

## Two new polydesmoid millipedes from a whitesand forest area near Manaus, Central Amazonia, Brazil (Diplopoda, Polydesmida: Pyrgodesmidae, Fuhrmannodesmidae)

### Два новых вида полидесмоидных многоножек из участка леса на белом песке близ Манауса (Центральная Амазония, Бразилия) (Diplopoda, Polydesmida: Pyrgodesmidae, Fuhrmannodesmidae)

Sergei I. Golovatch  
С. И. Головач

Institute for Problems of Ecology and Evolution, Russian Academy of Sciences, Leninsky prospekt 33, Moscow 117071 Russia.  
Институт проблем экологии и эволюции РАН, Ленинский пр-т, 33, Москва 117071 Россия.

KEY WORDS: Diplopoda, Pyrgodesmidae, Fuhrmannodesmidae, new species, campina, Amazonia, Brazil.

КЛЮЧЕВЫЕ СЛОВА: Diplopoda, Pyrgodesmidae, Fuhrmannodesmidae, новые виды, кампина, Амазония, Бразилия.

ABSTRACT: Two new millipede species are described from a whitesand degraded forest patch near Manaus, Brazil: *Adisiella piffae* sp.n. (Pyrgodesmidae) and *Moojenodesmus arenicola* sp.n. (Fuhrmannodesmidae). Both new taxa differ from congeners chiefly by certain details of gonopod structure.

РЕЗЮМЕ: Из участка деградировавшего леса на белом песке близ Манауса (Бразилия) описаны два новых вида диплопод: *Adisiella piffae* sp.n. (Pyrgodesmidae) и *Moojenodesmus arenicola* sp.n. (Fuhrmannodesmidae). Оба новых таксона отличаются от конгенеричных видов прежде всего некоторыми деталями строения гоноподий.

#### Introduction

Although the millipede families Pyrgodesmidae and Fuhrmannodesmidae are certainly among the best-known as regards the fauna in the environs of Manaus, Brazil [e.g., Hoffman, 1985; Golovatch, 1992a, 1994, 1996a, b, 1997, 1999; Golovatch & Adis, 1998; Golovatch & Sierwald, 2001], virtually any reasonable collection from that region still proves to contain new species. This is especially true for such a peculiar habitat as whitesand degraded primary tropical rainforest, or campina, whence almost no diplopods have hitherto been reported [Golovatch, 1992b].

The present paper puts on record two new species taken by Prof. Dr. Joachim Adis and his collaborators in a campina plot near Manaus during a soil fauna survey in 1988.

Type material is largely housed in the Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil (INPA), with only a few paratypes retained for the collections of the Zoological

Museum of the Moscow State University, Moscow, Russia (ZMUM), Zoologisk Museum, University of Copenhagen, Denmark (ZMUC), and J. Adis (CA).

#### Descriptions

##### *Adisiella piffae* sp.n.

Figs 1–6.

Holotype ♂ (INPA), Brazil, Amazônas, environs of Manaus, Biological Reserve INPA/SUFRAMA (2°30'S, 60°10'W), whitesand degraded primary tropical rainforest on terra firme (= campina), Kempson soil extraction (K16 CPA), 19.02.1988, leg. J. Adis et al.

Paratypes: 1 ♀ (INPA), 1 ♂, 1 ♀ (ZMUM), same locality, together with holotype. — 3 ♂♂, 1 ♀ (INPA), 1 ♂ (ZMUC), 1 ♂ (CA), same locality, habitat and date (K10 CPA). — 1 ♀ (INPA), same locality, habitat and date (K23 CPA). — 1 ♂ (INPA), same locality, habitat and date (K15 CPA), all leg. J. Adis et al.

DIAGNOSIS: Differs from both hitherto known congeners by certain details of gonopod structure.

NAME: Honours Mrs. Piff Fitting, Columbia, Maryland, U.S.A., one of the closest friends of the Adis family.

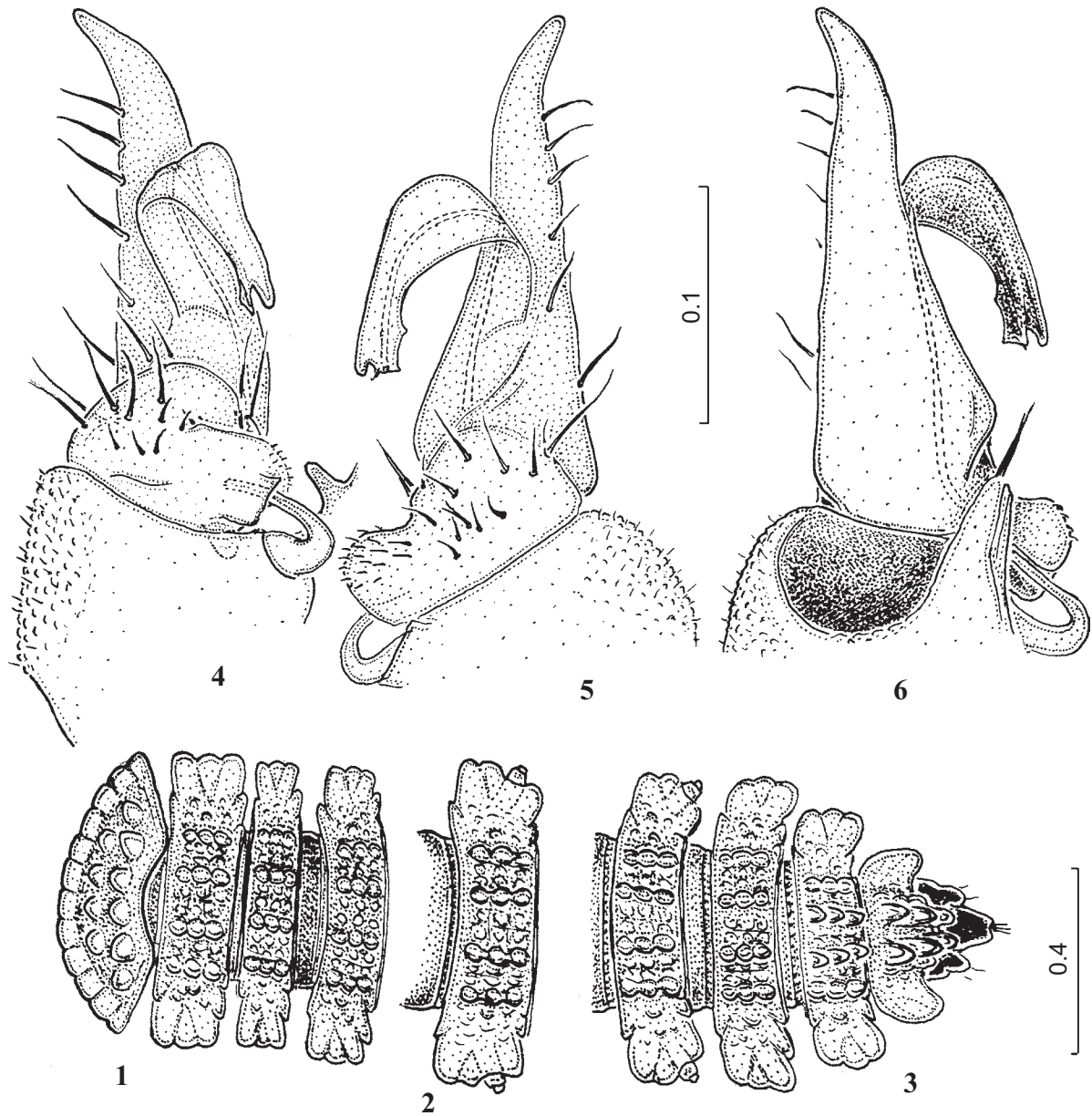
DESCRIPTION: Length ca. 4.5–5.2 mm (holotype 4.8 mm), width of midbody pro- and metazona 0.3–0.4 and 0.6–0.7 mm (GG, holotype 0.35 and 0.6), and 0.5 and 0.75 mm (EE), respectively. Coloration in alcohol entirely pallid, whitish to faintly grayish on vertex, larger metatergal tubercles and lateral edges of paraterga, apparently faded due to original preservation in picric acid.

Anterior edge of lobulations on collum upright and brim-like. All other peripheral features like in both hitherto known congeners (Figs 1–3) but metatergal tuberculation like in *A. circularis* Golovatch, 1999.

Gonopods (Figs 4–6) also more like in *A. circularis* but lateral femoral process a little shorter and conspicuously setose up to midway.

Epigynal ridge virtually absent.

REMARKS: The new species is a typical *Adisiella* [cf. Golovatch, 1999] and, based on the shape and size of the



Figs 1-6. *Adisiella piffae* sp.n., ♂ paratype: 1 — anterior body part (dorsal view), 2 — metatergum 10 (dorsal view), 14 — caudal body portion 4 (dorsal view), 4-6 — gonopods (caudal, subcaudal, and mesal views, resp.). Scale bars 0.4 (1-3) and 0.1 mm (4-6).

Рис. 12-17. *Adisiella piffae* sp.n., ♂ паратип: 1 — передняя часть тела (сверху), 2 — метатергит 10 (сверху), 3 — задняя часть тела (сверху), 4-6 — гоноподии (соответственно сзади, почти сзади и изнутри). Масштаб 0,4 (1-3) и 0,1 мм (4-6).

lateral gonofemoral process, it seems to occupy a position somewhat intermediate between both hitherto known congeners, *A. circularis* Golovatch, 1999 (the type species) and *A. geniculata* Golovatch, 1999. Yet by its gonopod being rather circular than geniculate coupled with the larger metatergal tubercles steadily growing toward the telson, *A. piffae* seems somewhat closer to *A. circularis*.

*Moojenodesmus arenicola* sp.n.

Figs 7-13.

Holotype ♂ (INPA), Brazil, Amazônas, environs of Manaus, Biological Reserve INPA/SUFRAMA (2°30'S, 60°10'W), white-

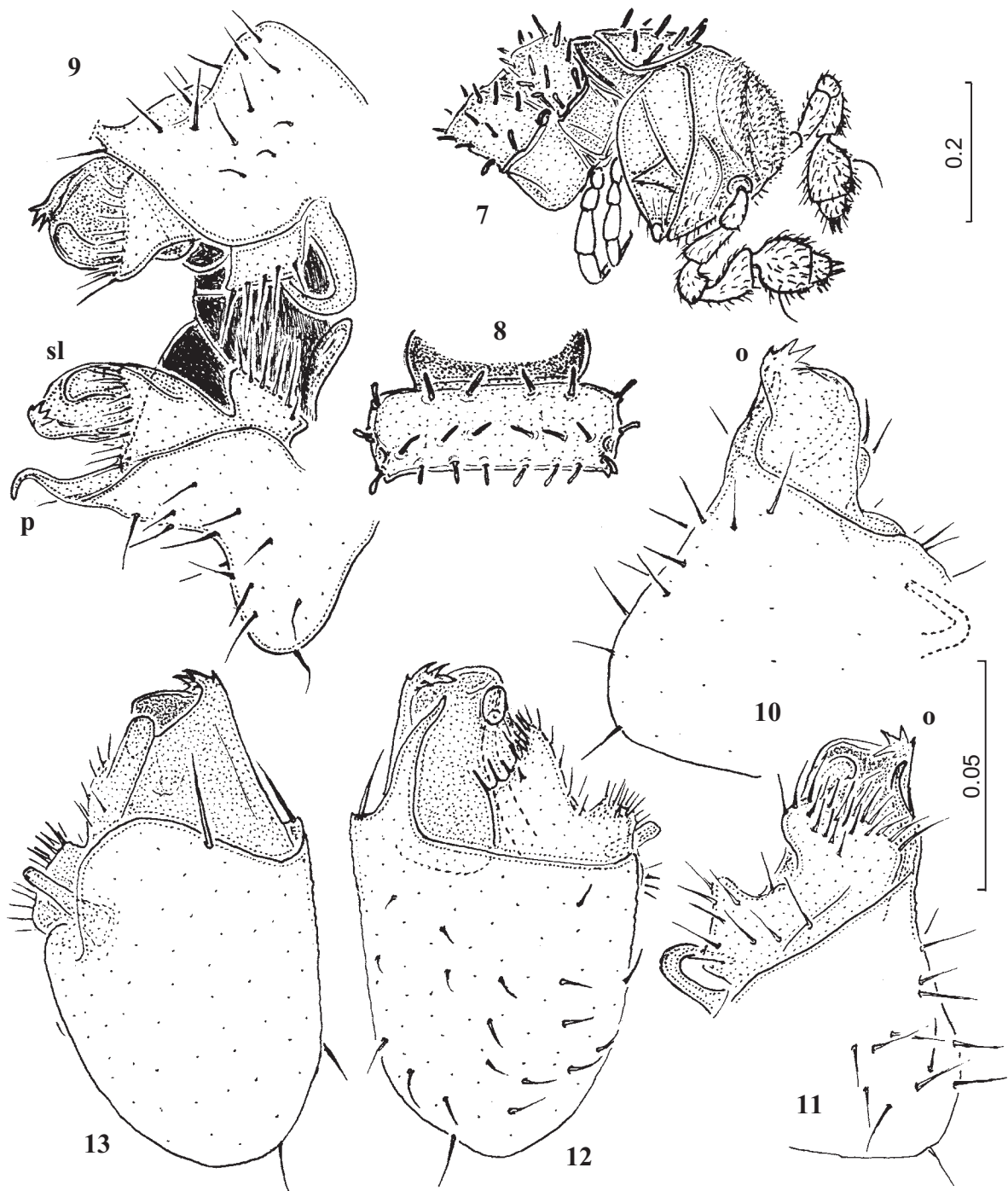
sand degraded primary tropical rainforest on terra firme (= campina), Kempson soil extraction (K28 CPA), 19.02.1988, leg. J. Adis et al.

Paratypes: 1 ♀ (INPA), 1 ♂, 1 ♀ (ZMUM), same locality, together with holotype. — 1 ♂, 1 ♂ fragm., 1 ♀ (INPA), same locality, habitat and date (K29 CPA). — 1 ♂ (INPA), 1 ♂ (CA), same locality, habitat and date (K26 CPA), all leg. J. Adis et al.

DIAGNOSIS: Differs from hitherto known congeners chiefly by certain details of gonopod structure.

NAME: Emphasizing the sandy habitat.

DESCRIPTION: Length ca. 3.5-4.0 (♂) to 5.0 mm (♀), width of midbody somites 0.3 and 0.5 (♂) to 0.4-0.45 and 0.6 mm (♀) on pro- and metazona, respectively. Holotype ca. 3.5 mm in length. Colour entirely pallid, whitish to pale pinkish



Figs 7–13. *Moojenodesmus arenicola* sp.n., ♂ paratype: 7 — anterior body part (lateral view), 8 — metatergite 10 (dorsal view), 9–13 — gonopods (caudal, lateral, mesal, sublateral, and submesal views, resp.). Scale bars 0.2 (7 & 8) and 0.05 mm (9–13).

Рис. 7–13. *Moojenodesmus arenicola* sp.n., ♂ паратип: 7 — передняя часть тела (сбоку), 8 — метатергит 10 (сверху), 9–13 — гоноподии (соответственно сзади, сбоку, изнутри, почти сбоку и почти изнутри). Масштаб 0,2 (7 и 8) и 0,05 мм (9–13).

or yellowish (alcohol material), brighter in anterior body portion, apparently faded due to original preservation in picric acid.

Body with 20 segments (♂, ♀). Head with a flattened frons and a relatively low, rounded, medial, densely micropilose hump above level of antennae (♂) (Fig. 7), or unmodi-

fied, with frons a bit more convex, densely and rather delicately setose (♀). Antennae relatively short, not too strongly clavate, in situ reaching up to midway of or, more seldom, beyond somite 3; antennomere 5 distodorsally distinctly sloping to support a rather modest group of bacilliform sensillae; antennomere 6 larger, with a similar distodorsal group of

sensillae; antennomere 7 with a minute, almost wanting, midway, dorsal knob (Fig. 7). Collum narrowest, with three usual rows of setae. Head subequal in width to somite 2, either a bit narrower than both somites 3 and 4, latter a bit narrower than somite 5. Body parallel-sided on somites 5–16(17), onward rather rapidly but gently tapering. Surface largely dull, shagreened, microreticulate. Disregarding collum, metaterga with well-developed (a little less so in ♀) lateral paraterga, latter set not too high (at about 1/3 midbody height, with dorsum a bit more convex in ♀), laterally incised at insertion points of tergal setae, with 2–3 incisions on each somite (Fig. 8). Paraterga more or less strongly obtusangular anteriorly, pointedly acutangular posteriorly, with caudal corner drawn back as a triangle already from somite 3, invariably within rear tergal contour until somite 15 or 16, onward increasingly strongly protruding beyond the contour, especially well so on somites 16–17, especially poorly so on somite 19. Tergal setae in three transverse rows, filiform to slightly claviform, medium-sized (Fig. 8), sometimes only barely longer in fore row on collum (Fig. 7) and in rear row on somite 19. Metatergal sculpture/bosses barely traceable. Ozo-pores vague, lying dorsolaterally (Fig. 8). Pleurosternal keels as rather prominent lappets only on GGsomite 2. Epiproct rather short, almost straight, digitiform. Subanal scale roundly subtrapeziform, with a pair of very long, paramedian, quite widely separated setae on knobs at caudal edge.

Sterna sparsely setose, unmodified. Epigynal ridge behind ♀ legpair 2 very low, blade-like, straight, traceable mostly due to somewhat elevated lateral corners. Legs relatively long and evidently incrassate due to all podomeres but tarsi, a bit longer and more strongly incrassate in ♂ as compared to ♀, only tarsi invariably slender and long, with neither tarsal papillae nor other evident modifications. In ♂ and ♀, legs ca. 2 and 1.5 times as long as body height, respectively. Particularly long, dorsal, tactile setae at least on most tibiae.

Gonopods (Figs 9–13) with strongly enlarged coxites concealing much of telopodite in their cavity. Each coxite rather sparsely setose laterally and with a rather long, slightly sigmoid, apicolateral process (**p**). Telopodites complex, transverse, each with setose front lobe, a higher rounded piece surmounted by a short dentate outgrowth (**o**) adjacent to **p**, and a very small, inconspicuous solenomerite (**sl**) distomesally.

Remarks: The rather prolific Neotropical genus *Moojenodesmus* Schubart, 1945 has hitherto been known to comprise nine species [cf. Golovatch, 1992a, 1994]. *M. arenicola* differs from congeners in the quite conspicuous apicolateral process on the gonocoxite combined with the peculiar conformation of the gonopod telopodite. The presence of an apicolateral process slightly broadens the diagnosis of the genus as given by Golovatch [1994].

ACKNOWLEDGMENTS: I am greatly obliged to both PD Dr. W. Junk and Prof. Dr. J. Adis who help me obtain grants from the Max-Planck-Society to regularly work at the Max-Planck-Institute for Limnology, Plön, Germany for over a decade in close collaboration with Dr. Adis. I wish to acknowledge the support rendered to me by the Max-Planck-Society as well as the great help and hospitality of my colleague and friend Dr. Joachim Adis, whose enthusiastic research in the Amazon region of Brazil has yielded highly important results.

## References

- Golovatch S.I. 1992a. Review of the Neotropical fauna of the millipede family Fuhrmannodesmidae, with the description of four new species from near Manaus, Central Amazonia, Brazil (Diplopoda, Polydesmida) // *Amazoniana*. Bd.12. H.2. S.207–226.
- Golovatch S.I. 1992b. Review of the Neotropical millipede genus *Onciurossoma* Silvestri, 1932, with the description of three new species from near Manaus, Central Amazonia, Brazil (Diplopoda, Polydesmida, Paradoxosomatidae) // *Ibid.* Bd.12. H.2. S.227–237.
- Golovatch S.I. 1994. Further new Fuhrmannodesmidae from the environs of Manaus, Central Amazonia, Brazil, with a revision of *Cryptogonodesmus* Silvestri, 1898 (Diplopoda, Polydesmida) // *Ibid.* Bd.13. H.1–2. S.131–161.
- Golovatch S.I. 1996a. Two new and one little-known species of the millipede family Pyrgodesmidae from near Manaus, Central Amazonia, Brazil (Diplopoda, Polydesmida) // *Ibid.* Bd.14. H.1–2. S.109–120.
- Golovatch S.I. 1996b. A new species of *Cutervodesmus* Kraus, 1957, from the environs of Manaus, Central Amazonia, Brazil, with notes on the genus (Diplopoda, Polydesmida, Fuhrmannodesmidae) // *Ibid.* Bd.14. H.1–2. S.137–141.
- Golovatch S.I. 1997. On some further Neotropical Pyrgodesmidae, partly from the environs of Manaus, Central Amazonia, Brazil (Diplopoda, Polydesmida) // *Ibid.* Bd.14. H.3–4. S.323–334.
- Golovatch S.I. 1999. On six new and some older Pyrgodesmidae from the environs of Manaus, Central Amazonia, Brazil (Diplopoda, Polydesmida) // *Ibid.* Bd.15. H.3–4. S.221–238.
- Golovatch S.I. & Adis J. 1998. Description of *Taulidesmella tabatinga* n.sp. (Diplopoda, Polydesmida, Pyrgodesmidae) from Amazon River floodplains, with notes on its distribution and ecology // *Ibid.* Bd.15. H.1–2. S.57–66.
- Golovatch S.I. & Sierwald P. 2001. Review of the millipede genus *Poratia* Cook & Cook, 1896 (Diplopoda: Polydesmida: Pyrgodesmidae) // *Arthropoda Selecta*. Vol.9 (for 2000). No.3. P.181–192.
- Hoffman R.L. 1985. A new millipede of the genus *Gonographis* from an inundation forest near Manaus, Brazil // *Amazoniana*. Bd.9. H.2. S.243–246.