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A study of Neotropical Symphyla (Myriapoda): list of species, keys to genera and description of two new Amazonian species

by

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Abstract

A provisional list of the Neotropical species of Symphyla and keys to Neotropical genera are given. Two new species from central Amazonia are described: *Scolopendrellopsis tropicus* and *Symphylella adisi*. *Hanseniella orientalis* is reported from South America for the first time.

Keywords: **Symphyla, *Scolopendrellopsis*, *Symphylella*, *Hanseniella*, faunal list, Neotropics, Brazil, soil fauna.**

Resumo

Uma lista provisória das espécies neotropicais de Symphyla e uma chave para os gêneros neotropicais são dadas. Duas novas espécies da Amazônia Central são descritas: *Scolopendrellopsis tropicus* e *Symphylella adisi*. *Hanseniella orientalis* é documentado pela primeira vez para América do Sul.

Introduction

Since 1980, PD Dr. J. ADIS of the Tropical Ecology Working Group of the Max-Planck-Institute for Limnology (MPI) in Plön (FRG) has attempted, in close cooperation with his Brazilian colleagues of the National Institute for Amazonian Research (INPA) at Manaus (Brazil), to survey Neotropical arthropods, both in inundation and in dryland (= upland) forests near Manaus, using modern collecting methods (cf. ADIS 1988; ADIS & SCHUBART 1984).

Symphylan species described in this contribution were collected between 1980 and 1983 from the soil of four forest types, all within 45 km of or in Manaus: (1) in a primary dryland forest at Reserva Florestal A. Ducke (RD) on the Manaus-Itacoatiara highway (AM-010 at km 26); (2) in a cut but unburned secondary dryland forest at the

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INPA campus in Manaus (IN); (3) in a cut but unburned secondary dryland forest at Rio Tarumã Mirím (TM), a tributary of the Rio Negro, and (4) in an inundation forest of Praja Grande (PG) at the Rio Negro (Fig. 1). Symphylans were extracted from soil samples following a modified method of KEMPSON (ADIS 1987). Data on the ecology of the species will be given elsewhere.

Provisional list of Neotropic species

The South American symphylan fauna has received little attention and very few papers have contributed to the present knowledge. Up till now the following 21 species are known. They belong to 6 out of 15 genera described.

Species	Country	Reference(s)
Fam. Scolopendrellidae (3 out of 8 genera)		
Genus *Scolopendrellopsis*		
brasiliensis JUBERTHIE-JUPEAU	Brazil	JUBERTHIE-JUPEAU 1962
delamarei JUBERTHIE-JUPEAU	Argentina	JUBERTHIE-JUPEAU 1962
silvestrii (HANSEN)	Argentina	HANSEN 1903; JUBERTHIE-JUPEAU 1962
	Paraguay	HANSEN 1903
tropicus SCHELLER	Brazil	SCHELLER, this paper
Genus *Symphylella*		
adisi SCHELLER	Brazil	SCHELLER, this paper
andina JUBERTHIE-JUPEAU	Argentina	JUBERTHIE-JUPEAU 1962
antennata (HANSEN)	Argentina	HANSEN 1903
	Paraguay	HANSEN 1903
	Brazil	HANSEN 1903
capicola MICHELBACHER	Venezuela	SCHELLER, in press
essigi MICHELBACHER	Argentina	JUBERTHIE-JUPEAU 1962
neotropica (HANSEN)	Venezuela	HANSEN 1903
Genus *Ribautiella*		
amazonica SCHELLER	Brazil	SCHELLER & ADIS 1984
Fam. Scutigerellidae (3 out of 7 genera)		
Genus *Scutigerella*		
immaculata (NEWPORT)	Chile	ATTEMS 1897; SILVESTRI 1899
	Argentina	ATTEMS 1897, 1902; HANSEN 1903

Genus *Hanseniella*		
angulosa (HANSEN)	Argentina	HANSEN 1903
	Uruguay	HANSEN 1903
arborea SCHELLER	Brazil	SCHELLER 1979
?caldaria (HANSEN)	Paraguay	HANSEN 1903
	Brazil	HANSEN 1903
	Ecuador	HANSEN 1903
chilensis (HANSEN)	Chile	HANSEN 1903
	Argentina	HANSEN 1903; JUBERTHIE-JUPEAU 1962
longisetis JUBERTHIE-JUPEAU	Brazil	JUBERTHIE-JUPEAU 1962
orientalis (HANSEN)	Brazil	SCHELLER, this paper
	Colombia	SCHELLER, this paper
paolettii SCHELLER	Venezuela	SCHELLER, in press
unguiculata (HANSEN)	Argentina	JUBERTHIE-JUPEAU 1962
	Brazil	JUBERTHIE-JUPEAU 1962
	Venezuela	HANSEN 1903
Genus *Neoscutigerella*		
minuta JUBERTHIE-JUPEAU	Argentina	JUBERTHIE-JUPEAU 1962

Of these species no less than 14 are not known outside the Neotropic and of the others two only are common to the Nearctic and then to its southwestern part. The remaining five species may have wide ranges: *Hanseniella orientalis* is widely distributed in the tropics, *Hanseniella longisetis* has been reported also from Sri Lanka and *Scutigerella immaculata, Hanseniella caldaria* and *H. unguiculata*, the taxonomic delimitations of which have not been fully cleared up, may be very widely distributed.

In relation to the vast area of South America and the enormous diversity of its ecosystems the known number of species is low. Most regions have not yet been visited by collectors and most likely only a small part of the Neotropic symphylans has been described. Under these circumstances it is premature to point out which taxonomical characters might be typical for Neotropic species. This makes it difficult to clear up the affinities to other faunas. Another fact working in the same direction is the wide ranges of the genera involved. All but *Ribautiella*, which is tropical but widely distributed too, are more or less subcosmopolitan. However, as far as external morphology is concerned most representants in *Scolopendrellopsis* and *Symphylella* seem to connect up with the fauna in the southern and southwestern Nearctic while the species in *Ribautiella* and Scutigerellidae more often may be linked to species especially in the Ethiopian region.

The list above contains two species described below, *Scolopendrellopsis tropicus* and *Symphylella adisi*, which were collected from near Manaus (Fig. 1) in connection with a study of the terrestrial invertebrates of Central Amazonian floodplains. Besides the descriptions preliminary keys to the families and genera of the South American Symphyla are given.

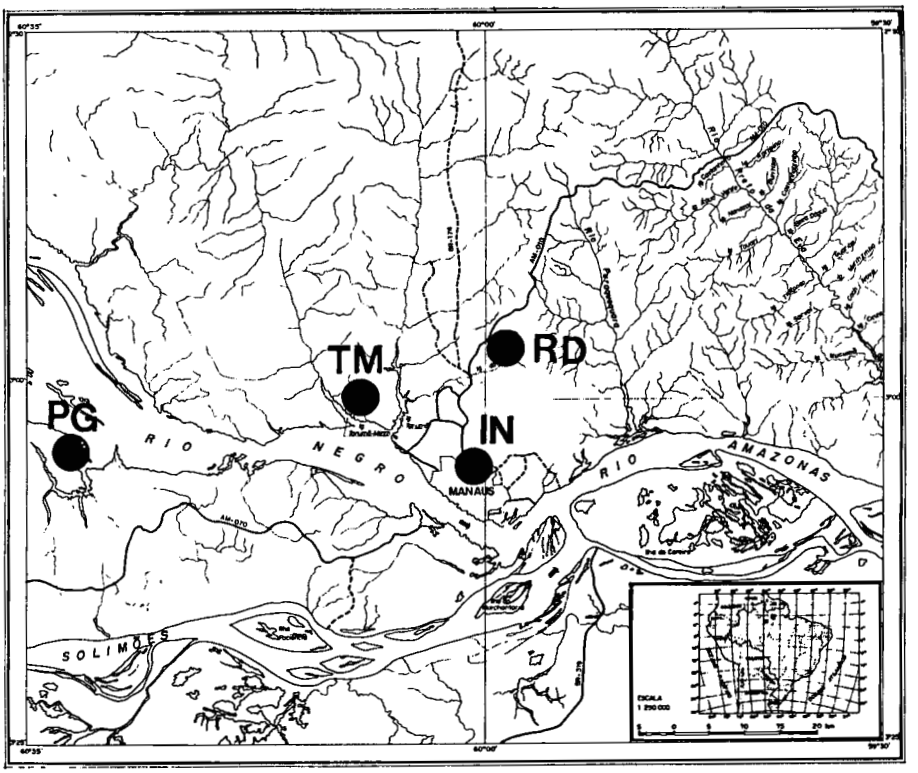

Fig. 1:
Location of the study areas: PG - Praja Grande, IN - Instituto Nacional des Pesquisas da Amazônia, RD - Reserva Florestal A. Ducke, TM - Rio Tarumã Mirím (map of RIBEIRO & ADIS 1984, modified).

Keys to Neotropic families and genera

Key to families of Symphyla

1. Paired sense calicles with smooth margin of pit; tergites either with pointed posterior projections or reduced in size; styli at base of legs small or reduced; first pair of legs less than half as long as following pair; usually slow-moving with slender body ..... *Scolopendrellidae* BAGNALL
- Paired sense calicles with many setae around margin of pit; tergites large with rounded posterior margins; styli large; first pair of legs more than half as long as following pair; usually swift runners with stout body ..... *Scutigerellidae* BAGNALL

Key to Neotropic Genera of Scolopendrellidae

1. 17 tergites or less ..... *Symphylella* SILVESTRI, 1902
- 21 tergites or more 2
2. First pair of legs represented only by small protuberances with terminal setae; 24 tergites ..... *Ribautiella* BRÖLEMANN, 1926

- First pair of legs present but only about half of the length of the 2nd pair; 21 or 22 tergites ..... *Scolopendrellopsis* BAGNALL, 1913

Key to Neotropic Genera of Scutigerellidae

1. Without cavity beneath middle of posterior margin of last tergite 2
- With deep cavity beneath middle of posterior margin of last tergite ..... *Scutigerella* RYDER, 1882
2. Setae on tergites thin and pointed; anterolateral macrochaetae most often on several tergites ..... *Hanseniella* BAGNALL, 1913
- Setae on anterior tergites short, most often blunt; anterior macrochaetae on at most two anterior tergites (2nd, 3rd) ..... *Neoscutigerella* BAGNALL, 1913

The genus *Scutigerella* belongs to the northern hemisphere but *S. immaculata* (NEWPORT) was reported from Chile by ATTEMS (1897: 4) and SILVESTRI (1899: 370). However, HANSEN showed (1903: 32) that SILVESTRI's identification was incorrect but at the same time (1. c.: 31) he wrote that he had seen specimens from Argentina not distinguishable from European *immaculata*. The genus has its known south border in Mexico but may be indigenous in northern South America. The occurrence in Argentina is probably a result of accidental introduction by man. The early records by ATTEMS from Chile (1897) and Argentina (1897, 1902) are dubious.

Description of species

Notes:

* Abbreviations: ad. = a specimen with the maximum number of legs; subad . . . and juv . . . = a subadult or juvenile specimen with the number of pairs of legs indicated (rudimentary first pair of legs in *Symphylella* included).

** Length of body except antennae and cerci; range of variation in paratypes given in parentheses.

Scolopendrellopsis (*Symphylellopsis*) *tropicus* n. sp. (Fig. 2)

Type locality. Brazil, Manaus, Reserva Florestal Ducke, primary dryland forest 26 km N of Manaus, 2°15' S, 59°56' W.

Type material. - Holotype: ad.* (♀), locality as above, KEMPSON soil extraction 1983.IV.1, (Loc. K 30 RD, leg. José Wellington de MORAIS). In the Systematic Entomology collections of Instituto Nacional de Pesquisas da Amazônia (INPA), Manaus, Brazil.

Paratypes: Same data as holotype, 1 ad. (♂); Manaus, Tarumã Mirím, capoeira 1 ad. (♀) 1983.I.30, (Loc. K 21, leg. José Maria Gomes RODRIGUES); Manaus, INPA, capoeira, ad. (♀), 1986.IV.24, (Loc. K 31, leg. Joachim ADIS). In the Systematic Entomology collections of Instituto Nacional de Pesquisas da Amazônia (INPA), Manaus, Brazil; Manaus, Tarumã Mirím, capoeira, ad. (♀), 1983.I.30, (Loc. K 11, leg. José Maria Gomes RODRIGUES) and ibidem, 1 ad. (♀), (Loc. K 32) in author's collection.

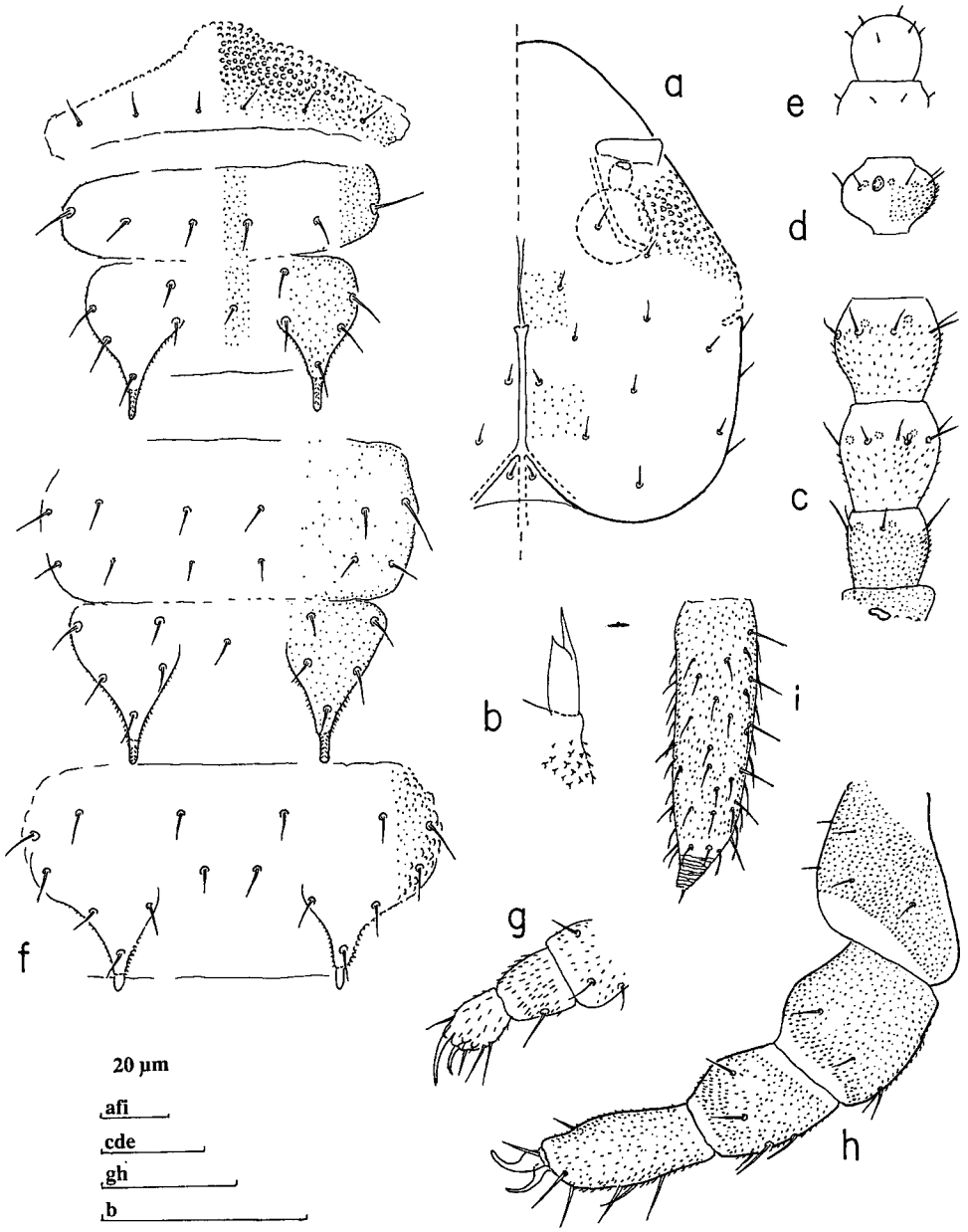

Fig. 2:
Scolopendrellopsis (*Symphylellopsis*) *tropicus* n. sp., holotype. a. Head, right half, dorsal view. b. Palp of first maxilla, left side, ventral view. c - e. Antenna, right side, dorsal view: c, first three segments; d, 10th segment; e, apical segment. f. Tergites 1 - 4. g. First leg, right side. h. 12th leg, left side, anterior view. i. Left cercus, ventral view. Pubescence not drawn in e and only partly drawn in a, d, f.

Description

Length. - (1.35 -) 1.58 (- 1.72)** mm, average 1.51 mm.

Head. - Head 1.1 (- 1.3) times as long as broad with broadest part just anterior of (- at) articulating points of the mandibles. The latter concealed under margins of head. Posterior part of central rod distinct (1.1 -) 1.3 (- 1.5) times as long as much thinner anterior part; frontal and median branches lacking. Dorsal surface of head sparsely setose with short thin setae of subequal length; no distinctly protruding setae. Diameter of postantennal organ (0.8 -) 0.9 of greatest diameter of 3rd antennal segment; tube between the organ and the head surface 0.3 of the diameter of organ. Palp of first maxilla (3.4 -) 3.7 (- 3.9) times as long as wide, bud-like with 2 distal points, the outer distinctly longer more pointed and more slender than the inner one. Cuticle of central and posterior parts of the head with sparse and rather strong granules, anterolateral part between postantennal organ and margin of head with larger and rounded granules.

Antennae. - Antennae with (16 -) 18 (- 20) segments; they are 0.2 of length of the body. First segment somewhat thinner than following ones and shorter than all but the apical one; it is (1.0 -) 1.1 times as long as wide; there are (5 -) 6 setae, all in the primary whorl; outer seta a little longer than inner setae and (0.5 -) 0.6 (- 0.7) of the greatest diameter of the segment. Second segment about as long as wide with (6 -) 8 (- 9) setae evenly spaced around the segment; they are of about the same length as setae of preceding segment; inner and outer setae of about the same length. Third segment with chaetotaxy as 2nd segment. Setae longest on proximal segments; longest setae there (3.2 -) 3.3 (- 3.7) times as long as corresponding setae on most distal segments. Proximal and median part of antenna with only the primary whorl of setae. Secondary whorl never complete, only 1 - 2 setae on a few subdistal segments. Circular sensory organs on dorsal side of segments (7 -) 9 - 16 (- 19), sometimes 2 ones on the (1 -) 2 outermost of them. Bladder-shaped organs on (4 -) 8 (- 10) segments next to the apical one. Small spined organs are on dorsal side of segments 2 (- 3) and on the apical segment. The latter subspherical with wide connection to preceding segment. All antennal segments with short pubescence.

Tergites. - Twentyone dorsal tergites and subtergites. First tergite rudimentary, triangular, with 6 setae in a straight row. Second tergite complete, broader than long, divided into two subtergites; the anterior one short with 6 setae in a transversal row; the posterior one with 2 posterior processes which are about as long as broad; distance between processes as long as their length. Third tergite divided, as preceding tergite but with 2 rows of setae on the anterior subtergite; processes (1.2 -) 1.3 times as long as broad, a little longer than their distance apart. In 4th tergite the processes are about as broad as long and distinctly shorter than their distance apart. Thirteen tergites with triangular processes. The latter longest at the middle of body, no setae between apical and inner basal setae. Tips of processes with very few exceptions lengthened with parallell sides and coarse pubescence. Pubescence of tergites longest on the margins of the processes, for the rest minute. Anterolateral setae of anterior tergites (1.1 -) 1.2 - 1.4 (- 1.5) times as long as the second longest seta of tergite. Number of lateromarginal setae on different tergites varies: (3 -) 4 on 2nd, 5 (- 6) on 3rd and 4 (- 5) on 4th. Last tergite with 14 (- 15) setae.

Legs. - First pair of legs short, 3-segmented. Tarsus (1.5 -) 1.6 (- 1.8) times as long as wide with (3 -) 4 setae, longest one (1.2 -) 1.4 times as long as the diameter of segment. Pubescence distinct. Tarsus of last pair of legs (1.9 -) 2.3 (- 3.0) times as long as wide with 5 dorsal setae, 3 of which are protruding and 2 depressed; these setae are of about the same length and about as long as the greatest diameter of tarsus; 1 (- 2) short setae on the distal half of ventral side. Tibia (1.4 -) 1.7 (- 1.8) times as long as wide with (5 -) 6 setae; longest seta on dorsal side, (0.8 -) 0.9 of the greatest diameter of the joint and about as long as longest seta on the tarsus. Femur as long as wide with 5 (- 6) short thin setae. Trochanter with 5 (- 6) setae, all very thin. Anterior claw with broad base, length 0.7 (- 1.0) of greatest diameter of tarsus; posterior claw very slender. All leg segments with sparse pubescence.

Styli at bases of 3rd - 12th pair of legs, conical, 3 - 4 times longer than their greatest width, densely pubescent, apical hair thin and pointed. There are 7 pairs of fully developed coxal sacs at bases of 3rd - 9th pair of legs. Coxal plates of 10th - 12th pair of legs with (1 -) 2 setae.

Cerci. - Cerci (3.2 -) 3.4 (- 3.8) times as long as wide, dorsally straight, slightly curved inwards. They do no not reach 0.1 of the length of body and are set with setae on all sides. Most setae short, curved and depressed but several are longer, straight or almost straight, protruding; the latter most on outer side which

has (5 -) 6 (- 8) ones. These setae 0.4 (- 0.5) of the greatest diameter of cercus. Terminal area short. Long apical setae lacking in holotype, in a few paratype specimens they are about as long as terminal area and a little shorter than longest protruding setae.

Affinities. - *S. tropicus* is very akin to *S. remyi* HINSCHBERGER (1950) from Mexico. The new species is distinguished from it in having a much more elongated head (distinctly longer than broad, not broader than long), the head more dense setose, about the same length of the inner and the outer setae of the proximal antennal segments (not inner ones 1.5 times as long as outer ones), bladdershaped organs on more antennal segments (4 - 10, not 3 - 4), more slender and coarsely pubescent triangular processes of the anterior tergites, and also a greater difference in size and shape of the claws of the last pair of legs (posterior claw very slender, not subequal to the anterior one).

Symphylella adisi n. sp. (Figs. 3 - 4)

Type locality. - Brazil, Manaus, Reserva Florestal Ducke, primary dryland forest 26 km N of Manaus, 2°15' S, 59°56' W.

Type material. - Holotype, ad. (♀), locality as above, KEMPSON soil extraction 1983.IV.12, (Loc. K 21 RD 8, leg. José Wellington de MORAIS). In the Systematic Entomology collections of Instituto Nacional de Pesquisas da Amazônia (INPA), Manaus, Brazil.

Paratypes. Same data as holotype, 2 ad. (♂, ♀), 1 subad. 11 (♀), (Loc. K 19): Manaus, Praja Grande, 1 ad. (♀), 1 juv. 10, KEMPSON soil extraction, 1981.IV.23, (Loc. K 15, leg. Joachim ADIS), in the Systematic Entomology collections of Instituto Nacional de Pesquisas da Amazônia (INPA), Manaus, Brazil; Manaus, Reserva Florestal Ducke, 1 ad. (♀), 1983.IV.1, (Loc. K 30, leg. José Wellington de MORAIS) and Manaus, Tarumã Mirím, capoeira, 1 ad. (♀), 1982.VIII.25, (Loc. K 12 TM) and 1 ad. (♀), 1982.X.26, (Loc. K 23 TM, leg. José Maria Gomes RODRIGUEZ), in author's collection.

Etymology. - Dedicated to PD Dr. Joachim ADIS, MPI, Plön, who initiated the study.

Description

Length. - (1.60 -) 3.35 (- 4.14) mm, average 2.47 mm.

Head. - Head 1.1 (- 1.2) times as long as broad with broadest part at articulating points of the mandibles. The latter concealed under margins of head. Central rod indistinct, posterior part broadest, (1.1 -) 1.2 times as long as anterior part: frontal branches vestigial, median ones lacking. Dorsal surface of head covered with short, straight, thin setae of subequal length. Three setae at inner base of antenna and a few lateral setae are twice longer than inner setae. Diameter of postantennal organ (0.4 -) 0.5 of greatest diameter of 3rd antennal segment; length of tube between the organ and the head surface (0.2 -) 0.3 of the diameter of organ. Palp of first maxilla conical, very slender and pointed, outer side straight, (4 -) 4.5 times as long as wide. Cuticle of head very faintly granular.

Antennae. - Antennae with 16 (- 19) segments; they are (0.2 -) 0.3 of the length of the body. First segment thinner and shorter than following ones, (1.5 -) 1.7 (- 1.8) times as wide as long; there are 6 (- 9) setae, all in the primary whorl; inner setae longest 1.2 - 1.3 (- 1.4) times as long as outer seta and (0.5 -) 0.6 - 0.7 (- 0.8) of the greatest diameter of the segment. Second segment 1.3 (- 1.4) times as wide as long with (8 -) 9 setae, the main part of them on inner half; they are (of about the same length or) a little longer than setae of preceding segment; inner setae distinctly longer than outer ones. Third segment with (9 -) 10 (- 11) setae almost evenly distributed around the segment; inner setae distinctly longer than outer ones, (0.5 -) 0.6 of the diameter of segment. Setae longest on proximal segments. Longest setae there 3 (- 4) times longer than corresponding setae on the most distal segments. Proximal part of antennae with one whorl of setae on each segment, secondary whorl beginning on inner side of segment (6 -) 7 (- 8). On 10th segment this whorl consists of 4 (- 5) setae; inner setae of primary whorl here a little longer than outer ones. Circular sensory organs on dorsal side of segments 6 - 13 (- 17). Bladdershaped organs on 5 (- 7) segments next to the apical one. Small spined organs are on dorsal side of most segments from segment

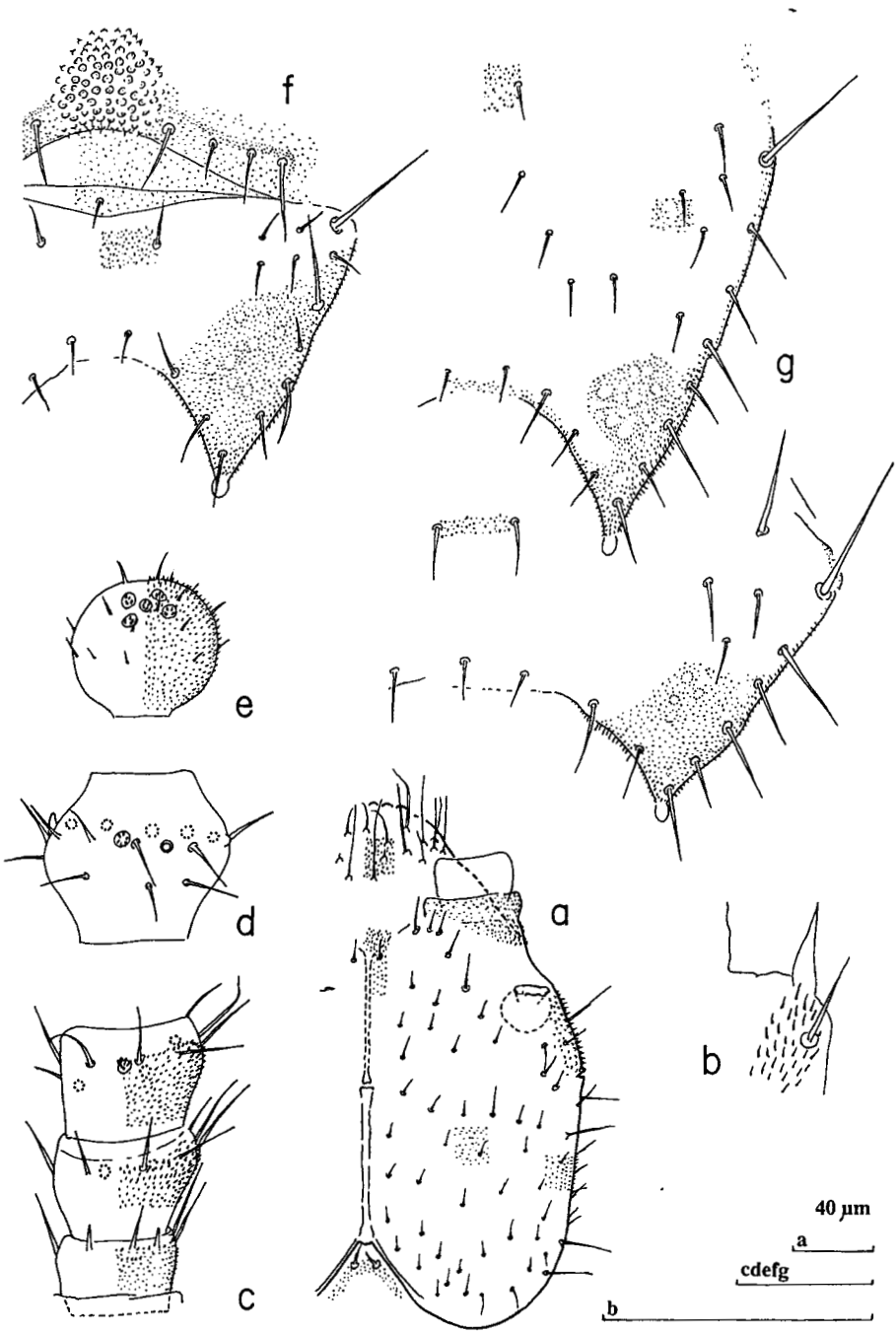

Fig. 3:
Symphylella adisi n. sp., holotype. a. Head, right half, dorsal view. b. Palp of first maxilla, left side, ventral view. c - e. Antenna, left side, dorsal view: c, first three segments; d, 10th segment; e, apical segment. f. Tergites 1 and 2. g. Tergites 3 and 4. Pubescence not drawn in d and only partially drawn in a, c, e, f, g.

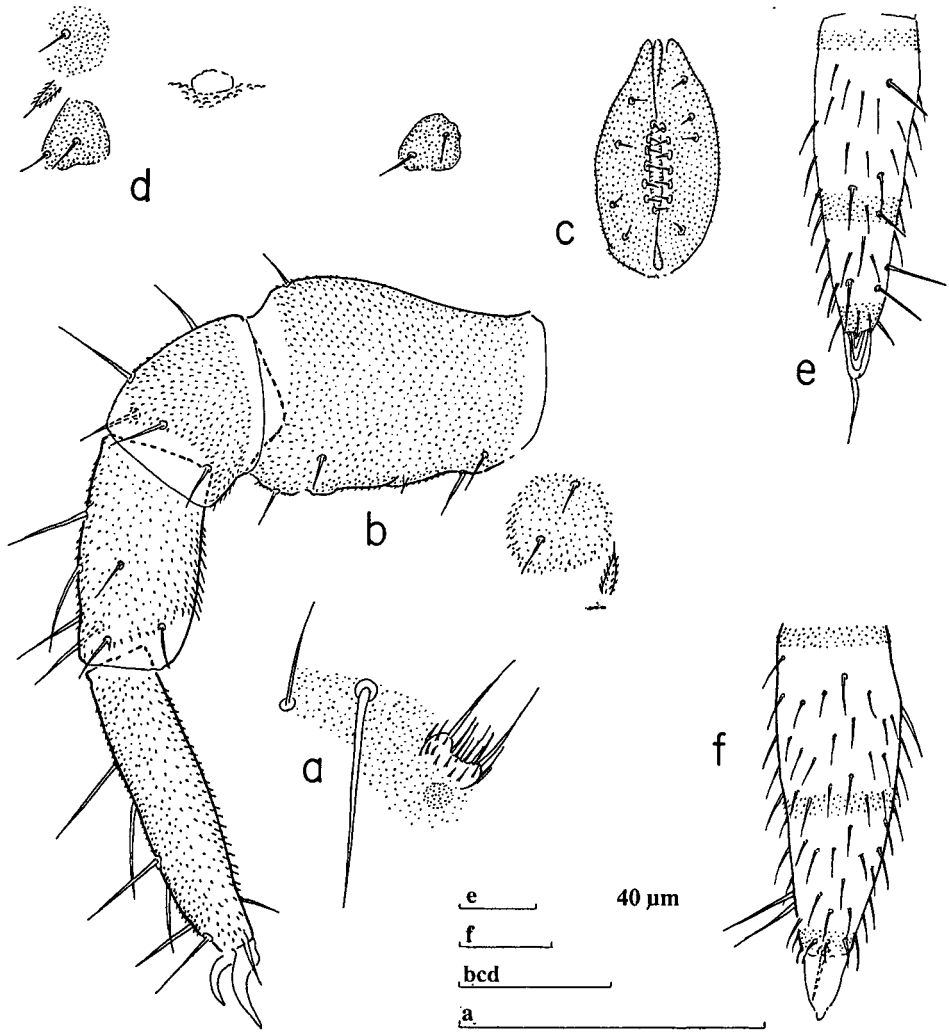

Fig. 4:
Symphylella adisi n. sp., a, b, d, e holotype, c and f paratypes. a. First leg, left side. b. 12th leg, left side, anterior view. c. Genital opening ♂. d. Genital opening ♀ and coxal plates of 4th pair of legs. e. Right cercus, ventral view. f. Left cercus, tergal view.

3 - 12 (- 15) and on the apical one; on the latter at least (4 -) 5 pits each with one such organ. Apical segment subspherical with many short thin setae. All antennal segments with short pubescence.

Tergites. - First tergite rudimentary with (7 -) 8 setae arranged in two groups of (3 -) 4 setae; most lateral seta on each side longest. Thirteen tergites have triangular posterior processes. Second tergite complete. The ratio of the distance between the processes (measured along posterior margin of tergite) to their length is 1.1 on 2nd, (0.6 -) 1.0 on 3rd and 1.3 (- 1.6) on 4th tergite. Third tergite larger than preceding one. Processes of posterior tergites have broader bases than those anteriorly. Tips of triangular processes everywhere short, blunt, somewhat spatulate. Longest anterolateral seta of 2nd tergite (0.8 -) 0.9 (- 1.2) of the length of the processes; on tergites 3 and 4 this ratio is (1.1 -) 1.3 (- 1.4) and (1.0 -) 1.1 (1.2) respectively. Anterior tergites with 1 - 2 marginal setae between apical and inner basal setae. Number of

posteromarginal setae (between inner basal setae) on different tergites varies very little: (1 -) 2 on 2nd and 3rd, (2 -) 3 on 4th. Anterolateral setae longer than outer marginal setae. Cuticle of tergites granular or pubescent. On lateral part of anterior tergites some small circular spots are either smooth or with minute granulation.

Legs. - First pair of legs reduced to two small twoparted knobs; parts subequal, each with one long seta and several shorter hairs; length of long setae (2.5 -) 2.7 (- 2.9) times as long as height of the knob. Last pair of legs with a subcylindrical tarsus which tapers towards distal end. It is (3.4 -) 4.1 (- 4.8) times as long as wide with 6 setae on dorsal side, 4 of which are erect and straight and 2 are depressed and somewhat curved. Longest seta on proximal part of dorsal side; it is (1.2 -) 1.3 times as long as greatest diameter of tarsus and 0.4 of the length of tibia. The latter (1.7 -) 2.0 (- 2.1) times as long as wide with (6 -) 7 setae, all but one on dorsal side; 1 (- 2) of the latter protruding, 0.7 of the greatest diameter of joint and almost as long as longest seta on the tarsus. Femur about as long as wide with 5 setae. Setae of trochanter short. Anterior claw as long as greatest diameter of tarsus. All leg segments pubescent.

Styli conical, about 3 times longer than their greatest width, densely pubescent; apical hair thin, pointed. There are 7 pairs of fully developed coxal sacs at bases of 3rd - 9th pair of legs.

Cerci. - Cerci (3.3 -) 3.4 (- 3.7) times as long as wide with outer side more convex than inner one. They reach 0.1 of the length of body and are a little shorter than the length of 12th pair of legs. Setae either short, slightly curved, depressed or longer, straight, erect; the former are on all sides, the latter are (7 -) 8 (- 10) in number and are on ventral and outer lateral sides, longest ones 0.5 (- 0.6) of the greatest diameter of cercus. Terminal area short. Apical seta about as long as terminal area and (0.1 -) 0.2 of the length of cercus. Pubescence dense and delicate.

Affinities. - The species is close to my own *S. caribica* from the Virgin Islands (SCHELLER & MUCHMORE 1989) and *rossi* MICHELBACHER (1942) from California but also to *neotropica* (HANSEN 1903) from Venezuela and, but to a much lesser degree, to the *vulgaris* group with the widespread *vulgaris* (HANSEN), *tenella* SCHELLER from Hawaii, *capitata* MICHELBACHER from California and *multisetosa* SCHELLER from Sri Lanka. It is distinguished from *caribica* by the more distinct central rod of the head, the shorter and thicker palp of the first maxilla, the lack of the naked spot of the cuticula of the inner distal part of the tibia of the 12th pair of legs and a lesser number of straight protruding setae on the ventral side of the cerci. Good distinguishing characters in relation to *rossi* seem to be the spatulate tips of the triangular processes of the tergites (not widened in *rossi*), the shorter inner setae of the proximal antennal segments and the distribution of the protruding setae on the cerci. From *neotropica* it deviates distinctly in the shape of the first pair of legs and the claws of the 12th pair but also in the chaetotaxy of the cerci.

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