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Redescription of *Scolopendropsis bahiensis* (Brandt, 1841), the relations between *Scolopendropsis* and *Rhoda*, and notes on some characters used in scolopendromorph taxonomy (Chilopoda: Scolopendromorpha)

Переописание *Scolopendropsis bahiensis* (Brandt, 1841), связи между родами *Scolopendropsis* и *Rhoda*, а также замечания о некоторых признаках, используемых в таксономии сколопендр (Chilopoda: Scolopendromorpha)

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КЛЮЧЕВЫЕ СЛОВА: Scolopendromorpha, *Scolopendropsis*, *Rhoda*, таксономия, синонимия, Бразилия.

ABSTRACT. The holotype of *Scolopendropsis bahiensis* (Brandt, 1841), from Bahia, Brazil, recently relocated in the collection of the Zoological Institute in St. Petersburg, is redescribed. Since *Rhoda calcarata* (Pocock, 1891) is, except for two additional leg-bearing segments, almost identical to it, this form is considered to be a junior synonym of *Scolopendropsis bahiensis*, syn.n. The genus *Rhoda* Meinert, 1886 currently comprises *Rhoda thayeri* Meinert, 1886 (type species), *R. isolata* Chamberlin, 1958 and *R. spinifer* (Kraepelin, 1903). The taxonomic importance of the number of leg-bearing segments in the Scolopendromorpha appears to be less significant than thought previously, because *S. bahiensis* is a "segmentally dimorphic" species. An identification key to the species of *Scolopendropsis* and *Rhoda* is also presented.

РЕЗЮМЕ. Переописан голотип недавно обнаруженного в Зоологическом институте в Санкт-Петербурге вида *Scolopendropsis bahiensis* (Brandt, 1841) из штата Баиа (Бразилия). Поскольку вид *Rhoda calcarata* (Pocock, 1891) практически идентичен ему, за исключение двух дополнительных ногонесущих сегментов, этот вид является младшим синонимом *Scolopendropsis bahiensis*, **syn.n.** Род *Rhoda* ныне включает *Rhoda thayeri* Meinert, 1886 (типовой вид), *R. isolata* Chamberlin, 1958 и *R. spinifer* (Kraepelin, 1903). Таксономическая важность числа несущих ноги сегментов тела у Scolopendromorpha менее значима, чем думали прежде, потому что *S. bahiensis* — "сегментально диморфный" вид. Приведен определительный ключ для видов *Scolopendropsis* и *Rhoda*.

Introduction

The order Scolopendromorpha currently contains 33 genera [Schileyko, 2002; Shelley & Mercurio, 2005], of which 24 show 21, and nine genera 23, leg-bearing segments. The first group contains seven blind and 17 "eyed" genera, while all genera of the second group are blind and the only "ocellate" exception seems to be *Scolopendropsis bahiensis* (Brandt, 1841). This species was originally described as *Scolopendra bahiensis* Brandt, 1841 from a single specimen from "Provincia bahiensi regni Brasiliensis" [Brandt, 1841a] (Fig. 1). This is currently the type species of the monobasic genus *Scolopendropsis* Brandt, 1841, showing a combination of characters unique among scolopendromorphs, namely, 23 leg-bearing segments and the presence of ocelli. The original description of this animal is very short and lacks both figures and some important details, such as the presence of spiracles on body segment 7 and of tarsal spurs on the locomotory legs. The holotype has never been redescribed, even its repository has hitherto remained unknown.

From the same state of Bahia, Brazil Brölemann [1897] recorded another specimen which he identified as *Scolopendropsis bahiensis*. In February 2005, further eight specimens were collected by Dr. Amazonas Chagas, Jr. and his colleagues, i.e. seven in southern Bahia and one in the state of Minais Gerais (Fig. 1) [Amazonas Chagas, personal communication].

Pocock [1891], Brölemann [1897, 1902b], Chamberlin [1914], Attems [1930] and Bücherl [1939, 1941b] noted especially close affinities existing between *Scolopendropsis* and *Rhoda* Meinert, 1886 (syn. *Pithopus*

Fig. 1. Distribution of *Scolopendropsis* and *Rhoda*:

Brazil: 1 — Santarem, Pará state; 2 — Iguarassú, Pernambuco state; 3 — Vitória, Espírito Santo state; 4 — Colatina, Espírito Santo state; 5 - Ilha do Bananal, Goiás state;

Peru: 6 — Lima, Lima Province.

Рис. 1. Распространение *Scolopendropsis* и *Rhoda*:

Бразилия: 1 — Сантарем, штат Пара; 2 — Игуарассу, штат Пернамбуко; 3 — Виктория, штат Эспирито Санто; 4 — Колатина, штат Эспирито Санто; 5 — Илья до Бананаль, штат Гойас;

Перу: 6 — Лима, провинция Лима.

Pocock, 1891, see below), the latter genus a typical scolopendrine with ocelli and 21 leg-bearing segments. Both these genera form a monophyletic group showing tarsus II of locomotory legs longer than tarsus I, a unique condition among all scolopendromorphs. Some of the above authors suggested that *S. bahiensis* might

be based on an abnormal specimen of one of the *Rhoda* species [Bücherl, 1941b] or both this *Rhoda* sp. and *Scolopendropsis bahiensis* belong to the same segmentally dimorphic species [Brölemann, 1897; Chamberlin, 1914; Attems, 1930; Bücherl, 1939]. Bücherl [1941b: 305], with neither any comments nor evidence, surmised this difference in the number of body segments possibly to be due to sexual dimorphism. The genus *Rhoda* Meinert, 1886 is subendemic to Brazil, occurring in the states of Pará (locus typicus of *Rhoda thayeri* Meinert, 1886: Santarem), Goiás, Mato Grosso, Ceará, Rio Grande do Norte, Pernambuco, Alagoas, Bahia and Espírito Santo (Fig. 1).

So one can suggest that *S. bahiensis* contains specimens both with 21 and 23 segments, the latter condition representing unusual variation in segment number observed at least in (southern) Bahia and adjacent regions (see also below).

Material and methods

During a visit to the Zoological Institute of the Russian Academy of Sciences in St. Petersburg, a few scolopendromorph types of J.-F. Brandt were relocated. One of the jars contained a single specimen, labeled "Scolopendropsis bahiensis N 372, Bahia [Brazil], 1840, [leg.?] Luschath[?], det. V. Soldatov". All the features of this specimen, as well as provenance and the year of collection, correspond exactly with those of *Scolopendropsis bahiensis* as presented in the original description [Brandt, 1841a]. The animal thus is certainly the missing holotype. However, the label is not in Brandt's hand and states "det. V. Soldatov". Dr. Soldatov worked at the Department of Invertebrates of the Zoological Institute early last century and must have replaced the old original label.

In addition, some material of *Rhoda calcarata* (Pocock, 1891), in the Zoological Museum of Copenhagen (ZMUC) and Naturhistorisches Museum in Vienna (NHMW), has been restudied for comparative purposes [Schileyko & Stagl, 2004].

To revise Pocock's and Brölemann's material, respectively, and to avoid the risk of damage or even loss in the post, J.G.E. Lewis kindly agreed to re-examine the types of *Pithopus* (= *Rhoda*) kept in the Natural History Museum in London (NHML), and Dr. J.-J. Geoffroy to do the same for Brölemann's [1897] specimen of *Scolopendropsis bahiensis*, housed in the Muséum national d'Histoire naturelle (MNHN) in Paris.

Systematic part

Scolopendropsis bahiensis (Brandt, 1841)
Figs 2–6.

Scolopendra bahiensis Brandt, 1841a: 24;
Scolopendra (*Scolopendropsis*) *bahiensis* Brandt, 1841a: 25;
Scolopendra bahiensis — Brandt, 1841b: 75;
Scolopendra (*Scolopendropsis*) *bahiensis* — Brandt, 1841b: 77;
Scolopendropsis Bahiensis — Newport, 1844: 419;
Scolopendra Bahiensis — Gervais, 1847: 296;
Scolopendropsis Bahiensis — Newport, 1856: 71;
Scolopendropsis bahiensis — Kohlrausch, 1881: 53;
Pithopus calcaratus Pocock, 1891: 224, **syn.n.**;
Scolopendropsis bahiensis — Pocock, 1891: 225;
Scolopendropsis bahiensis — Brölemann, 1897: 142;
Scolopendropsis bahiensis — Brölemann, 1902b: 651;
Scolopendropsis calcaratus — Brölemann, 1902b: 651;
Pithopus calcaratus — Kraepelin, 1903: 170;
Scolopendropsis bahiensis — Kraepelin, 1903: 172;
Pithopus calcaratus — Kraepelin, 1904: 251;
Scolonpendropsis (sic!) *bahiensis* — Brölemann, 1909 (part): 31;
Scolopendropsis calcaratus — Brölemann, 1909: 32;
Scolopendropsis bahiensis — Chamberlin, 1914: 152 (part), 154 (part), 182;
Scolopendropsis calcaratus — Chamberlin, 1914: 152, 154, 183;
Scolopopendropsis (sic!) *calcaratus* — Chamberlin, 1914: 152;
Rhoda calcarata — Attems 1930: 119;
Scolopendropsis bahiensis — Attems, 1930: 121;
Rhoda calcarata — Bücherl, 1939: 253;
Scolopendropsis bahiensis — Bücherl, 1939: 254;
Rhoda c. calcarata — Bücherl, 1941a: 126;
Rhoda calcarata — Bücherl, 1941a: 127;
Rhoda calcarata — Bücherl, 1941b: 303;
Rhoda c. calcarata — Bücherl, 1941b: 304;
Scolopendropsis bahiensis — Bücherl, 1941b: 304;
Scolopendropsis bahiensis — Bücherl, 1974: 109;
Rhoda calcarata — Bücherl, 1950: 173, 183;
Rhoda calcarata — Bücherl, 1974: 103;
Rhoda calcarata — Schileyko & Stagl, 2004: 111.

MATERIAL. N 372, [Brazil,] Bahia, 1840, [leg.?] Luschath[?], [det. J.-F. Brandt,] [vid.] V. Soldatov, 1 adult.

DIAGNOSIS. 23 or 21 leg-bearing segments with 10 or 9 pairs of spiracles, respectively; spiracles on segments 3, 5, 8, 10, 12, 14, 16, 18, 20 and on 22 when 23 leg-bearing segments (i.e. 7th segment lacking spiracles); 4 ocelli on each side of cephalic plate. Locomotory legs with tarsus 1 twice shorter than tarsus 2.

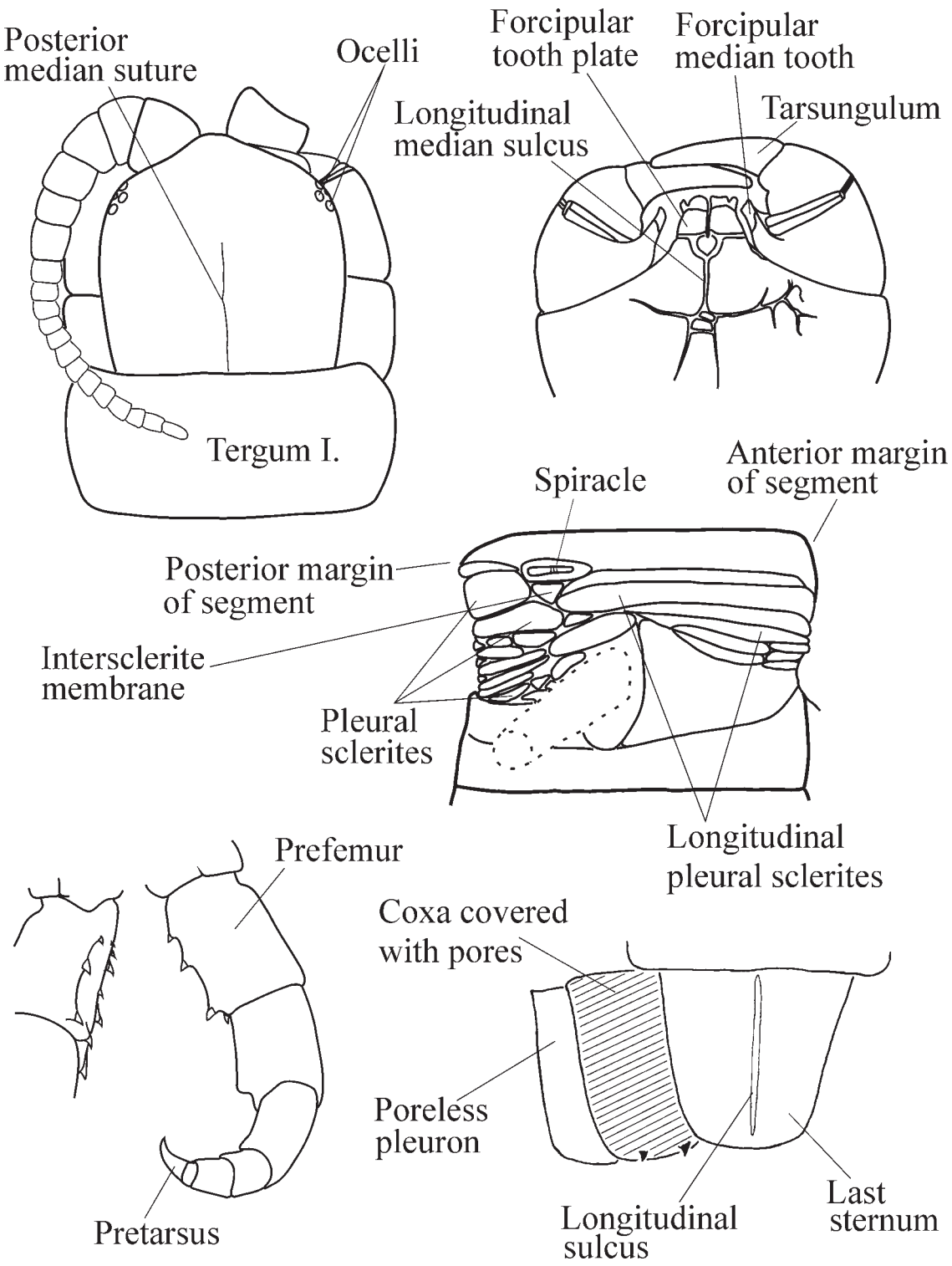
REDESCRIPTION OF THE HOLOTYPE. Length of body 80 mm, length of somewhat curved ultimate legs about 12 mm. Colour in ethanol: body uniformly yellow-brownish; head, tergum 1, tergum 23 and ultimate legs darker. 23 leg-bearing segments. Anisotergy best developed in anterior body third as in other Scolopendromorpha.

Antennae. Short, just reaching the anterior margin of tergum 2. Left antenna (Fig. 2) consisting of 19, right one of 18, antennomeres; terminal antennomere broken off. Six basal antennomeres in both antennae virtually glabrous, subsequent antennomeres densely microsetose. Basal half of each antenna flattened dorsoventrally.

Head. Cephalic plate relatively small, with only an incomplete posterior median suture (Fig. 2). Cephalic posterior margin clearly covered with tergum 1. Each side of head with four ocelli of usual configuration (Fig. 2).

Maxillae II. Pretarsus with two accessory spurs, the one positioned dorsally visibly shorter; upper edge of apical telomere with a weak dorsal brush. Telomere 2 with a usual distal spur. Coxosternum with a well-developed median sulcus.

Forcipules of maxillipedes. Clearly visible in dorsal view (Fig. 2). Coxosternum with a single longitudinal median sulcus bifurcating in mid region of coxosternum, where it is crossed by a transverse sulcus (Fig. 2). Coxosternal tooth plates twice as high as wide basally, basal sutures forming a straight line. Each tooth plate with a clearly isolated lateral tooth and a solid median part (probably a result of wear) (Fig. 3). A large median tooth of trochanteroprefemur somewhat lower than tooth plate, pointed apically, left tooth with a single well-produced median tubercle. Tarsungulum of



Figs 2–6. *Scolopendropsis bahiensis* (Brandt, 1841), holotype: 2 — headplate and tergum 1, dorsal view; 3 — forcipular segment, ventral view; 4 — right pleuron of midbody segment, lateral view; 5 — ultimate legs: the left in ventral, the right in ventromedial view; 6 — schematic presentation of posterior body end (sternum 21 and right coxopleuron), ventral view.

Рис. 2–6. *Scolopendropsis bahiensis* (Brandt, 1841), голотип: 2 — головной щиток и тергит 1, вид сверху; 3 — ногочелюстной сегмент, вид снизу; 4 — правый плейрит среднетуловищного сегмента, вид сбоку; 5 — последние ноги: левая снизу, правая снизу и медиально; 6 — схематическое представление заднего конца тела (последний стернит и правый плейрит), вид снизу.

normal length, obtuse apically. (Because in the many dozens of examples of various scolopendromorph species examined such obtuse forcipules of maxillipedes appear to only occur in larger adults, this likewise seems to be a result of wear.)

Terga. Preterga absent. Tergum 1 not sutured (Fig. 2), terga 2–22 with complete paramedian sutures; tergum 23 with a slightly rounded posterior margin and a complete longitudinal median suture. Only this tergum margined laterally, 1.5 times as long as penultimate tergum.

Sterna 2–22 with well-developed, complete, paramedian sutures. Sternum 23 virtually trapezoidal, its anterior margin slightly shorter than longitudinal length, while its posterior margin straight with corners slightly rounded.

Pleura. Anterior part of pleuron of very special structure (Fig. 4), being composed of several longitudinal sclerites coaxial with body axis. No intersclerite membrane visible between these sclerites.

Spiracles. Opening narrow (relatively to other Scolopendrinae) and with a typical flap consisting of three clearly recognisable parts (Fig. 4). First spiracle slightly longer, second one slightly shorter, than half the length of the segments on which they occur. The sizes of the following spiracles decrease rapidly.

Locomotory legs. Tarsus 1 about half as long as tarsus 2, latter as long as pretarsus. Two large accessory spurs. Slightly more than distal 2/3 of pretarsus dark brown, contrasting with a pale basal part (after preservation in alcohol for more than 160 years). Ventral surface of that dark part of pretarsus bearing two sharp parallel ridges. No tarsal spur recognised on left leg 1, distal half of right leg 1 missing. Legs 2–7 lost; one tarsal spur present on tarsus 1 of legs 8–21. (Brölemann [1897], Kraepelin [1903] and Attems [1930] noted a complete absence of these spurs.) Penultimate legs without tarsal spurs.

Ultimate segment. Strongly enlarged, nearly twice as long as penultimate.

Coxopleuron. Coxa partly separated from a well-developed pleuron (Fig. 6) by a clear longitudinal sulcus (in other scolopendromorph genera, this sulcus is reduced to various degrees, up to complete absence). Posterior coxopleural margin straight, without any traces of a coxopleural process, but with a small spine in its place. Another smaller, nearly rudimentary posterior spine situated more laterally, close to border with pleura. Entire coxal surface densely beset with small pores, with a very narrow, poreless, marginal strip posteriorly; pleuron without pores (Fig. 6). Both sternum 23 and adjacent coxae forming a common flat surface, being closely pressed to each other.

Ultimate legs. Extremely stout, pincer-shaped, with tarsomeres equally long and pretarsus clearly longer than tarsus 1 or 2 (Fig. 5). Both prefemur and femur triangular in cross-section, with dorsal and medial faces flattened. Two large spines at prefemoral dorsomedial edge, latter with a well-developed corner spine which bears two apical spines. Femur without spines; prefemoral ventromedial edge with three spines, their sizes increasing caudad (Fig. 5); four small spines located on medial face. Tarsal spur absent. Pretarsus large, claw-shaped, with a sharply serrate ridge ventrally. Two rudimentary accessory spurs at base of pretarsus.

RANGE. The form with 23 leg-bearing segments occurs Brazil: Bahia (terra typica), Minais Gerais (Fig. 1). Bücherl [1939] mentioned that *S. bahiensis* occurs in "estados Bahia e Pernambuco" (Fig. 1).

REMARKS. All leg-bearing segments of the holotype are developed completely (at least externally) and have no traces of any morphological abnormalities.

The relationships of *Scolopendropsis*, *Rhoda* and *Pithopus*, the species to be referred to *Scolopendropsis* and *Rhoda*

The following species (all from Brazil) are to be referred to the genera *Scolopendropsis* and *Rhoda*:

(1). *Scolopendropsis bahiensis* (Brandt, 1841) — holotype and one more, Brölemann's (MNHN) specimen from Bahia state (Fig. 1); further eight specimens collected recently by Amazonas Chagas, Jr. in southern Bahia and Minais Gerais states. Attems [1930: 121] supposed an identity of *R. thayeri* and *S. bahiensis*, stating this could be a single, "segmentally dimophic" species ["in Bezug auf die Segmentzahl dimorphen Art"]. Locomotory legs with tarsal spurs.

(2). *Rhoda thayeri* Meinert, 1886 — an unknown number of syntypes from Santarem, Pará state (Fig. 1). Bücherl [1941b] noted an unknown number of specimens from Iguarassú, Pernambuco state and "Vitória and Colatina", both Espírito Santo state (Fig. 1). This species must be rather usual within the common distribution area of *Rhoda* [Amazonas Chagas, personal communication]. Locomotory legs without tarsal spurs.

(3). *Pithopus calcaratus* Pocock, 1891 — holotype from Bahia state. Numerous specimens are recorded from Pará, Mato Grosso, Ceará, Rio Grande do Norte, Pernambuco, Alagoas, Bahia and Espírito Santo states (Fig. 1). Bücherl [1943] recorded "*Rhoda c. calcarata* (non Bücherl, 1941)" from Peru (Amancais near Lima, Fig. 1), which seems to be the only non-Brazilian report of *Rhoda*. Locomotory legs with tarsal spurs.

(4). *Pithopus inermis* Pocock, 1891 — only two syntypes from Iguarassú, Pernambuco state are known. Brölemann [1909] referred to *P. inermis* as a synonym of *S. bahiensis*. Attems [1930] synonymised this name with *Rhoda thayeri*. Locomotory legs without tarsal spurs.

(5). *Rhoda isolata* Chamberlin, 1958 — two syntypes from Santa Isabel, Ilha do Bananal, Goiás state (Fig. 1). Chamberlin wrote [op. cit., p. 57]: "In general structure this species agrees with *R. calcarata* (Pocock) but a smaller and darker species differing in having the paired dorsal sulci [sutures] beginning on tergite 1 instead of on 2, in having [tergum] 3 equal in length to [tergum] 4 and shorter than 5 instead of having 4 longer than either 3 or 5, and also in having the claws of the prehensors when closed not surpassing the anterior margin of the head". Locomotory legs with tarsal spurs.

(6). *Cupipes spinifer* Kraepelin, 1903 (or *Arthrorhabdus spinifer* sensu Attems [1930]) — a single specimen described from the state of Pará ("Mus. Hamburg", see Kraepelin [1903: 176]). This form has been referred to by Shelley & Chagas [2004] as *Rhoda spinifer*. Locomotory legs with tarsal spurs.

As noted above, the genus *Rhoda* was first established for *R. thayeri*. The original description [Meinert, 1886: 188] is very short and lacks some important details, first of all concerning the presence or absence

of tarsal spurs of the locomotory legs. A recent re-examination of the type series [Amazonas Chagas, personal communication] showed complete absence of these structures.

Pocock [1891: 223] renamed *Rhoda* into *Pithopus*, suggesting the former was a nomen praeoccupatum ("*Rhode*, Simon, Arachnida, 1882; *Rhodea*, Adams, Mollusca, 1857"). Two other species, both from Bahia, were also described therein, i.e. *Pithopus inermis* and *P. calcaratus*. Concerning the latter species, the only difference noted in its original description reads as follows: "It differs [from *inermis*], however, in having the proximal tarsal segment of its legs armed beneath with a spur"). Further below Pocock [1891: 225] stated: "The diagnosis of *P*[*ithopus*] *Thayeri*, Meinert (sub *Rhoda*), is too brief for the satisfactory determination of the species. Consequently either of the two here described may prove to be synonymous with it". He also noted "the close similarity that exists between the description of *P. calcaratus* and that of *Scolopendropsis bahiensis*".

Brölemann [1897] described another specimen of *Scolopendropsis bahiensis* (length about 60 mm), giving no precise locality (mentioning only "dans les environs de Bahia"), but later [Brölemann, 1902b: 561] he mentioned "Santo-Antonio de Barra: Sertão de Bahia" (Fig.1) as the locality for *S. bahiensis*. According to Brölemann [1897], his specimen differed from the holotype only by the complete absence of tarsal spurs on the locomotory legs; thus *Scolopendropsis* is much closer to *Rhoda thayeri* than to *Pithopus calcaratus* (cf. Pocock [1891]). However, a recent restudy of Brölemann's material of *S. bahiensis* (N 404 in MNHN, Paris) shows that the locomotory legs do have tarsal spurs [J.-J. Geoffroy, personal communication]. Some later authors repeated Brölemann's error concerning the absence of tarsal spurs in *Scolopendropsis*. Summarising, Brölemann's specimen appears to be exactly the same form as Brandt's holotype.

Brölemann [1902b], without comment, transferred *P. calcaratus* into *Scolopendropsis*, but he did not formally synonymise *Pithopus* under *Scolopendropsis*. In 1909, however, he referred to *Pithopus inermis* as a synonym of *Scolopendropsis bahiensis*, and to *P. calcaratus* and *R. thayeri* as *S. calcaratus* and *S. thayeri*, respectively. Thus, by transferring *R. thayeri*, the type-species of *Rhoda*, to *Scolopendropsis*, Brölemann [1909] formally synonymised *Rhoda* under *Scolopendropsis*.

Kraepelin [1903] maintained *Pithopus* and *Scolopendropsis* as two different genera. He listed (p. 170) three species of *Pithopus*: *P. thayeri*, *P. calcaratus* and *P. inermis*. By stating that *P. thayeri* had not been described in due detail, he only included both latter species in his key. He also erred, following Brölemann [1897], that the locomotory legs lacked tarsal spurs in *Scolopendropsis*.

Chamberlin [1914] followed Brölemann [1902b, 1909] in using the name *Scolopendropsis* for all these species. He wrote: "Two species, the only valid ones known, occur in Brazil". These species are: (a) *Scolopendropsis bahiensis* with *Rhoda thayeri* and *Pithopus inermis* as its synonyms, and (b) *Scolopendropsis calcaratus*. Further we read [op. cit., p. 182]: "… an examination of the type of *thayeri* shows that it is the same as the *inermis* of Pocock and that both are the same as Brandt's *bahiensis* which has long priority. Through probable error twenty-three pairs of legs were attributed to Brandt's species, although the not very probable suggestion has been made that the species is dimorphic, having some individuals with twenty-three and others with twenty-one pairs of legs". The absence of tarsal spurs in the types of *R. thayeri* has been confirmed [Amazonas Chagas, personal communication].

Attems [1930: 118] reinstated *Rhoda* and distinguished it from *Scolopendropsis* (versus both Brölemann and Chamberlin). He synonymised *Pithopus* under *Rhoda*, referred to *Pithopus inermis* (= *Rhoda inermis*) as a synonym of *R. thayeri* (the type-species), and noted very close resemblance of the latter to *calcarata* [op. cit., p. 120]. Repeating Brölemann's erroneous statement that *Scolopendropsis* had no tarsal spurs, Attems suggested [op. cit., p. 121] that *S. bahiensis* and *R. thayeri* represented a single, segmentally dimorphic species. However, he never formalised the latter synonymy.

Chamberlin [1958] again used *Rhoda* when he described his new species *R. isolata* from Goiás, while Bücherl [1939, 1941b, 1974] regarded *Rhoda* and *Scolopendropsis* as separate genera.

As the result of a re-examination of the types of *Pithopus*, the holotype of *P. calcaratus* agrees well with the original description, which in its turn matches in every detail, except for the number of leg-bearing segments, that of *Scolopendropsis*. Lewis [personal communication] observed that the types of *Pithopus inermis* and *P. calcaratus* are virtually identical apart from the absence of tarsal spurs in *P. inermis*. There is only one syntype of *P. inermis* (length 58 mm) in NHML, and it agrees well with the original description and has an old label which reads "Iguarassú, Ramage coll.". This restudied specimen is incorrectly labelled as *Pithopus spinosus* [nom. nudum], but it is logical to suppose it to be Pocock's syntype due to its characteristics, locus typicus and place of its deposition.

A re-examination of the material of *Rhoda calcarata* (Pocock, 1891) preserved in NHMW (NN 995-997) showed the following minor differences between them and the holotype of *Scolopendropsis bahiensis*: 19-21 antennomeres; pretarsus of locomotory legs slightly shorter than tarsus 1, latter usually clearly shorter than tarsus 2, sometimes almost as long as tarsus 1; both spines placed at posterior coxopleural margin in *R. calcarata* almost of the same size. That *R. calcarata* is a junior synonym of *S. bahiensis* is also suggested by the fact that Brölemann's [1897] specimen he identified as *S. bahiensis* was in the same vial as two normal (21-segmented) specimens of "*Pithopus calcaratus* Pocock", all three collected at "Santo-Antonio de Barra: Sertão de Bahia".

Taking in consideration the results of an analysis of the following 15 taxonomically important characters we consider *Pithopus calcaratus* (= *Rhoda calcarata*) Pocock, 1891 as a junior synonym of *Scolopendropsis bahiensis* (Brandt, 1841).

(1) general habitus of animal (including relatively small head and large forcipules, strongly enlarged ultimate segment and its enlarged pincer-shaped limbs),

(2) antennal structure, number of antennomeres,

(3) sulcation of cephalic capsule,

(4) well-developed median sulcus of coxosternum of maxilla II,

(5) structure and spurs of maxilla II,

(6) structure and sulcation of forcipular coxosternum,

(7) shape of sternal sutures, structure of the last sternum,

(8) very unusual structure of the pleura of leg-bearing segments (unique among Scolopendromorpha),

(9) 7th leg-bearing segment lacking spiracles,

(10) tarsus I of locomotory legs about half the length of tarsus II (unique combination among Scolopendromorpha),

(11) relative length of pretarsus of the locomotory legs,

(12) proportions of strongly enlarged ultimate leg-bearing segment,

(13) relative sizes and structure of coxopleuron, absence of posterior coxopleural process,

(14) well-developed complete longitudinal sulcus which divides coxopleural coxa from its pleuron,

(15) composition of very large, pincer-shaped ultimate legs and proportions of their joints.

Therefore, four valid species are to be referred to the genera *Scolopendropsis* and *Rhoda* at the moment: *Scolopendropsis bahiensis* (Brandt, 1841), *Rhoda thayeri* Meinert, 1886, *Rhoda isolata* Chamberlin, 1958 and *Rhoda spinifer* (Kraepelin, 1903). One can see that all real differences between these species (i.e. presence versus absence of tarsal spurs on the locomotory legs and of paramedian sutures on tergum I) are of specific level, so they appear to belong to a single genus, namely *Scolopendropsis*, which name has priority over its other synonyms. Moreover, it appears impossible to reliably draw two generic diagnoses, as both these "genera" contain species with tarsal spurs.

However, since we have not seen all of the relevant type material, especially that of *R. thayeri*, for the time being we prefer to maintain these two nominate genera: *Scolopendropsis* (monotypic) and *Rhoda* (three species).

As for such a "key-character" as the presence or absence of tarsal spurs on the locomotory legs, at least in *Scolopendropsis+Rhoda,* it is to be considered as only species-specific.

The taxonomic significance of tarsal spurs

In the majority of scolopendromorph genera, the locomotory legs are equipped with tarsal spurs, but there are genera in various lineages, in which these structures are absent. These are *Arrhabdotus* Attems, 1930 (Sterropristinae), *Cormocephalus* Newport, 1844 (+ *Hemiscolopendra* Kraepelin, 1903), *Campylostigmus* Ribaut, 1923 and *Notiasemus* L.E. Koch, 1985 (Scolopendrinae), all in Scolopendridae, *Ectonocryptops* Crabill, 1979 (Ectonocryptopinae) and *Tidops* Chamberlin, 1915 (Scolopocryptopinae) in Scolopocryptopidae, as well as *Cryptops* Leach, 1815 and *Paracryptops* Pocock, 1891 (Cryptopinae) in Cryptopidae.

However, in some genera, for example *Newportia* Gervais, 1847, even among closely related congeners there are some that have tarsal spurs, whereas some others lack them. For example, *Newportia stolli* (Pocock, 1896), but not *N. paraensis* Chamberlin, 1914, is supplied with tarsal spurs [Schileyko & Minelli, 1999]. In addition, two of some 70–80 species of *Otostigmus* Porat, 1876, namely *O.* (*Otostigmus*) *nudus* Pocock, 1890 and *O.* (*Otostigmus*) *taeniatus* Pocock, 1896, show no locomotory tarsal spurs, while in two other species, *O.* (*Parotostigmus*) *limbatus* Meinert, 1886 and *O.* (*Parotostigmus*) *inermipes* Porat, 1873, these spurs are absent or "barely visible" [Attems, 1930, "kaum sichtbar"].

The number of legs which bear these spurs can vary very widely in some genera. For example, in *Otostigmus* (Otostigminae) it varies from 0 to 21, i.e. all legs may have these spurs, including the ultimate ones as in *O.* (*O.*) *spinosus* Porat, 1876, *O.* (*O.*) *nemorensis* Silvestri, 1895, *O.* (*O.*) *chiltoni* Archey, 1921 or *O.* (*O.*) *sucki* Kraepelin, 1903.

Also in *Otostigmus*, there are congeners which have some leg pairs equipped with a single tarsal spur. Some other species show certain anterior leg pairs bearing two tarsal spurs, whereas the legs of some following pairs have only one spur (*O.* (*O.*) *spinosus*). In addition, there are species which have all legs armed with two tarsal spurs (in *O.* (*Parotostigmus*) *sulcatus* Meinert, 1886, legs 1–18 have two such spurs, while the remaining have none). Finally, all locomotory legs (i.e. pairs 1–20) can be supplied with two tarsal spurs (e.g. *O.* (*O.*) *chiltoni*).

The number of anterior leg-pairs with two tarsal spurs can vary considerably. Thus, according to Attems [1930], two tarsal spurs are present on legs 4–12(17) in *O.* (*O.*) *astenus* (Kohlrausch, 1881) and on legs 1–14(20) in *O.* (*O.*) *multidens* Haase, 1887.

There are examples of intraspecific variability in the presence of tarsal spurs. Thus, in the genus *Asanada* Meinert, 1886 (which, together with *Scolopendropsis*, belongs to the subfamily Scolopendrinae) these spurs can be present or totally absent in *A. brevicornis* Meinert, 1886. This also shows this character to be related to age, because Vietnamese juveniles of *A. brevicornis* have no tarsal spurs on the locomotory legs, whereas adults show them [Schileyko, 1995].

Summarizing, some genera can be separated by the presence or absence of tarsal spurs. In other genera, such as *Rhoda*, certain species can be distinguished by the same character or by the number of legs which bear

these spurs. Finally, both these characters can vary intraspecifically.

The taxonomic significance of leg number and a dimorphic nature of *Scolopendropsis bahiensis*

The number of leg-bearing segments has traditionally been taken as a high-level taxonomic character in scolopendromorph systematics [Schileyko, 1992, 1996; Schileyko & Pavlinov, 1997], but it appears to never "work alone". For example, it is used to separate subfamilies in Scolopendromorpha in combination with such other important characters as the number of spiracles, presence of ocelli etc. As shown here, it only seems to be the sole difference between *Scolopendropsis* and "*Rhoda calcarata*".

Schileyko & Pavlinov [1997] suggested 21 leg-bearing segments to be the plesiomorphic condition for this character. In all clades these authors obtained, *Scolopendropsis* appears in the same monophyletic group with *Rhoda*, being much closer to the latter than to the other genera with 23 leg-bearing segments. But Minelli et al. [2000], revising the analysis provided by Schileyko & Pavlinov [1997], deleted this character from the reworked Schileyko & Pavlinov's matrix. They wrote [op cit., p. 112]: "Our strict consensus cladogram is very poorly resolved. In principle, it does not rule out the hypothesis that the presence of 23 pairs of legs in *Scolopendropsis* may be plesiomorphic within the Scolopendromorpha. One evolutionary step would have thus produced the 21 pair condition of most remaining genera. Reversal to 23 pairs may have occurred just once, at the base of a clade comprising … [all remaining genera with 23 leg pairs]".

However, Minelli et al. [2000], when describing a mechanism for the appearance of both 21-segment and 23-segment conditions, have shown themselves that the 21-condition is plesiomorphic (as the recent Scolopendromorpha could have evolved from an ancestral condition undergoing three-merous meromeric segmentation). "The problem remains, however, of deriving the Scolopendromorpha with 23 pairs of legs from those with 21 pairs of legs. If the degree of meromeric segmentation in the anterior part of the trunk is the same in the two groups (see above), then we must assume that the difference affects the last eosegments, possibly with eosegments 7 and 8 undergoing four-merous (rather than three-merous) meromeric segmentation " [op. cit., p. 113]. Further below they state: "It is quite possible that the very conspicuous variation observed in many species [of Geophilomorpha] is genetically controlled, at least in part".

So the appearance of scolopendromorphs with 23 leg-bearing segments from animals with 21 segments is supported by Minelli et al. [2000], who noted an "increasing degree of meromeric segmentation of the trunk" [op. cit., p. 114] as one of the main trends of centipede segmentation. The apomorphic condition of all other scolopendromorph genera with 23 leg pairs (but *Scolopendropsis*) is also supported by their high-level specialization (absence of eyes, fusion of tarsal joints etc.).

Hence there is at least one scolopendromorph species (*Scolopendropsis bahiensis*), which seems to include animals both with 21 and 23 leg-bearing segments.

Taking in consideration all above, and that there are no visible adaptive reasons for the appearance of two additional trunk segments, one may suggest that *Scolopendropsis* specimens with 23 segments result from spontaneous mutations. Perhaps there is some predisposition in the genome of this species to such a mutation. This is strongly confirmed by the presence of nine scolopendromorph genera whose species possess 23 segments and is well explicable in terms of meromeric segmentation. Obviously, the 23-legged condition is characteristic of the Scolopocryptopidae but is a rare mutation in Scolopendridae. As this somewhat reduces the taxonomic importance of the number of leg-bearing trunk segments, this character should not be used alone for separating scolopendromorph taxa.

IDENTIFICATION KEY TO THE SPECIES OF *SCOLOPENDROPSIS+RHODA*

1. Tergum I with paramedian sutures 2
– Tergum I without paramedian sutures 3
2. Tergum I with complete paramedian sutures; posterior margin of coxopleuron with small spines; forcipular coxosternum without transverse sulcus .... *Rhoda spinifer*
– Paramedian sutures of tergum I incomplete anteriorly; coxopleural spines absent; forcipular coxosternum with a transverse sulcus ..... *Rhoda isolata*
3. Locomotory legs with tarsal spurs .... *Scolopendropsis bahiensis*
– Locomotory legs without tarsal spurs ..... *Rhoda thayeri*

Conclusions

As a result of this study, *Roda calcarata* (Pocock, 1891) is shown to be a junior synonym of *Scolopendropsis bahiensis* (Brandt, 1841). This seems to be a "segmentally dimorphic" species. The taxonomic significance of the number of leg-bearing segments seems to be somewhat lower in the order Scolopendromorpha than thought previously. For formal reasons alone, *Scolopendropsis* (monotypic, with *S. bahiensis*) and *Rhoda* (with the species *thayeri*, *isolata* and *spinifer*) are still maintained as two independent genera, although it seems impossible to find any generic-level traits which would allow to keep these four closely related species within two genera.

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