

Description of a new species of the genus *Schizonampa* discovered in Martinique (Chilopoda, Geophilidae)

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<http://zoobank.org/CD001565-2777-445B-9601-E497DD4D1864>

(Accepté le 25.VII.2019 ; publié le 11.X.2019)

Abstract. – A new species of geophilomorph centipede of the genus *Schizonampa* Chamberlin, 1914, collected in Martinique Island (Lesser Antilles) is described: *S. barberi* n. sp. It is distinguished from other species of *Schizonampa* by a number of morphological characters, particularly its 47 to 51 pairs of legs, its larger size, number of coxal pores and the intermediate part of its labrum. With this discovery and other unpublished data, a provisional list of eight species for the order Geophilomorpha of Martinique is provided, with also a ninth unpublished species of the family Geophilidae.

Résumé. – **Description d'une nouvelle espèce du genre *Schizonampa* découverte en Martinique (Chilopoda, Geophilidae).** Une nouvelle espèce de Myriapode géophilomorphe provenant de Martinique (Antilles françaises), appartenant au genre *Schizonampa* Chamberlin, 1914, est décrite : *S. barberi* n. sp. Celle-ci se démarque des autres espèces du genre par plusieurs caractères morphologiques, dont notamment ses 47 à 51 paires de pattes, sa plus grande taille, ses pores coxaux et la partie médiane de son labre. Avec cette découverte et d'autres données inédites des auteurs, huit espèces sont aujourd'hui formellement identifiées pour l'ordre Geophilomorpha en Martinique et sont listées de manière provisoire. Une neuvième de la famille Geophilidae demeure inédite.

Keywords. – Geophilomorpha, neotropical fauna, Antilles, taxonomy, morphology.

The genus *Schizonampa* Chamberlin, 1914, includes four described species, all living in tropical and sub-tropical regions: *S. africana* Kraus, 1958, in Congo; *S. angolana* Chamberlin, 1951, in Angola; *S. libera* Foddai, Pereira & Minelli, 2000 [syn. *S. prognatha* (Crabill, 1964)] in Liberia; *S. manni* Chamberlin, 1914, in Brazil (CHAMBERLIN, 1914, 1951, 1965; KRAUS, 1958; CRABILL, 1964; FODDAI *et al.*, 2000, 2004).

The centipedes of Martinique Island (Lesser Antilles) have been largely neglected. A recent dedicated contribution has been made, but it concerned exclusively the order Scolopendromorpha (SCHILEYKO *et al.*, 2018). This work included the description of two new species and a preliminary checklist of the 13 scolopendromorph species in Martinique. The limited information available about Chilopoda is, in general, marginal citations in papers on other neotropical areas not supported by large data sets (POCOCK, 1893; CHAMBERLIN, 1918; DEMANGE, 1981; DEMANGE & PEREIRA, 1985; PEREIRA, 1999; FODDAI *et al.*, 2000; CHAGAS-JÚNIOR *et al.*, 2014; BONATO *et al.*, 2016). There is still extensive work to accomplish on the centipedes of Martinique, particularly on the Geophilomorpha, that potentially have the highest species diversity.

The first specimen of an unknown species of the genus *Schizonampa*, from the Piton Boucher, was identified by the first author at the beginning of 2018. Then, thanks to the *Association Martinique Entomologie*, fieldwork with collecting in various areas of Martinique for centipedes was made at the beginning of 2019 by the authors. Numerous other samples have been collected by the second author between 2015 and 2018, namely during the project of an

inventory of invertebrate diversity of the Integral Biological Reserve of the Pitons du Carbet (Martinique Island). All this material allowed us to find other specimens of the same species of *Schizonampa*, which we immediately distinguished from the other geophilomorphs. We have therefore hypothesized they belong to a new species, the description of which is given here.

MATERIAL AND METHODS

Most of the specimens were collected from soil and litter, either by sieving or by Berlèse-Tullgren extraction. However, a few specimens were hand collected in favourable micro-habitats (under litter and dead wood on the soil, and in the upper horizons of the soil). All specimens have been preserved in 70° ethanol.

A trinocular lens Motic SMZ-168-TLED with a magnification from 7 to 50 times has been used for the observation of the majority of the characters, but the labrum, mandibles and maxillae have been examined with a Paralux microscope (magnification of 100 and 400 times) as well as the study of the sternal and coxal pores. The following references were consulted: CHAMBERLIN (1914, 1951, 1965), ATTEMS (1929), KRAUS (1958), CRABILL (1964) and FODDAI *et al.* (2000). The taxonomy is based on BONATO *et al.* (2016). The figures in this paper result from magnified pictures taken with the trinocular lens and a Moticam 5 digital camera, and the focus stacking of the Combine ZP software (HADLEY, 2010). Measurements have been made with a micrometer graduated to 0.1 mm.

As the four species already described in the genus *Schizonampa* are very different from the specimens from Martinique, we did not consider it necessary to carry out a revision of their type material. A fortiori, *Schizonampa manni*, the only other neotropical species, has clearly distinctive morphological characteristics. Furthermore, we also submitted the description and all the figures of this paper to Lucio Bonato, recognized expert on the Geophilomorpha of the World, who has confirmed that our specimens belong to a new species.

The holotype and one paratype will be placed in the collection “Myriapodes & Onychophores” of the Muséum national d’Histoire naturelle de Paris (MNHN). The material is detailed in the results. Coordinates are from the WGS84 projection system. Immature specimens were not sexed if too young.

Abbreviations used. – EI, Étienne Iorio; MC, Mathieu Coulis; MNHN, Muséum national d’Histoire naturelle, Paris; a.s.l., altitude above sea level; P6B, P6C, P6I, P6K, P7B, P8E, P9D, references of the soil and litter samples (Berlèse-Tullgren extraction). Abbreviations used for the figures are detailed in the corresponding legend.

The morphological description essentially follows the terminology of BONATO *et al.* (2010).

RESULTS

Schizonampa barberi n. sp.

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HOLOTYPE: adult ♀, Martinique, Fond-Saint-Denis, piton Boucher, P6C, 21.V.2016, lat. 14.71461, long. -61.10500, 1058 m a.s.l., *leg.* MC, det. EI (MNHN).

PARATYPES: 1 adult ♂, *idem* holotype, P6B (MNHN); 4 immatures, *idem* (coll. MC); 1 immature ♀, 1 immature ♂, *idem*, P6I, lat. 14.71461, long. -61.10501, 1059 m a.s.l. (coll. EI); 5 immatures, *idem* (coll. MC); 1 immature, *idem*, P6K, (coll. MC); 1 adult ♂, *idem* holotype, hand collecting (coll. MC); 2 immature ♂, Saint-Joseph, plateau Perdrix, P7B, 22.III.2017, lat. 14.68827, long. -61.08060, 550 m a.s.l., *leg.* MC, det. EI (coll. EI); 1 immature, Schœlcher, plateau Clarck, P8E, 3.X.2016, lat. 14.68206, long. -61.10365, 531 m a.s.l., *leg.* MC, det. EI (coll. MC); 1 immature, Schœlcher, plateau Concorde, P9D, 4.X.2018, lat. 14.67912, long. -61.10634, 582 m a.s.l., *leg.* MC, det. EI (coll. MC).

Diagnosis. – Body-length up to 24 mm; 47 to 51 pairs of legs. Head 1.4 to 1.5 times longer than wide. Labrum with 7 to 8 teeth on the intermediate part. First maxillae with a pair of external lappets and second maxillae with an external denticle on the distal edge of the first

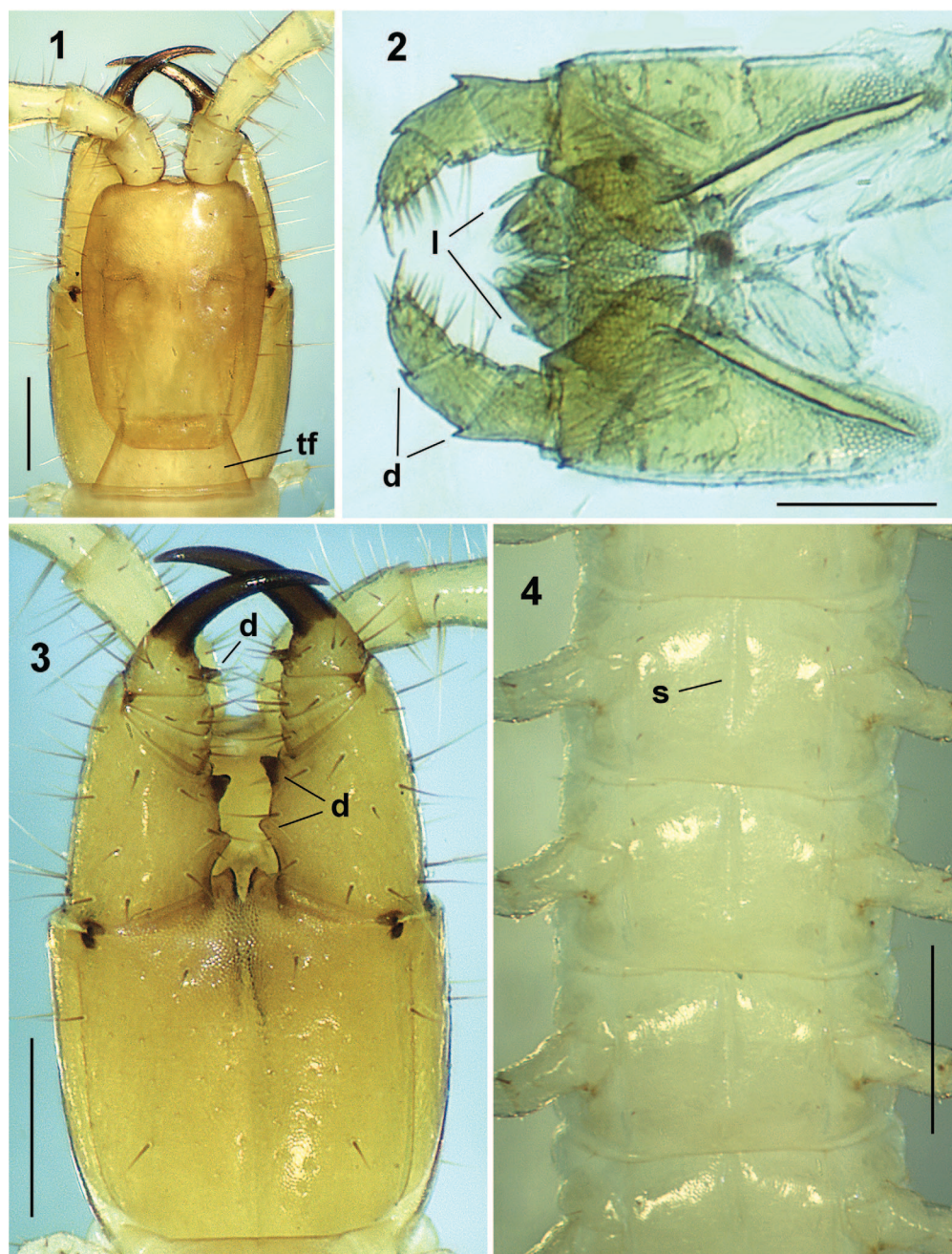


Fig. 1-4. – *Schizonampa barberi* n. sp., holotype female. – 1, Head and forcipular segment, dorsal view (scale bar = 0.3 mm); tf = tergite of the forcipular segment. – 2, First and second maxillae, ventral view (scale bar = 0.2 mm); d = denticles; l = lappets. – 3, Forcipules, ventral view (scale bar = 0.4 mm); d = denticles. – 4, Sternites of the 8th to 10th leg-bearing segments (scale bar = 0.4 mm); s = sulcus.

and second articles. Forcipular tergite of trapezoidal shape. Forcipular trochanteroprefemur with two denticles, a proximal and a distal one; also a denticle on the base of the forcipular claw. Sternites without pore-fields. Penultimate pair of legs with a normal claw and telopodite of the last pair with a minute seventh article but without claw. 3 + 3 to 4 + 4 coxal pores on last legs. No anal pores.

Derivatio nominis. – The name of this species is dedicated to our very kind myriapodologist colleague Tony Barber, who already had helped us several times with the second reading of our manuscripts and the correction of our English language. Again, he has read and corrected the present work.

Description of the holotype. – 51 pairs of legs. Body-length 24 mm. Body and legs pale yellow and head darker, orange to orange reddish.

Head 1.5 times longer than wide (0.9 mm long, 0.6 mm wide) (fig. 1). Antennae with 14 articles, fairly long, up to 3.2 mm, hence 3.55 times the length of the head; the last article being almost twice as long as the penultimate. Areolate part of the clypeus present but narrow, with 4 setae clearly visible only with a high magnification (400 times). Tripartite labrum, with 8 teeth on the intermediate part and with 12 + 11 long bristles on the lateral parts; the posterior margin of the intermediate part being convex. Mandibles without dentate lamella, with only a pectinate lamella having 19 subcylindrical and slender projections. First maxillae with a pair of external lappets on the distal edge of the basal articles (fig. 2); the basal article being distinct even if poorly/partially individualized, short and not as large as the apical article. Second maxillae with separated coxosternites, with parastatuminal sutures and with a clear external denticle on the distal edge of the first and second articles (fig. 2). Third article of the second maxillae with fairly numerous setae on the internal margin and with a long apical claw.

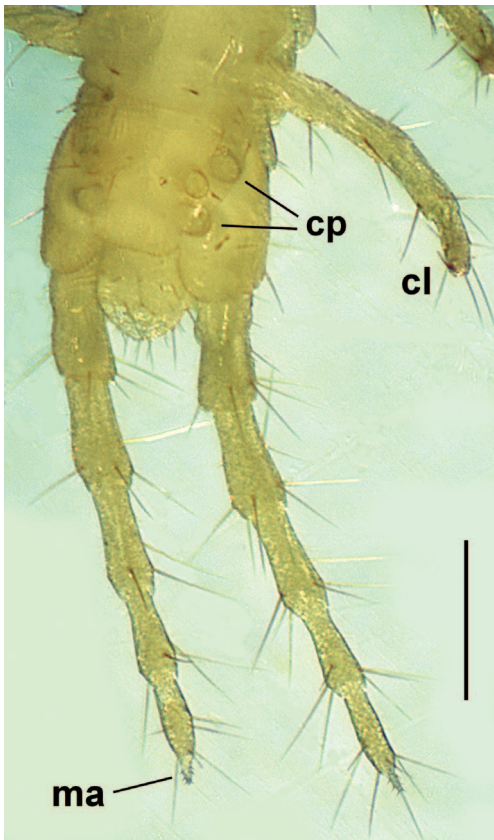


Fig. 5. – *Schizonampa barberi* n. sp., holotype female, two last leg-bearing segments (scale bar = 0.3 mm); cl = claw; cp = coxal pores; ma = minute supplementary article of the telopodite of ultimate legs.

Forcipules with a rather narrow tergite, distinctly of trapezoidal shape (fig. 1); with their anterior and posterior edges being covered by the cephalic plate and the tergite of the first leg-bearing segment respectively. Chitin-lines of the forcipular coxosternite present, sub-rectilinear and sub-parallel to the outer margins (fig. 3). Distal edge of the coxosternite with two teeth. Two stout denticles on the internal side of the trochanteroprefemur: one proximal and one distal, the latter being strongly sclerified (fig. 3). A fairly stout denticle on the internal base of the forcipular claw, which is smooth (with a magnification of 400 times, some very weak sections can be seen; but these must be considered as insignificant) (fig. 3).

Pretergites of the trunk without any sulcus. Metatergites with two longitudinal-paramedian sulci, poorly visible to almost absent on the antepenultimate and penultimate leg-bearing segments, absent on the last leg-bearing segment. Sternites without pore-fields and without a carpophagus structure, but with a longitudinal-median sulcus (fig. 4).

Legs, including those of the penultimate leg-bearing segment, having a normal claw, which is relatively long (fig. 5). Last coxae with 4 + 4 pores largely covered by a last sternite of trapezoidal shape; 3 + 3 of these pores are very distinct and 2 + 2 of these latter are of large size (fig. 5). Fourth pore located

anteriorly to the others, smaller and poorly visible. Telopodite of last legs with a seventh minute article, this having several minute setae but lacking a claw (fig. 5). No anal pores.

Description of the paratypes. – Forty-seven to 51 pairs of legs. Body-length from 20 to 22 mm in the two other clearly adult specimens, and 9.5 to 16.5 mm in the immatures. Habitus identical to the holotype, with the exception of the very young immatures which are paler than the others.

Head from 1.4 to 1.5 time longer than wide. Antennae reaching from 3.3 to 3.9 times the length of the head approximately. In the two adult paratypes, intermediate part of the labrum with 7 or 8 teeth and the lateral parts with 10 to 12 bristles (fig. 7). Immatures with 5 to 8 teeth and 4 to 8 bristles respectively; smaller immatures (9.5-13 mm) having a tendency to have only 5 or 6 teeth, the larger (15 to 16.5 mm) seeming to have 7 or 8 teeth like the adults. Mandibles with a pectinate lamella having approximately 17 to 22 slender projections (fig. 6). Maxillae of all specimens resembling those of the holotype.

All other characters identical to those of the holotype, with the exception of the coxal pores of the last legs. In the two adult paratypes and in almost all the immatures except four, the number of these pores is 3 + 3; one large immature of 16 mm has 4 + 3; an immature of 12 mm 3 + 2; three immatures from 9.5 to 12 mm 2 + 2. In the two adult males, gonopods long and slender; these gonopods being shorter and less well conformed in those males considered to be immatures.

Remarks. – The evidence that the new species belongs to the genus *Schizonampa* is particularly confirmed by: the presence of a pair of lappets on the first maxillae and of a clear external denticle on the two first articles of the telopodite of the second maxillae, these latter also having separated coxosternites; the aspect of the forcipules; the lack of pore-fields on the sternites; the distinct, minute seventh article of the telopodite of the last legs and the normal claw of the penultimate legs (CHAMBERLIN, 1914, 1965). As a secondary criterion, we can also mention that the ratio head length/head width is between 1.4 and 1.5 in all the *Schizonampa* species.

On the other hand, CHAMBERLIN (1914) has written that the genus *Schizonampa* is “without distinctly developed” chitin-lines on the coxosternite. At the view of the figure 3 of his plate 6 concerning *S. manni*, this species has in fact two chitin-lines as described in *S. barberi* n. sp., as well as figured for *S. africana* (KRAUS, 1958: fig. 2, p. 7) and for *S. libera* (CRABILL, 1964: fig. 2, p. 41). *S. angolana* remains unknown on this aspect, but it seems probable that all species of this genus have these chitin-lines.

Until now, only 2 + 2 large coxal pores on the last legs were known in the genus *Schizonampa* (CHAMBERLIN, 1914, 1951, 1965; KRAUS, 1958). Because no more pores than these were known

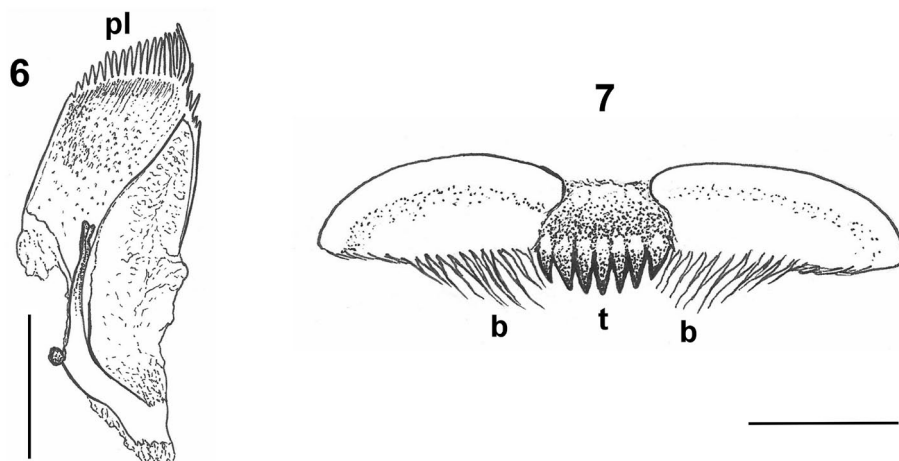


Fig. 6-7. – *Schizonampa barberi* n. sp., paratype male of Fond-Saint-Denis, Piton Boucher (n°P6B). – 6, Mandible (scale bar = 50 μ m); pl = pectinate lamella. – 7, Labrum (scale bar = 40 μ m); b = bristles, t = teeth.

in *Schizonampa* in the past, CHAMBERLIN (1965) included this character as a criterion for this genus by comparison with the genus *Schizotaenia* Cook, 1896; this latter having 3 + 3 or more (COOK, 1896; ATTEMS, 1929). However, in our opinion, when it concerns a difference of small numbers, this character is not reliable in separating two genera in the family Geophilidae, especially in comparison with the other characters noted above. For example, the genus *Geophilus* Leach, 1814, includes several species with very few coxal pores such as 2 + 2 or 3 + 3 and several with more pores than these and even sometimes many more and distributed on all of the ventral side of the coxopleura; or species with pores more localized but present on both the ventral and the dorsal surfaces of the coxopleura (e.g. BROLEMANN, 1930; IORIO & LABROCHE, 2015). Another example, with some species with a distribution closer to Martinique, is *Ribautia* Brölemann, 1909, which has wide variation in both the numbers and aspect of the coxal pores (e.g. DEMANGE, 1963; PEREIRA *et al.*, 1995; FODDAI *et al.*, 2002). In addition, in geophilids the number of coxal pores can vary even with the age of specimens, immatures generally having fewer pores than adults (EASON, 1964; GREGORY & BARBER, 2010).

Schizonampa barberi n. sp. is easily distinguished from other species of *Schizonampa* by its greater number of legs: 47 to 51 pairs *vs* 37 to 43 for the other described species of the genus. Its body-length is notably larger: adults of *S. barberi* n. sp. reaching 20 to 24 mm *vs* less than 15 mm for the others. It generally has 3 + 3 coxal pores or even 4 + 4, *vs* 2 + 2. Also, the intermediate part of its labrum with 7 or 8 teeth in adults and larger immatures is also useful for differentiation with regards to some species which have only 3 or 5 teeth on the same (*S. africana*, *S. manni*) (CHAMBERLIN, 1914, 1951, 1965; KRAUS, 1958; CRABILL, 1964).

Finally, another interesting point is that the three larger specimens (from 20 to 24 mm) have the highest number of legs (51) while the immatures and large immatures (from 9.5 to 16.5 mm) having from 47 to 49. Considering that all specimens are strictly identical in the rest of their morphology and that in the smallest (< 12 mm) it is very difficult or even impossible to see the gonopods, giving evidence of their immaturity, this phenomenon is probably a coincidence. This observation made on *S. barberi* has similarities with the observation made by DEMANGE (1963) on *Ribautia campestris* Demange, 1963 (Geophilidae). However, unlike in that case, we could not find any tendency for an increasing/decreasing number of legs with altitude: specimens with 47 to 49 pairs of legs have been found at the same altitude as the specimens with 51 pairs of legs and at lower altitude. Thus, at the present time there is no reason to propose a subspecific name for the specimens with less than 51 pairs of legs; if such a tendency exists, it would be necessary to study a large number of specimens to detect it.

Distribution and ecology. – *Schizonampa barberi* n. sp. is only known from Martinique at present. The genus *Schizonampa* has never been recorded from the other islands of the Lesser Antilles, including those that have been better studied such as Saint-Vincent and Guadeloupe (POCOCK, 1893; CHAMBERLIN, 1918; DEMANGE, 1981; DEMANGE & PEREIRA, 1985; PEREIRA *et al.*, 1995; FODDAI *et al.*, 2000, 2004; PEREIRA *et al.*, 1997, 2000; etc.). Taking into account the poor dispersal ability of Geophilomorpha, it is certain that this species has a restricted distribution and that it is very probably endemic to Martinique and nearby islands. However, more investigations on the neighbouring islands (Dominica and Saint Lucia) are essential to determine whether *S. barberi* is strictly endemic to Martinique or not. Within Martinique, the species is found only in the central mountain range of Pitons du Carbet (altitude > 500 m a.s.l.) which is covered by well-preserved tropical rain forest.

DISCUSSION

Up to now, no dedicated study has been carried out about the Geophilomorpha in Martinique. The discovery of *Schizonampa barberi* n. sp. also shows that this island of the Lesser Antilles has

significant interest in terms of this order of centipedes, even more so than for the Scolopendromorpha (SCHILEYKO *et al.*, 2018). The genus *Schizonampa* was unknown in the Antilles until now and contains five species in the world at present; *S. barberi* n. sp. and *S. manni* being the only two occurring in the neotropical area. In addition, our research led us to note that *S. angolana* is missing from the works of FODDAI *et al.* (2004) and of BONATO *et al.* (2016). These authors present only three of the four previously known species in this genus and it would be useful to update the taxonomic database “Chilobase” in the future (BONATO *et al.*, 2016).

Including the unpublished data of the authors (marked with a “(!)”), the number of geophilomorph species formally identified in Martinique is now increased to 8:

– *Ityphilus* sp. (Schendylidae) (!), possibly new; this genus has a high species richness in the neotropical area (>20 species);

– *Mecistocephalus guildingii* Newport, 1843 (Mecistocephalidae) (FODDAI *et al.*, 2000);

– *Notiphilides maximiliani* (Humbert & Saussure, 1870) (Oryidae) (BONATO *et al.*, 2016);

– *Schendylops varipictus* (Chamberlin, 1950) (Schendylidae) (!);

– *S. virgingordae* (Crabill, 1960), halophilous species (Schendylidae) (PEREIRA, 1999);

– *Schizonampa barberi* n. sp. (Geophilidae) (this paper);

– *Taeniolinum guadeloupensis* Demange & Pereira, 1985 (Schendylidae) (!);

– *Tygarrup javanicus* Attems, 1907 (Mecistocephalidae) (!).

We have also examined other specimens belonging to a species that is not listed above. It belongs to the large family Geophilidae but the genus is still undetermined at present, even after consulting other colleagues (L. Bonato, L. A. Pereira, pers. com.). It is likely that Martinique has more than ten species of Geophilomorpha. We hope to be able to pursue our research on this difficult order in the medium term, as well as to map the distribution of the different centipede species of Martinique. After only two recent contributions (SCHILEYKO *et al.*, 2018; this paper), it is interesting to note that this Island of only 1128 km² already reveals 22 species of Chilopoda.

ACKNOWLEDGMENTS. – We are very grateful to the *Direction de l'Environnement, de l'Aménagement et du Logement* (DEAL) for funding this project, to the association *Martinique Entomologie* for initiating it and for the help of all the volunteers of the association. We also thank our kind colleagues Tony Barber (British Myriapod and Isopod Group, Ivybridge, United Kingdom) and Ivan Tuf (Palacký University, Olomouc, Czech Republic), for their valuable help, as well as Lucio Bonato (University of Padova, Italy) who has checked our first version of the description and our figures and Luis Alberto Pereira (National Scientific and Technical Research Council, Buenos Aires, Argentina) for his useful information on *Schizonampa* at the beginning of our researches. Finally we thank the reviewers for their useful comments to improve the manuscript.

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