128) with 5 pairs of lobes: ventral pair long, tapered; ventrolateral pair two-segmented with truncate basal portion and digitiform distal portion; lateral lobes somewhat acute; dorsolateral lobes very low, inconspicuous; dorsal lobes higher, broadly rounded. Center of disc glabrous; outer parts of disc and lobes covered with fine setulae. Two stigmatic tubes arising near center of disc, each with a spiracular plate bearing a stigmatic scar, 3 spiracular slits with openings as those in *S. lagoa*, and 4 irregularly branched, dark, subopaque float setulae. Anal proleg small, inconspicuous, hookless. (Based on 19 specimens: 28 km southwest of Buenos Aires, Buenos Aires, Argentina).

Puparium (Figure 95): Light brown, with dark brown markings. Subopaque. Length 4.5–4.7 mm (average = 4.6); greatest width 1.9–2.1 mm (average = 2.0). Barrel-shaped, with 3–5 dark brown, V-shaped markings visible dorsally and laterally on anterior half. Ends of cephalic caps slightly upturned and projecting considerably dorsal to the longitudinal body axis. Anterior spiracles protruding upward from anterolateral corners of dorsal cephalic cap. Lateral tubercles of segments 5–11 persisting as light-colored protuberances; main ventral tubercles persisting as spots of roughened integument, lighter in color than most of puparium. Posterior end sharply upturned with posterior wall practically forming a right angle with longitudinal body axis. Two stigmatic tubes projected slightly backward, forming an angle of 150–160 degrees with longitudinal body axis. Lobes of spiracular disc shrunken. Anal plate marked by slight invagination; anal proleg lacking. Very similar in size and shape to *S. incipiens*, but markedly lighter in color; *S. lindneri* has dark brown, V-shaped markings on a light

brown background and *S. incipiens* has light brown, V-shaped markings on a dark-brown-to-black background. (Based on 5 specimens: 28 km southwest of Buenos Aires, Buenos Aires, Argentina).

REMARKS.—This species has the southernmost distribution of all congeners (Figure 142). It is easily distinguished from other congeners by the T-shaped distiphallus and the distinctly emarginate female synsternum. The only other species approaching these conditions is *S. veredae*, which is allopatric. Although the terminalia of the type specimens were not dissected, the species is demonstrably distinct on the basis of external characteristics, particularly the two protuberances on sternum five of the male. Similar protuberances are known only in *S. guianica*, which is distinct from *S. lindneri* by all other external characteristics.

Sepedonea neffi, new species

FIGURES 70–75, 140

ADULT.—*Head*: Lateral facial spot rather large.

Thorax: Mesonotum grayish or greenish black; postpronotum brownish; setulae near posterior spiracle moderately dense and strong. Legs: Midfemur posteroventrally with 3–6 spines, not extended beyond half distance to base; hindcoxa posteriorly with row of setulae, decreasing in length laterally; hindfemur with dark lateral preapical marks; darker and larger on mesal surface. Wing: Usually distinctly clouded anteroapically and over crossveins r-m and dm-cu; length 5–6 mm.

Abdomen: Male terminalia: Posterior margin of sternum 4 broadly emarginate, with median lobe (Figure 70); anterior plate of sternum 5 mesally with short posterior flange and more anterior projection (Figure 70); distiphallus (Figure 71) strongly curved, with elongate, slightly curved, posteroventral process; anterior surstylus indistinct; posterior surstyli with large, triangular median lobe (Figure 72) and with small lateral lobe, gently curved anterad (Figure 73). Female synsternum: Shape in ventral view almost an equilateral triangle (Figure 74); in lateral view ventral surface sinuous; posterior margin with small ridge (Figure 75).

TYPE SPECIMENS.—*Holotype* ♂: VENEZUELA. ARAGUA: Maracay, 13 March 1971, C.O. Berg, USNM.

Allotype: BRAZIL. ESPIRITO SANTO: Baixo Guandu, October 1970, P.C. Elias, USNM.

Paratypes: same data as allotype, 1♂, USNM; 5♂, 4♀, MZUSP.

OTHER SPECIMENS EXAMINED.—None.

ADDITIONAL RECORDS FROM LITERATURE.—None.

IMMATURE STAGES.—Unknown.

ETYMOLOGY.—This species is named after S.E. Neff in recognition of his contributions to the study of Sciomyzidae.

REMARKS.—This species is known from only two localities that are about 4000 kilometers apart (Figure 140). The terminalia of specimens, especially males, from the two disjunct localities are virtually identical, however, assuring our identification of this species. We expect this species will eventually be found to occur across northern South America, between the two known localities.

Sepedonea telson (Steyskal)

FIGURES 8, 10, 76–81, 96, 98, 119, 121, 124–125, 130, 136, 142

Sepedon telson Steyskal, 1951:291.

Sepedonea telson.—Steyskal, 1973:145 [list].—Knutson et al., 1976:11 [catalog].—Knutson and Valley, 1978:189 [review].—Mello and Bredt, 1978:1459 [phenology].

ADULT.—*Head*: Lateral facial spot large.

Thorax: Mesonotum, including postpronotum, grayish black; setulae near posterior spiracle moderately strong and dense. Legs: Midfemur posteroventrally with 4–8 spines, not extended beyond half distance to base (Figure 8); hindcoxa posteriorly with setulae decreasing in size laterally; hindfemur with dark lateral and elongate dorsal preapical marks (Figure 10). Wing: With rather distinct clouds anteroapically and over crossveins r-m and dm-cu; length 4.5–6 mm.

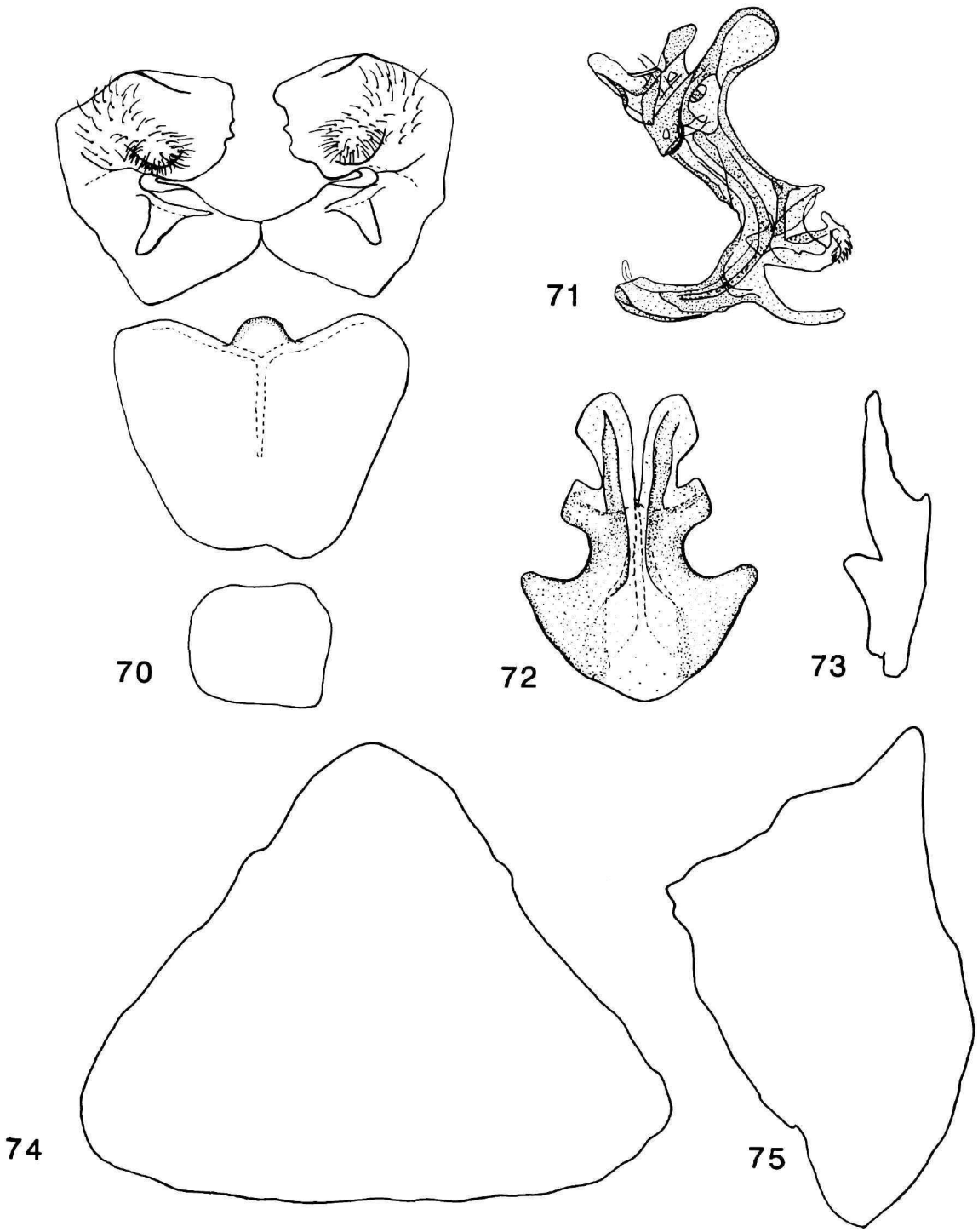
Abdomen: Male terminalia: Posterior margin of sternum 4 straight, with 1 pair of approximate posterior tubercles, subequal ventral pair at ends of median apodeme and just anterior to posterior pair, and larger ventral pair laterad of these (Figure 76); anterior plate of sternum 5 with 1 anterolaterally directed fingerlike process (Figure 76); distiphallus (Figure 77) moderately curved, with short, straight posterior process; anterior surstylus indistinct; posterior surstyli with median lobe moderately developed (Figure 78) and with large lateral lobes moderately curved anterad (Figure 79). Female synsternum: In ventral view posterior margin distinctly projecting in middle with apical 1/3 distinctly narrowed (Figure 80); in lateral view with ventral surface straight, posteroventral 1/3 attenuate, pointed, and with posterior shoulder (Figure 81).

TYPE SPECIMENS.—*Holotype* ♂: BRAZIL. MINAS GERAIS: Juiz de Fora, January 1945, H. de Souza Lopes, IOC (not examined).

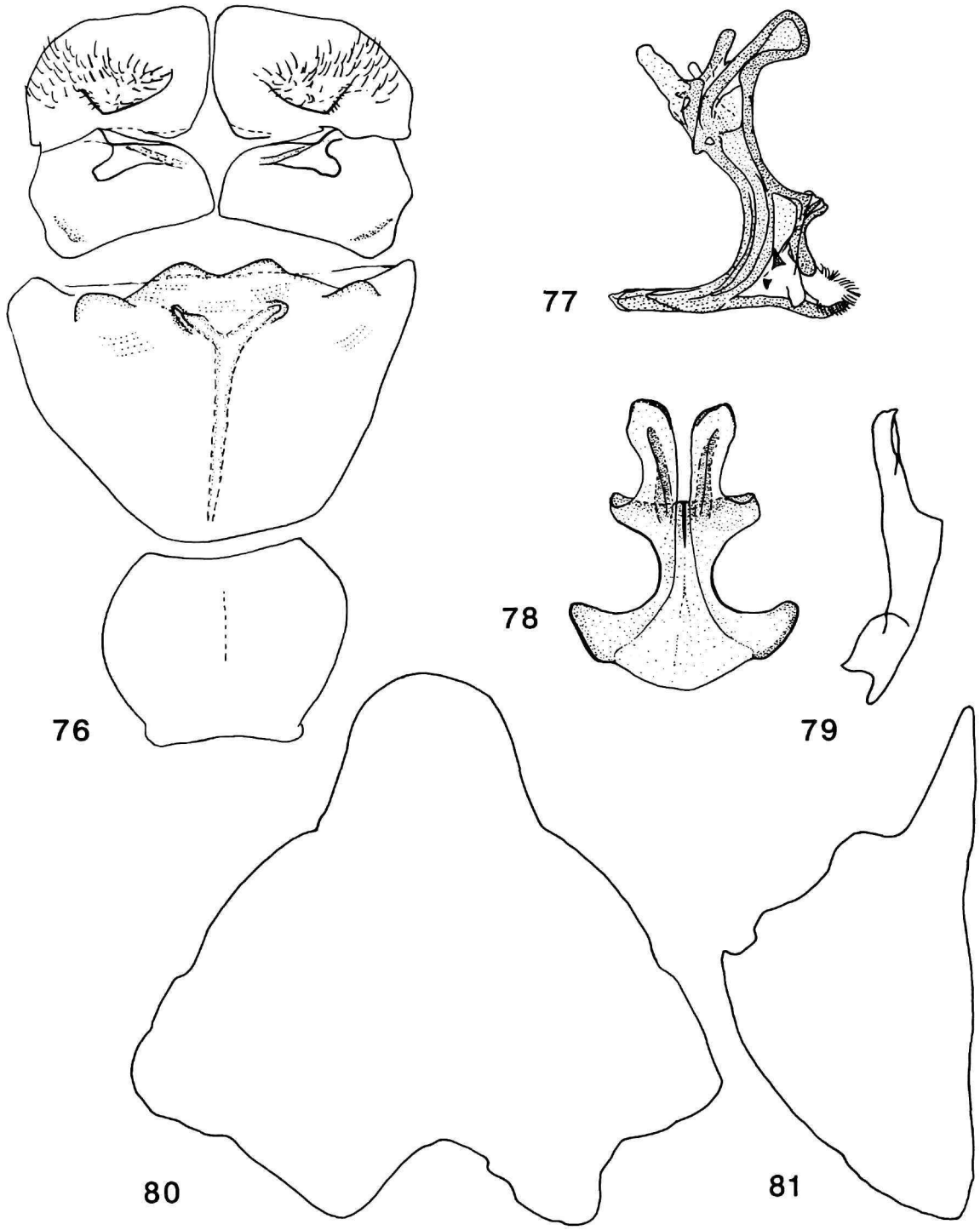
Allotype: same data, (not examined).

Paratypes: same data, 3♂ (not examined). One male paratype, same data according to Steyskal (1951), but actually labeled "Juiz De Fora, Salvatera, Lopes, Jan. 945", USNM (terminalia examined).

OTHER SPECIMENS EXAMINED.—BRAZIL. SÃO PAULO: São Paulo, 17 April 1967, C.O. Berg, 1♂, 2♀ (field collected), 1♂, 1♀ (laboratory reared). São Paulo, Inst. Bot. Secr. Agric., 11–13 July 1964, Berg and Papavero, 1♀, all in USNM. São Paulo, Inst. de Botânica, 15 August 1964, N. Papavero, 1♂, 1♀, September 1964, N. Papavero, 1♂, 2♀, all in MZUSP. São Vicente, Parque Bitaru, 29 May 1967, Berg and Abercrombie, 1♀ (field collected), 1♀ (laboratory reared). 10 km N Rio Preto, 13 January 1977, L. Knutson, 2♂, 1♀. Onda Verde, Faz São Joao, January 1946, F. Lane, 1♀. PARANÁ: Rio Iguaçu at



FIGURES 70–75.—*Sepedonea neffi*: 70, male, sterna 3–5; 71, distiphallus, lateral view; 72, posterior surstyli, anterior view; 73, same, lateral view; 74, female, synsternum, ventral view; 75, same, lateral view.



FIGURES 76–81.—*Sepedonea telson*: 76, male, sterna 3–5; 77, distiphallus, lateral view; 78, posterior surstyli, anterior view; 79, same, lateral view; 80, female, synsternum, ventral view; 81, same, lateral view.

Araucaria, 1 May 1967, Berg and Abercrombie, 1♂ (reared from field-collected larva). 6 km E Morretes, 4, 17 May 1967, Berg and Abercrombie, 2♀. SANTA CATARINA: 4 km E Corupa, 3 May 1967, Berg and Abercrombie, 16♂, 7♀ (field collected), 2♂, 5♀ (reared from field-collected larvae), 2♀ (reared from field-collected pupae), 11♂, 9♀ (laboratory reared). 5 km W Lajes, 6 May 1967, Berg and Abercrombie, 9♂, 8♀ (field collected), 2♀ (reared from field-collected larvae), 1♀ (reared from field-collected pupa). 30 km S Lajes, 12 May 1967, Berg and Abercrombie, 10♂, 4♀, all in USNM. 192 km S of Curitaba, 16 May 1967, Berg and Abercrombie, 2 pupae, CU. RIO GRANDE DO SUL: São Leopoldo, 3, 11 May 1967, Berg and Abercrombie, 17♂, 9♀, USNM.

ADDITIONAL RECORDS FROM LITERATURE.—BRAZIL. DISTRITO FEDERAL: Núcleo Bandeirantes, 11 November 1974, Mello and Bredt. Rio S. Bartolomeu-DF 13, 8 May 1974, Mello and Bredt. L 2 Norte, Brasília, 5 November 1974, Mello and Bredt. Lago do Paránoa, Brasília, 5 November 1974, Mello and Bredt. GOIÁS: Lagoa das Pedras, Formosa, 15 January 1975, Mello and Bredt. GOIÁS: Formosa, March 1975, 1♀, September 1975, 1♂, January 1976, 2♀, April 1976, 1♀, June 1976, 2♂, 2♀, Mello and Bredt (all from Mello and Bredt, 1978).

IMMATURE STAGES.—*Egg* (Figure 96): White. Length: 1.16–1.24 mm (average = 1.9); greatest width 0.32–0.44 mm (average = 0.38). Very similar to *S. incipiens*, except larger. Central area between dorsal ridges marked anteriorly with elongate depression in some specimens. Appearing in cross-section as in Figure 96. (Based on 11 specimens: 4 km east of Corupa, Santa Catarina, Brazil).

First-instar Larva (Figures 121, 124): White. Integument transparent. Length: 1.8–3.1 mm (average = 2.5); greatest width 0.3–0.6 mm (average = 0.4). Cephalopharyngeal skeleton 0.32–0.33 mm long; mandible 0.05–0.07 mm in length, with 3 component parts. Epistomal and hypopharyngeal sclerites fused to paired tentoropharyngeal sclerite; latter light brown, with very light ventral cornu, thus obscuring ventral window; obfuscation anterodorsally. Indentation index 26–33. Segment 1 bilobed anteriorly, each lobe with a sensory papilla. Segment 2 without spiracles or setae. Segment 3 with 1 very small, white seta dorsolaterally and 1 ventrally. Segment 4 with 1 seta dorsolaterally, 1 ventrally, and 2 on each side. Segments 5–11 each with a transverse dorsal row of setulae, forming long and thick patches dorsolaterally except segment 11 with short, inconspious setulae; lateral tubercle group of 3 contiguous tubercles, more or less in a vertical row, with middle and ventral ones bearing short, stout setulae; main ventral tubercle group with 4 small tubercles in a transverse row, each with short, stout setulae or longer setae. Posterior spiracular disc (Figure 124) with 5 pairs of lobes: ventral lobes conical, annulate; ventrolateral lobes two-segmented with short, truncate base and rather long, subconical, annulate distal section; lateral lobes very small, conical, annulate, each bearing long seta at tip; dorsolateral lobes very low, inconspicuous; dorsal lobes low, broadly rounded. Entire disc rather hirsute, with setulae arranged in concentric rows. Two stigmatic tubes, each with a spiracular plate (Figure 121) bearing 1 B-shaped spiracular slit and 4 darkly transparent, irregularly branched float setulae. Anal proleg small, the size of a main ventral tubercle when viewed laterally; hookless. (Based on 12 specimens: 8 from 4 km east of Corupa, Santa Catarina, and 4 from São Paulo, São Paulo, both in Brazil).

Second-instar Larva (Figure 125): Light brown, not striped. Integument diaphanous. Length 2.3–5.3 mm (average = 3.4); greatest width 0.4–1.2 mm (average = 0.7). Cephalopharyngeal skeleton 0.47–0.49 mm long, with paired mandibles 0.10–0.11 mm in length, each with 3 or 4 accessory teeth, and each with a hole in the low dorsal projection. Ventral arch fused posterolaterally on each side with mandibles; with 17–19 small, rounded, closely situated denticles; very similar in appearance to that of the third-instar larva. Epipharyngeal sclerite with parastomal bars fused to tentoropharyngeal sclerite. Hypopharyngeal sclerite fused to tentoropharyngeal sclerite; latter light brown with dark line extended posteriorly from juncture with parastomal bars; obfuscation anterodorsally; ventral window inconspicuous and indistinct; dorsal cornu with several very small hyaline areas near dorsal margin. Indentation index 28–35. Segment 1 as in first-instar larva. Segments 2–4 each with 1 seta dorsolaterally, 1 ventrally, and 1 on each side; ventral setae of segment 3 very small and difficult to see; in addition, segment 2 with an anterior spiracle on each side. Segments 5–11 each with dorsolateral patch of setulae (reduced on segment 11); lateral tubercle group of 3 conterminous tubercles, middle 1 slightly anterior to other 2; dorsal and ventral ones each bearing a seta (but dorsal one sometimes setaless); main ventral tubercle group of 4 tubercles in a transverse row, followed posteriorly by 2 rows of much smaller, less concpicuous intrasegmental tubercles. Posterior spiracular disc (Figure 125) with 5 pairs of lobes: ventral pair conical; ventrolateral pair two-segmented, with truncate basal portion and digitiform distal portion; lateral lobes rather acute; dorsolateral lobes very inconspicuous; dorsal lobes (in mature second-instar larvae) developed, broadly rounded. Disc hirsute, except for center section. Two stigmatic tubes, each with a spiracular plate with 3 small spiracular slits, 1 stigmatic scar, and 4 irregularly branched, darkly transparent float setulae. Anal proleg small, inconspicuous, hookless. (Based on 16 specimens: 4 km east of Corupa, Santa Catarina, Brazil).

Third-instar Larva (Figures 119, 130, 136): Light to dark brown, with very broad (up to 0.72 mm wide) dark brown dorsal stripe, flanked on both sides by broken, irregular light brown area and continuous, dark brown dorsolateral stripe. Integument opaque. Length 4.3–7.3 mm (average = 6.1); greatest width 1.0–2.0 mm (average = 1.5). Cephalopharyngeal skeleton 0.77–0.80 mm in length, with paired mandibles, each with 3 or 4 accessory teeth. Mandible 0.15–0.16 mm long; very similar to that of *S. lagoa* in appearance, but somewhat smaller and narrower. Ventral arch fused to mandibles as in second-

instar larva; with 23–25 denticles; very similar to that of *S. lindneri* except more deeply emarginate in median posteriorly. Epipharyngeal sclerite (Figure 119) distinct, with parastomal bars fused to tentoropharyngeal sclerite and continuing posteriorly as conspicuous dark lines throughout length of sclerite. Hypopharyngeal and labial sclerites free of other sclerites. Paired tentoropharyngeal sclerite light brown, with very light ventral cornu, thus obscuring ventral window; obfuscation anterodorsally; no hyaline areas in dorsal cornu. Indentation index 30–36. Segment 1 as in second-instar larva. Segment 2 with 1 seta dorsolaterally, 1 ventrally, and 2 on each side; bearing anterior spiracle (Figure 136) on each side 0.15–0.17 mm in length, with 5 or 6 papillae anteriorly; very similar to that of *S. lindneri* but larger. Segments 3 and 4 as in second-instar larva. Segments 5–11 each with salient dorsolateral patch of setulae; lateral tubercle group of 3 contiguous tubercles, middle 1 slightly anterior to other 2 and bearing small patch of setulae; dorsal and ventral tubercles each with single seta; ventral tubercles as in second-instar larva. Posterior spiracular disc (Figure 130) with 5 pairs of lobes: ventral pair rather long, tapered; ventrolateral pair two-segmented; basal section short, truncate; distal section digitiform; lateral lobes rather acute; dorsolateral and dorsal lobes small, broadly rounded. Center of disc glabrous; outer parts of disc and lobes covered with setulae. Stigmatic tubes dark, scalloped basally as in other *Sepedonea*. Two spiracular plates, 1 on each stigmatic tube, darkly sclerotized, each bearing 3 spiracular slits, 1 stigmatic scar with radial pattern, and 4 dark, semitransparent, irregularly branched float setulae. Anal proleg small, hookless. (Based on 6 specimens: 4 km east of Corupa, Santa Catarina, Brazil).

Puparium (Figure 98): Dark brown; opaque. Length 4.9–6.2 mm (average = 5.4); greatest width 2.1–2.7 mm (average = 2.3). Barrel-shaped, with ends of cephalic caps projecting anteriorly slightly dorsal to the longitudinal body axis and parallel to it; anterior spiracles protruding at right angles (when viewed dorsally) from anterolateral corners of dorsal cephalic cap. Lateral and ventral tubercles persisting as light areas. Dorsolateral patches of setulae discernable as fine white lines when viewed dorsally. From 3 to 4 very faint V-shaped markings visible dorsally and dorsolaterally on anterior segments; more prominent in alcoholic specimens. Posterior end upturned, forming angle of 120–130 degrees with the longitudinal body axis. Lobes of spiracular disc shrunken. Two stigmatic tubes separate, each bearing spiracular plates with 3 spiracular slits and 4 float setulae. Anal plate invaginated. Anal proleg lacking. Distinguished from *S. guianica* and *S. trichotypa* chiefly by its very dark color and light, very faint markings. (Based on 7 specimens: 6 from 4 km east of Corupa and 1 from 192 km south of Curitiba, both in Santa Catarina, Brazil).

REMARKS.—This species is widely found in the southern half of Brazil (Figure 142). The terminalia are generally similar to those of *S. guianica* but differ in details. The male sternum 4 and some other external characters, such as leg coloration and setation, are also different.

Sepedonea trichotypa, new species

FIGURES 3, 12, 82–87, 99, 111, 114, 131, 137, 143

ADULT.—*Head*: Lateral facial spot black.

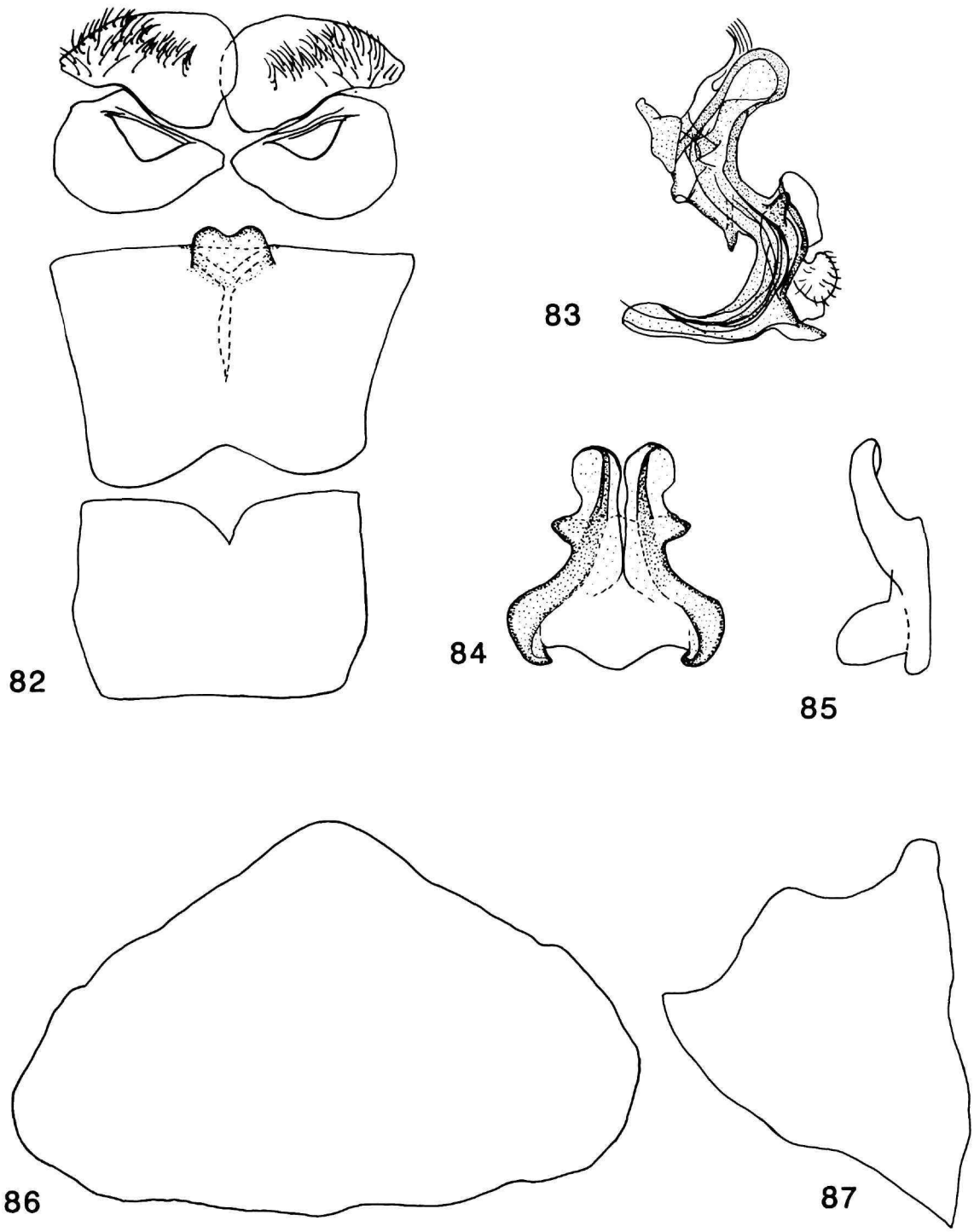
Thorax: Mesonotum, including postpronotum, yellowish; setulae near posterior spiracle dense and strong (Figure 3). Legs: Midfemur posteroventrally with 3–8 spines not extended beyond half distance to base; hindcoxa posteriorly with row of setulae, mostly longer than setulae on dorsum of abdomen, most ventrad setulae longest (Figure 12); hindfemur usually with red dorsal and lateral preapical marks. Wing: Grayish yellow, with crossveins r-m and dm-cu slightly clouded; length 4–6 mm.

Abdomen: Male terminalia: Posterior margin of sternum 4 straight, with short, truncate median lobe that is slightly bifid at apex (Figure 82); anterior plate of sternum 5 with anteriorly directed, triangular flange (Figure 82); distiphallus (Figure 83) strongly curved, with ventral spur; anterior surstylus indistinct; posterior surstyli with lateral lobe larger than median lobe (Figure 84), strongly curved anterad (Figure 85). Female synsternum: In ventral view relatively short and broad, strongly tapered posteriorly (Figure 86); in lateral view ventral surface sinuous; and posterior margin with ridge (Figure 87).

TYPE SPECIMENS.—*Holotype* ♂: BRAZIL. PARANÁ: Rio Iguassu at Araucaria, 1 May 1967, Berg and Abercrombie, USNM.

Allotype: same data as holotype, ♀, USNM.

Paratypes: same data as holotype, 83♂, 32♀ (field collected), 2♂, 1♀ (laboratory reared), 17 eggs. 61 km S Curitiba, Rio Varzea, 16 May 1967, Berg and Abercrombie, 13♂, 3♀. 8 km E Imbituva, 30 April 1967, Berg and Abercrombie, 4♂. 19 km W Guarapuava, Rio Coutinho, 28 April 1967, Berg and Abercrombie, 1♂. 6 km W Guarapuava, 28 April 1967, Berg and Abercrombie, 1♂. Morretes (Canoas)?, 22 December 1974, V.P. Daniel, 1♂. MINAS GERAIS: 17 km N Belo Horizonte, 18–23 July 1964, C.O. Berg, 1♀. SÃO PAULO: São Paulo, 26 May 1967, J. Abercrombie, 1♀ (reared from field-collected larva). 7 June 1967, J. Abercrombie, 1♂, 1♀ (reared from field-collected pupae). São Paulo, Inst. de Botânica, September 1964, N. Papavero, 8♂, 8♀. São Paulo, Parque D. Pedro II, 11 July 1964, Berg and Papavero, 3♂. Mogi das Cruzes, 15 August 1964, N. Papavero, 1♀. SANTA CATARINA: 5 km W Lajes, 6 May 1967, Berg and Abercrombie, 2♂. 30 km S Lajes, 12 May 1967, Berg and Abercrombie, 6♂. 71 km N Lajes, 6 May 1967, J. Abercrombie, 1♂. 50 km SW Concordia, 14 May 1967, Berg and Abercrombie, 1♀. 192 km S Curitiba, 16 May 1967, Berg and Abercrombie, 4♂, 1♀, and 1♂, 1♀ (reared from field-collected pupae). RIO GRANDE DO SUL: Rio Pelotas Valley, 10 May 1967, Berg and Abercrombie, 2♂. 87 km S Porto Alegre, 10 May 1967, Berg



FIGURES 82–87.—*Sepedonea trichotypa*: 82, male, sterna 3–5; 83, distiphallus, lateral view; 84, posterior surstyli, anterior view; 85, same, lateral view; 86, female, synsternum, ventral view; 87, same, lateral view.

and Abercrombie, 13♂, 5♀, 11 eggs. 19 km S Camaqua, 9 May 1967, Berg and Abercrombie, 8♂, 9♀ (field collected), 4♂, 2♀ (laboratory reared), 2♀ (reared from field-collected larvae), 7♂, 2♀ (reared from field-collected pupae), 23 eggs. São Leopoldo, 3, 11 May 1967, Berg and Abercrombie, 4♀. ARGENTINA. BUENOS AIRES: 28 km SW Buenos Aires, 15-16 April 1967, J. Abercrombie, 15♂, 9♀ (field collected), 1♂, 3♀ (laboratory reared), 1♂, 1♀ (reared from field-collected larvae), 2♂ (reared from field-collected pupae),. Ao. Carnaval, Villa Elisa, 26 November 1979, C.M. and O.S. Flint, Jr., 1♂.

OTHER SPECIMENS EXAMINED.—None.

ADDITIONAL RECORDS FROM LITERATURE.—None.

ETYMOLOGY.—This species is named after its setulose posterior spiracle.

IMMATURE STAGES.—*Egg*: White. Length 0.90-1.06 mm (average = 1.01); greatest width 0.22-0.34 mm (average = 0.27). Elongate-ovoid, tapered at both ends. Similar to *S. incipiens* in ridging, reticulation, and globose ends. (Based on 12 specimens: 19 km south of Camagua, Rio Grande do Sul, Brazil).

First-instar Larva: White. Integument transparent. Length 1.2-2.3 mm (average = 1.7); greatest width 0.3-0.4 mm (average = 0.35). Cephalopharyngeal skeleton length 0.30-0.32 mm. Mandible composed of 3 separate sclerites; 0.05-0.07 mm long. Epistomal and hypopharyngeal sclerites fused to paired tentoropharyngeal sclerite; latter light brown in color with vague L-shaped obfuscation anterodorsally. Indentation index 38-40. Segment 1 bilobed anteriorly, each lobe with sensory papilla. Segments 2 and 4 each with 2 lateral setae. Segment 3 as in *S. lagoa*. Segments 5-11 each with prominent dorsolateral patch of setulae, with setulae somewhat shorter than in other species of *Sepedonea*: lateral tubercle group of 3 contiguous tubercles, middle one slightly anterior to dorsal and ventral ones; latter 2 each usually bearing a seta; main ventral tubercle group of 4 quite small tubercles in transverse row; intrasegmental tubercles even smaller. Posterior spiracular disc with 5 pairs of lobes: ventral pair subconical, annulate; ventrolateral pair two-segmented as in other *Sepedonea*, with distal part annulate; lateral pair small, subtriangular, each bearing solitary seta at tip; dorsolateral and dorsal pairs very low, inconspicuous, broadly rounded. Entire disc quite hirsute and very similar to those of *S. lindneri* and *S. telson*. Two stigmatic tubes separate, each with spiracular plate bearing a B-shaped spiracular slit and 4 irregularly branched, transparent float setulae each with glandular pore at its base. Anal proleg small, inconspicuous, hookless. (Based on 15 specimens: Araucaria, Paraná, Brazil).

Second-instar Larva: Light brown; integument diaphanous. Length 3.4-5.0 mm (average = 4.2); greatest width 0.8-1.3 mm (average = 1.0). Cephalopharyngeal skeleton 0.52-0.54 mm long, with paired mandibles 0.09-0.11 mm in length, each with 3 accessory teeth directed mesally; very similar to that of *S. lindneri*. Indentation index 39-41. Segment 1 bilobed anteriorly, each lobe with sensory papilla. Segments 2-4 with setae as in *S. lagoa*. Segment 2 bearing 2 anterior spiracles 0.06-0.08 mm in length, each with 3 small papillae at anterior end. Segments 5-11 each with dorsolateral patch of setulae composed of fine, light-colored setulae; lateral tubercle group as in other species of *Sepedonea* except each bearing 1 seta; main ventral tubercle group of 4 tubercles in transverse row, many with short, stout setae, frequently borne in groups; intrasegmental tubercles smaller, also with setae. Posterior spiracular disc with 5 pairs of lobes; very similar to that of *S. telson*. Stigmatic tubes, spiracular plates, spiracular slits, and float setulae very similar to those of *S. telson*. Anal proleg as in first-instar larva. (Based on 5 specimens: 4 from 87 km south of Porto Alegre, Rio Grande do Sul, and 1 from Araucaria, Paraná, both in Brazil).

Third-instar Larva (Figures 111, 114, 131, 137): Light brown, with dark brown middorsal stripe, narrower than in *S. telson*; also, dark brown dorsolateral V-shaped markings anteriorly but not posteriorly; irregular dark brown lateral stripe extended length of body; integument opaque. Length 6.2-8.3 mm (average = 7.1); greatest width 1.5-2.3 mm (average = 1.9). Cephalopharyngeal skeleton 0.83-0.84 mm long, with paired mandibles, each with 4 accessory teeth; mandible 0.15-0.16 mm in length, very similar to that of other *Sepedonea*. Ventral arch (Figure 111) fused posterolaterally to mandibles, with 21-23 rounded denticles anteriorly. Epipharyngeal sclerite similar to *S. telson*, with parastomal bars connected to paired tentoropharyngeal sclerite. Hypopharyngeal sclerite (Figure 114) roughly H-shaped, narrow, free from tentoropharyngeal sclerite. Labial sclerite (Figure 114) heavily sclerotized, resting between anterior arms of hypopharyngeal sclerite. tentoropharyngeal sclerite with small clear areas near dorsal margin of dorsal cornu; ventral window indistinct in light, ventral cornu. Indentation index 30-32. Segment 1 as in second-instar larva. Segment 2 bearing on each side an anterior spiracle (Figure 137) 0.07-0.09 mm long with 5-8 papillae. Segment 3 bearing 1 dorsolateral seta and 1 ventral seta, differing from other *Sepedonea* in lacking lateral seta. Segment 4 with setae as in *S. lindneri*. Segments 5-11 each with dorsolateral patch of setulae, less prominent than in other species of *Sepedonea*; lateral tubercle group of 3 contiguous tubercles, more or less in vertical row but with middle one slightly anterior to other 2 and bearing small patch of short setulae; other 2 each bearing a seta; ventral tubercles as in second-instar larva. Posterior spiracular disc with 5 pairs of lobes: ventral pair subconical; ventrolateral pair two-segmented, basal section truncate and distal section digitiform; lateral, dorsolateral, and dorsal lobes low, broadly rounded. Disc moderately hirsute, with glabrous area in center. Stigmatic tubes (Figure 131) separate, scalloped at base as in other *Sepedonea*. Spiracular plate (Figure 131) with 3 spiracular slits, a stigmatic scar, and 4 large, semitransparent, irregularly branched float setulae, each with glandular pore at base. Anal

proleg as in second-instar larva. (Based on 5 specimens: Araucaria, Paraná, Brazil).

Puparium (Figure 99): Light to dark brown. Variable in color pattern, but always marked by 2 prominent dorsolateral V-shaped marks near anterior end; light areas usually well separated but sometimes with borders merging; these marks much more prominent than in other species of *Sepedonea* with dorsolateral markings; integument opaque. Length 4.5–5.7 mm (average = 5.1); greatest width 2.2–2.6 mm (average = 2.3). Barrel-shaped, with ends of cephalic caps projecting anteriorly dorsal to the longitudinal body axis and parallel to it. Anterior spiracles protruding from anterolateral corners of dorsal cephalic cap. Lateral and main ventral tubercles usually appearing as very distinct, conspicuous light brown spots, with all 3 lateral and all 4 ventral tubercles clearly apparent; spots sometimes obscured by large, light brown splotches laterally and ventrally. Color pattern dull or absent on dried specimens. Posterior segments sharply upturned; stigmatic tubes forming an angle of 130–140 degrees with longitudinal body axis. Lobes of posterior disc shrunken. Float setulae large and prominent. Anal plate invaginated. Anal proleg lacking. (Based on 5 specimens: 3 from Araucaria, Paraná; 1 from 87 km south of Porto Alegre, Rio Grande do Sul; and 1 from 19 km south of Camaqua, Rio Grande do Sul; all in Brazil).

REMARKS.—This species and *S. veredae* are the only species of *Sepedonea* that consistently have a yellowish mesonotum (in *S. lindneri* it is occasionally yellowish). The two species can easily be separated by details of the male and female terminalia. Distinguishing between them is facilitated by their allopatric distribution (Figure 143).

Sepedonea veredae, new species

FIGURES 17–19, 88–93, 143

ADULT.—*Head*: Lateral facial spot small.

Thorax: Mesonotum yellowish to grayish-brownish yellow; setulae near posterior spiracle weak, moderately dense. Legs: Midfemur posteroventrally with 7–10 spines, not extended beyond half distance to base; hindcoxa posteriorly with row of setulae, longest setulae restricted mesally; hindfemur without dark preapical marks. Wing: Grayish hyaline, not clouded; length 5–6.5 mm.

Abdomen: Male terminalia: Posterior margin of sternum 4 gently concave without protuberances (Figure 88); anterior plate of sternum 5 with anteriorly curved, narrow projection (Figure 88); distiphallus (Figure 89) slightly curved, with posteroventral projection; anterior surstylus indistinct; posterior surstyli lacking median lobe, straight mesoventrally (Figure 90), and with lateral lobe strongly curved anterad (Figure 91). Female abdomen as in Figures 17–19. Female synsternum: In ventral view gently concave posteriorly (Figure 92); in lateral view with ventral surface broadly convex; posterior margin with ridge (Figure 93).

TYPE SPECIMENS.—*Holotype* ♂: BRAZIL. BAHIA: between Capim Grosso and Graviao, August 1974, N. Papavero, MZUSP.

Allotype: same data as holotype, ♀, USNM.

Paratypes: ESPIRITO SANTO: Baixo Guandu, October 1970, P.C. Elias, 2♀, USNM.

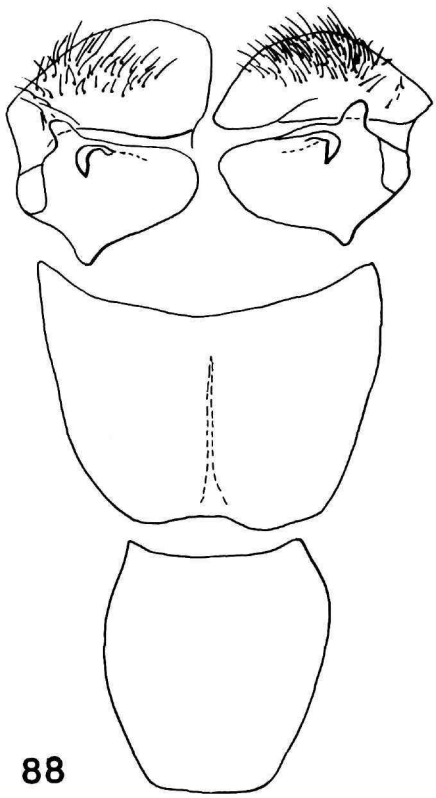
OTHER SPECIMENS EXAMINED.—BRAZIL. ESPIRITO SANTO: Baixo Guandu, October 1970, P.C. Elias, 21♂, 21♀. PERNAMBUCO: Faz Boi Hanso, Sanharo, July 1974, N. Papavero, 1♂, 1♀. SERGIPE: São Cristovao, A. Bredt, 1♀. Aracaju, A. Bredt, 2♂. MATO GROSSO: S. Luiz de Caceres, November 1955, M. Alvarenga, 1♂. Two specimens reared in laboratory: 1♂ emerged 16 September 1975, 1♀ emerged 6 October 1975, no further data available.

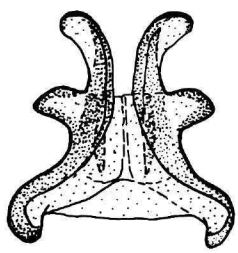
ADDITIONAL RECORDS FROM LITERATURE.—None.

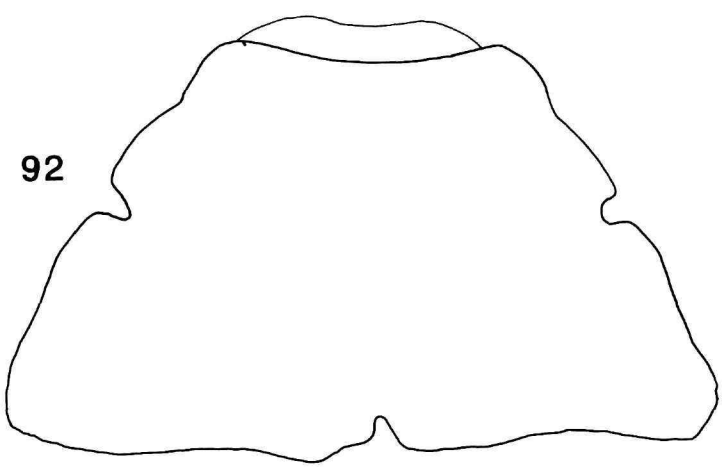
IMMATURE STAGES.—Unknown.

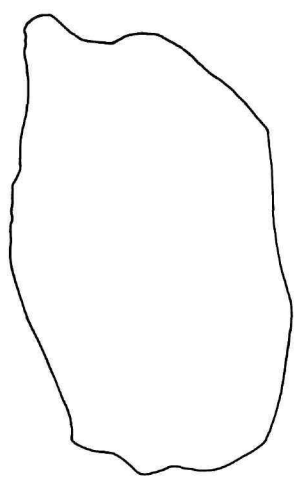
ETYMOLOGY.—This species is named after Vered Freidberg, the elder daughter of the senior author.

REMARKS.—See remarks under *S. trichotypa*.









FIGURES 88–93.—*Sepedonea veredae*: 88, male, sterna 3–5; 89, distiphallus, lateral view; 90, posterior surstyli, anterior view; 91, same, lateral view; 92, female, synsternum, ventral view; 93, same, lateral view.

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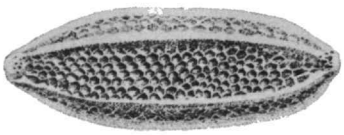

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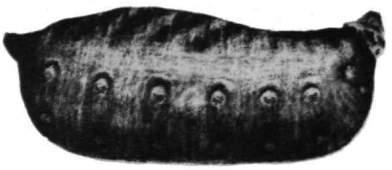

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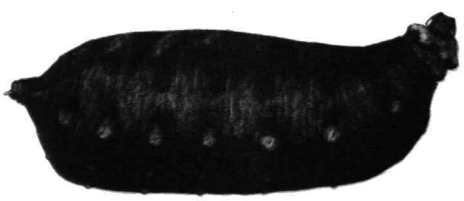

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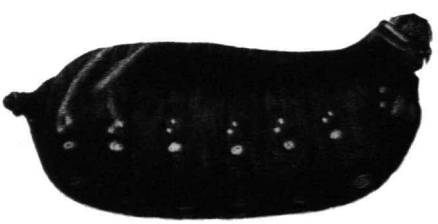

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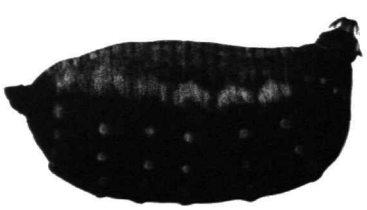

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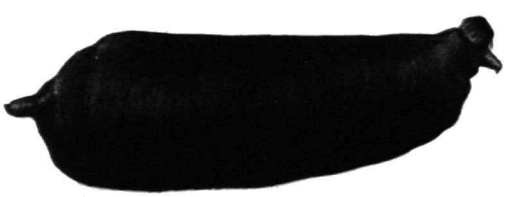

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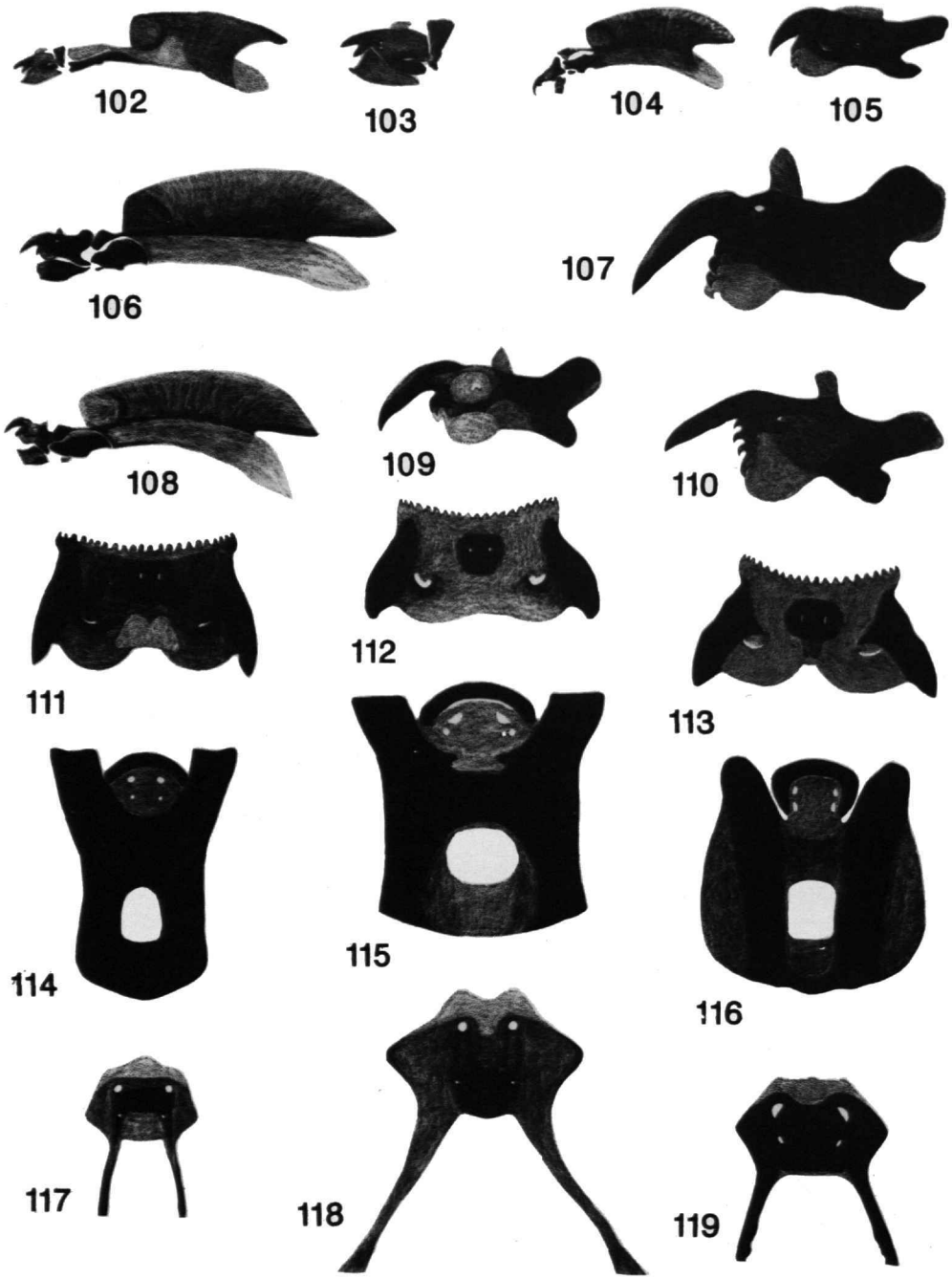
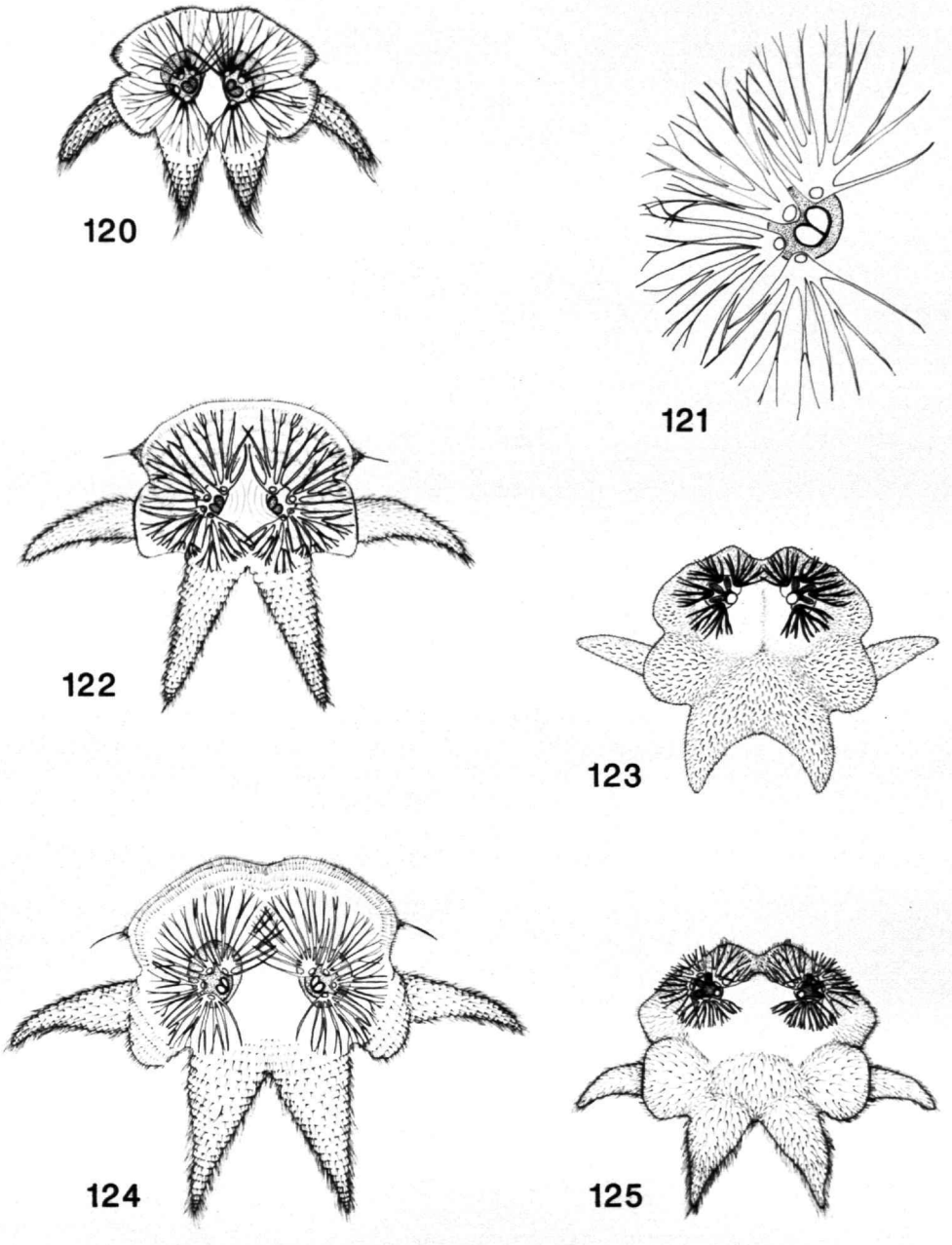
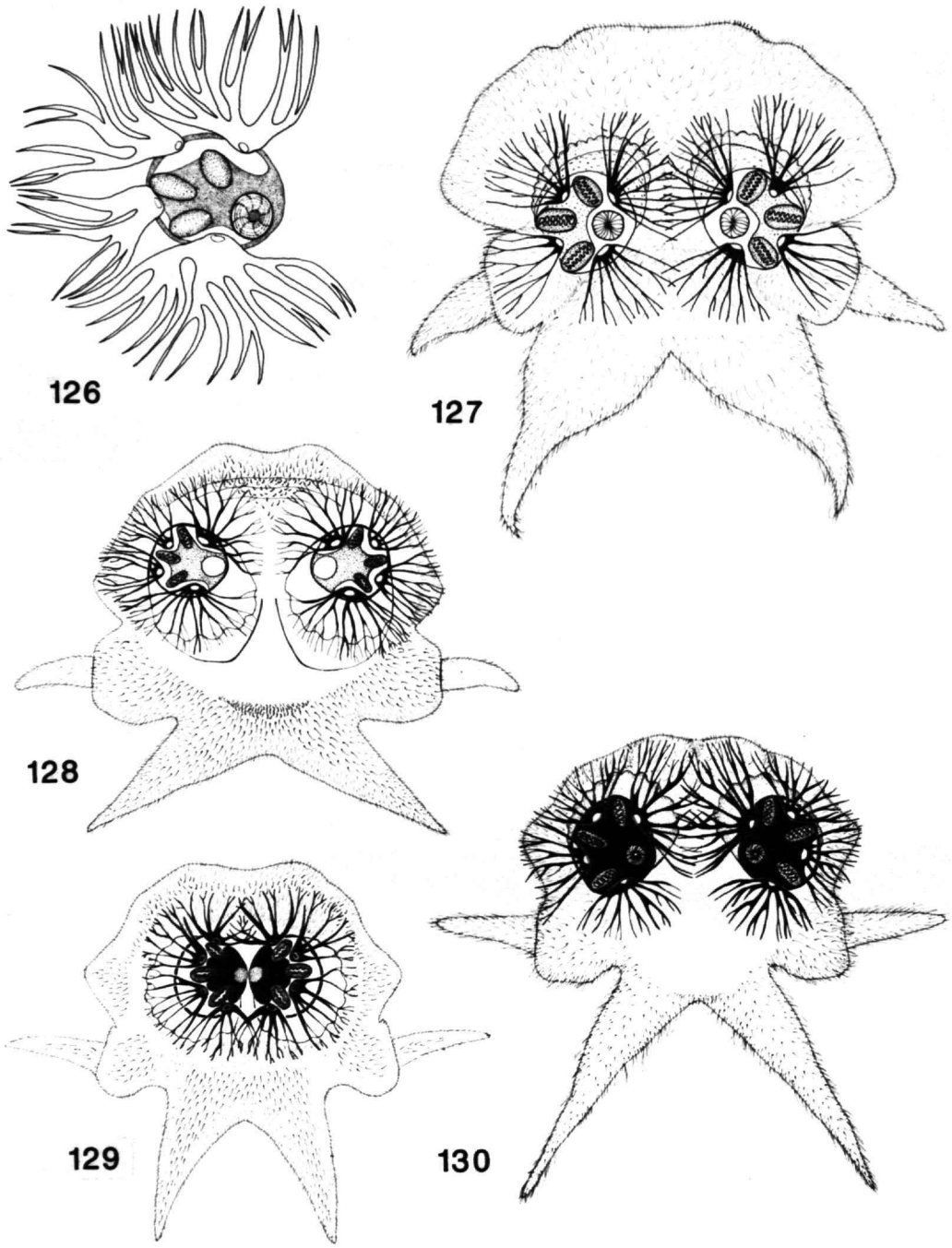
FIGURES 94–101.—*Sepedonea* spp., immature stages: 94, *S. incipiens*, egg, dorsal view; 95, *S. lindneri*, puparium, lateral view; 96, *S. telson*, egg, diagrammatic cross-section; 97, *S. guianica*, puparium, lateral view; 98, *S. telson*, puparium, lateral view; 99, *S. trichotypa*, puparium, lateral view; 100, *S. incipiens*, puparium, lateral view; 101, *S. lagoa*, puparium, lateral view.



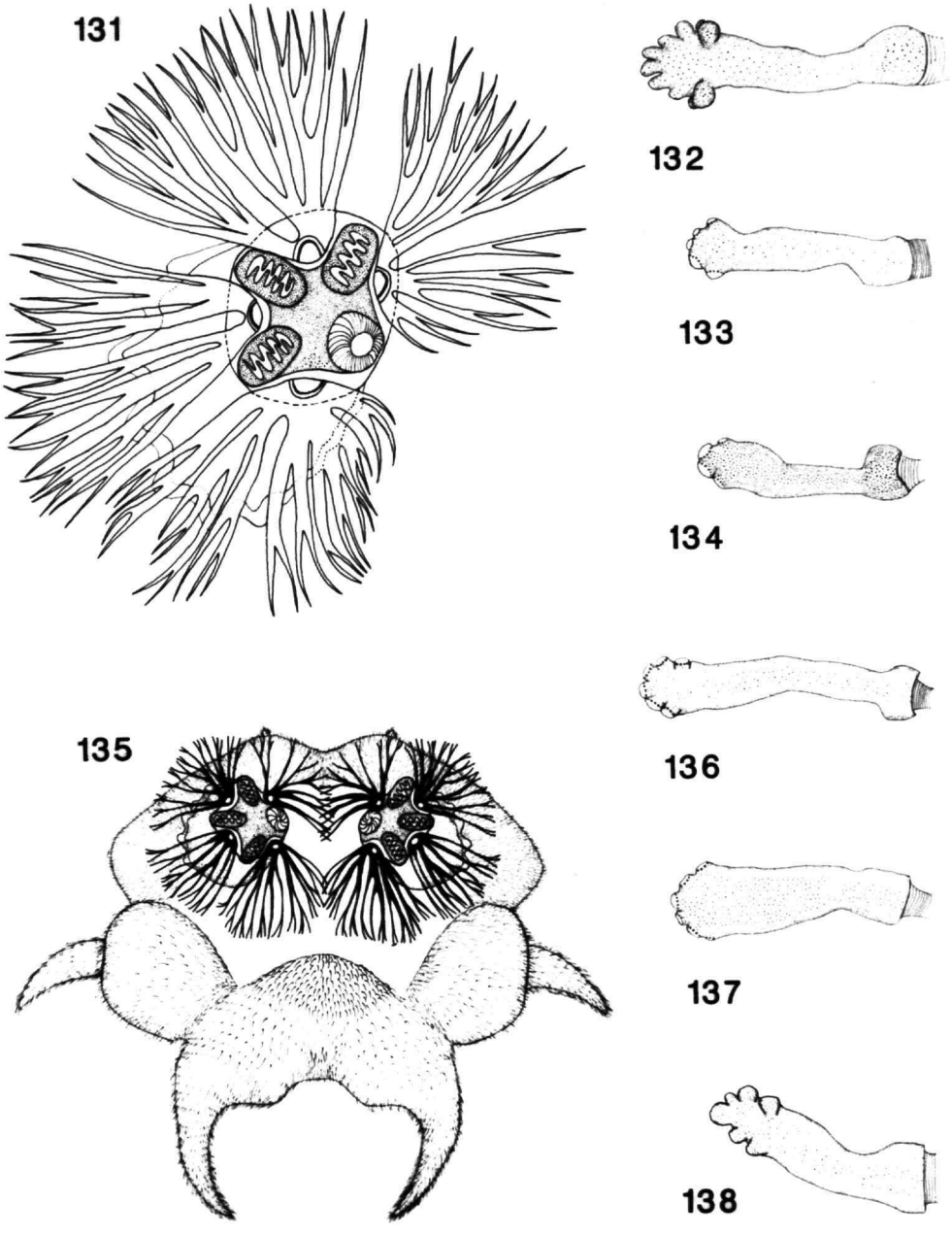
FIGURES 102–119.—*Sepedonea* spp., immature stages: 102–103, *S. lagoa*, first-instar larva: 102, cephalopharyngeal skeleton, lateral view; 103, mandible and ventral arch, lateral view; 104, *S. incipiens*, second-instar larva, cephalopharyngeal skeleton, lateral view; 105, *S. lindneri*, second-instar larva, mandible, mesal view; 106–107: *S. lagoa*, third-instar larva: 106, cephalopharyngeal skeleton, lateral view; 107, mandible, mesal view; 108–109: *S. incipiens*, third-instar larva, 108, cephalopharyngeal skeleton, lateral view; 109, mandible, mesal view; 110, *S. guianica*, third-instar larva, mandible, mesal view; 111, *S. trichotypa*, third-instar larva, ventral arch, ventral view; 112, *S. lindneri*, third-instar larva, ventral arch, ventral view; 113, *S. guianica*, third-instar larva, ventral arch, ventral view; 114, *S. trichotypa*, third-instar larva hypopharyngeal and labial sclerites, ventral view; 115, *S. lagoa*, third-instar larva, hypopharyngeal and labial sclerites, ventral view; 116, *S. guianica*, third-instar larva, hypopharyngeal and labial sclerites, ventral view; 117, *S. incipiens*, third-instar larva, epipharyngeal sclerite, dorsal view; 118, *S. lagoa*, third-instar larva, epipharyngeal sclerite, dorsal view; 119, *S. telson*, third-instar larva, epipharyngeal sclerite, dorsal view.



FIGURES 120–125.—*Sepedonea* spp., immature stages: 120, *S. lagoa*, first-instar larva, posterior spiracular disc, caudal view; 121, *S. telson*, first-instar larva, left posterior spiracular plate, caudal view; 122, *S. lindneri*, first-instar larva, posterior spiracular disc, caudal view; 123, *S. incipiens*, second-instar larva, posterior spiracular disc, caudal view; 124, *S. telson*, first-instar larva, posterior spiracular disc, caudal view; 125, *S. telson*, second-instar larva, posterior spiracular disc, caudal view.



FIGURES 126–130.—*Sepedonea* spp., immature stages: 126, *S. guianica*, second-instar larva, left posterior spiracular plate, caudal view; 127, *S. lagoa*, third-instar larva, posterior spiracular disc, caudal view; 128, *S. lindneri*, third-instar larva, posterior spiracular disc, caudal view; 129, *S. incipiens*, third-instar larva, posterior spiracular disc, caudal view; 130, *S. telson*, third-instar larva, posterior spiracular disc, caudal view.



FIGURES 131–138.—*Sepedonea* spp., immature stages: 131, *S. trichotypa*, third-instar larva, left posterior spiracular plate, caudal view; 132, *S. lagoa*, third-instar larva, anterior spiracle, lateral view; 133, *S. lindneri*, third instar larva, anterior spiracle, lateral view; 134, *S. incipiens*, third-instar larva, anterior spiracle, lateral view; 135, *S. guianica*, third-instar larva, posterior spiracular disc, caudal view; 136, *S. telson*, third-instar larva, anterior spiracle, lateral view; 137, *S. trichotypa*, third-instar larva, anterior spiracle, lateral view; 138, *S. guianica*, third-instar larva, anterior spiracle, lateral view.

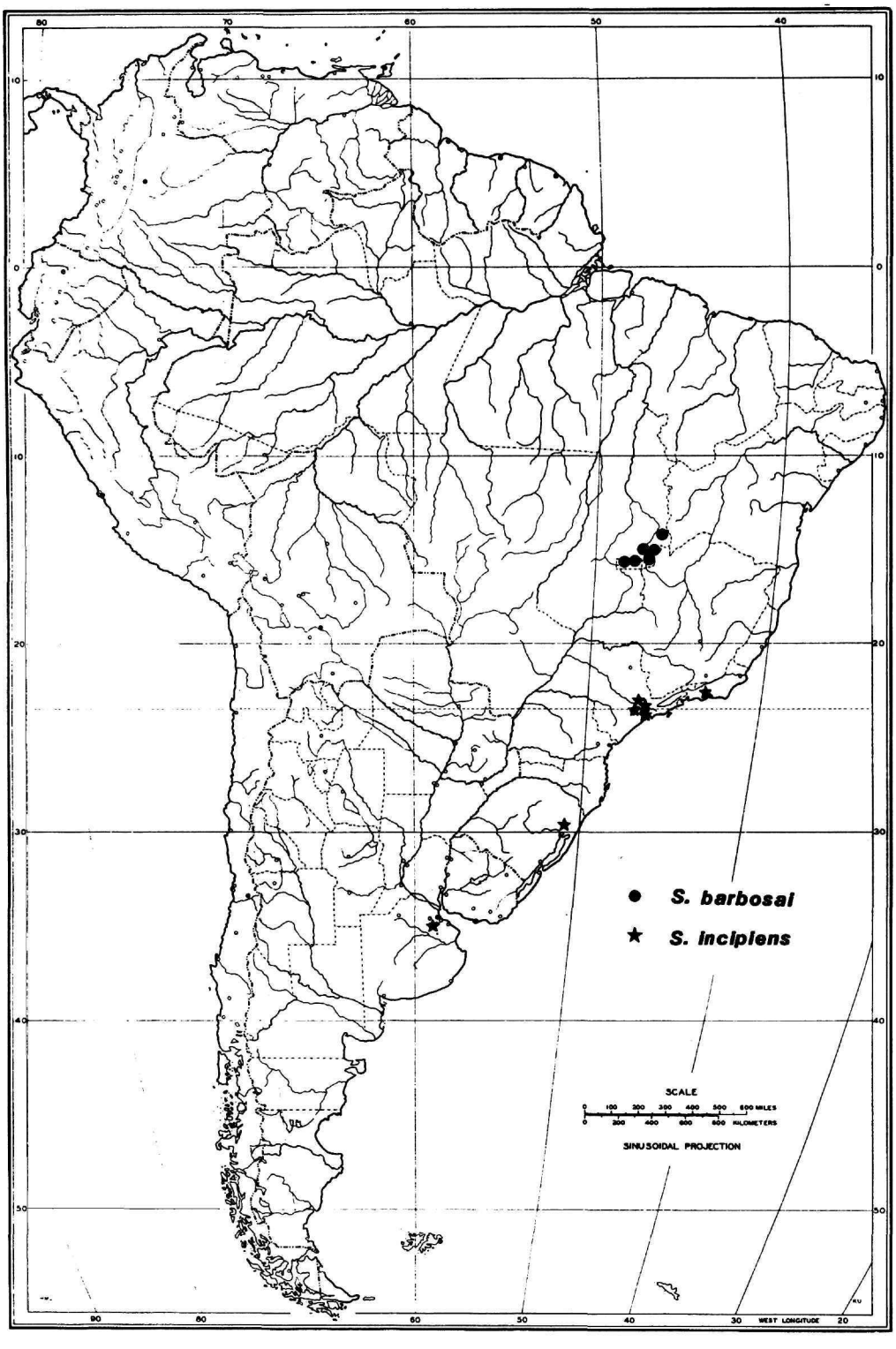


FIGURE 139.—Distribution map of *Sepedonea barbosai* and *S. incipiens*.

FIGURE 140.—Distribution map of *Sepedonea canabravana*, *S. guatemalana*, *S. lagoa*, and *S. neffi*.

FIGURE 141.—Distribution map of *Sepedonea guianica*.

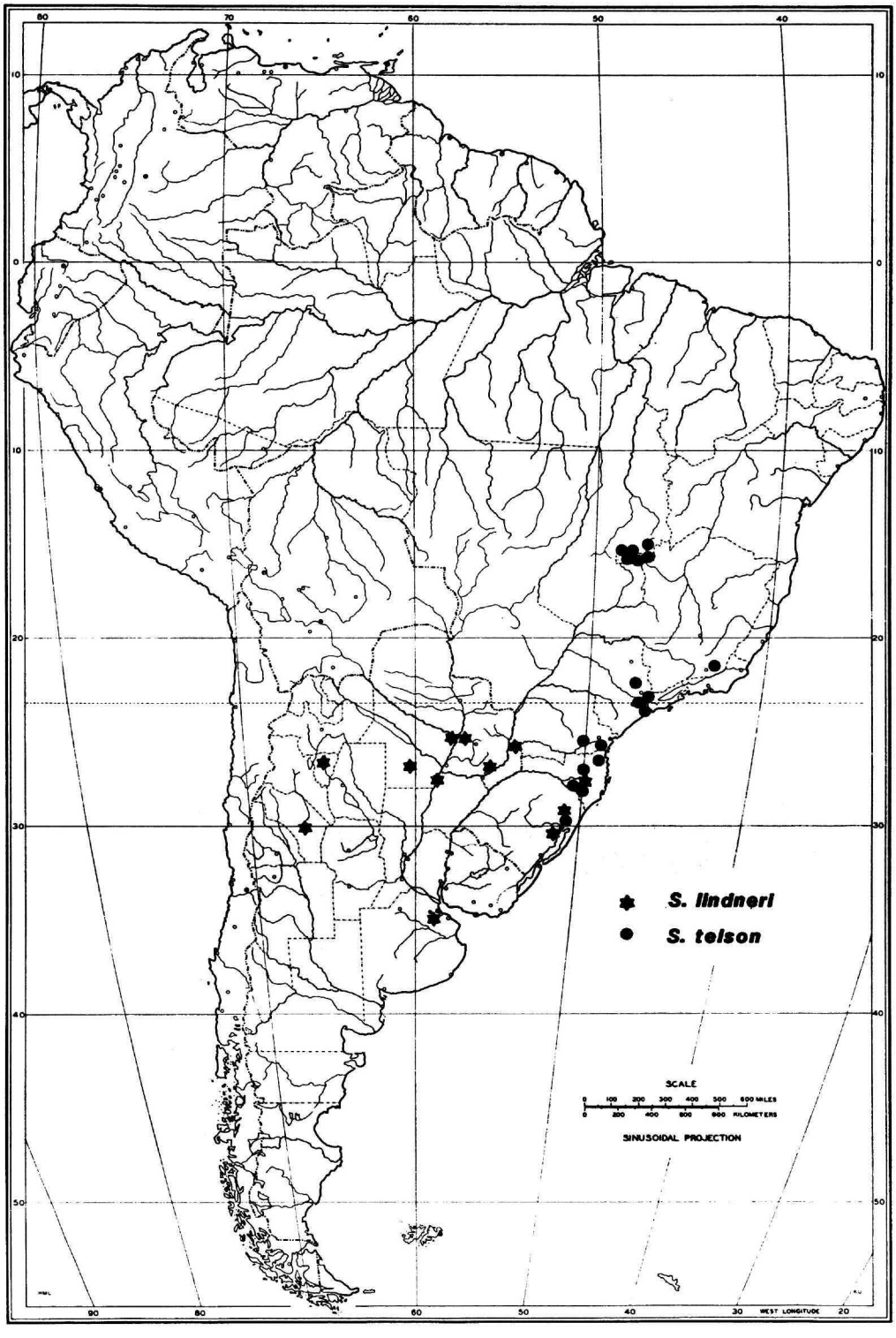


FIGURE 142.—Distribution map of *Sepedonea lindneri* and *S. telson*.

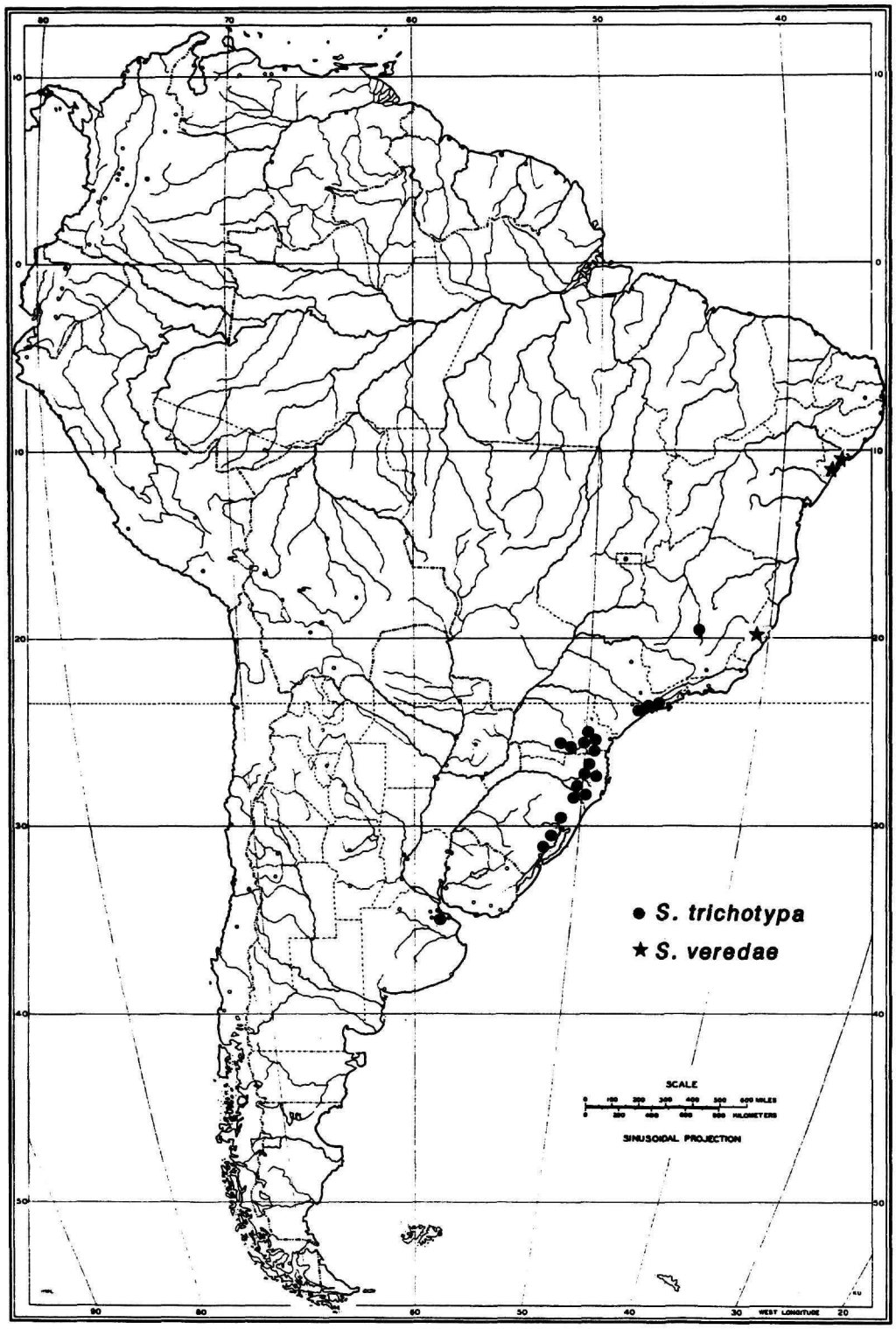


FIGURE 143.—Distribution map of *Sepedonea trichotypa* and *S. veredae*.

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