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DIPLOPODA FROM RONDONIA, BRASIL. I. TWO NEW GENERA AND SPECIES OF SPIROSTREPTIDAE

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ABSTRACT

Two new genera of Spirostreptidae, and their type species, are described from Rondonia, Brasil. Exallostreptus vanzolinii *(type locality Nova Esperança) differs strikingly from other known genera in a number of important character systems and no related taxon can now be identified; it is one of the very few American spirostreptids having well-defined metazonal sigilla.* Guaporeptus paradisius *(type locality Alto Paraiso) is likewise a highly disjunct taxon, but some lines of affinity seem evident with the genus* Urostreptus, *in terms of peripheral characteristics.*

During November and December of 1983, Dr. P. E. Vanzolini participated in a biological survey ("Museu de Zoologia — Polonoroeste") of areas selected for development in the state of Rondonia. In addition to the collection of specimens in his own areas of interest, Dr. Vanzolini was so concerned as to pick up millipeds, which were subsequently sent to me for study. The majority of the localities sampled lie along the route of Brasilian highway 364 which extends across the state between Porto Velho and Vilhena.

Heretofore no Diplopoda have been recorded from Rondonia, a fact which helps explain why all of the many species obtained, and most of the genera, are undescribed. Althrough study of the material is incomplete, enough can be deduced to suggest that the fauna has some affinities with that of Mato Grosso, and some with the eastern Andes.

Most of the species sent to me belong in the enormous and poorly understood family Chelodesmidae, and some time may pass before the Rondonian forms can be adequately worked out, pending revision of the genera or tribes to which they belong. For the present, a beginning can be made with material of other families, and I commence here with two new genera and species of the Spirostreptidae, expressing my best thanks to Dr. Vanzolini for making the specimens available for study and arranging for publication of the results.

Exallostreptus, gen. n.

Type species: *Exallostreptus vanzolinii,* sp. n.

Name: A neologism composed of the Greek adjective *exallos* ("quite different") + the last two syllables of the generic name *Spirostreptus.*

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Diagnosis: A genus of large spirostreptids (the type species 160 mm long) characterized by the large number of ocelli (about 90 in each ocellarium), prominent lobes of the mandibular dentate lamella; presence of a single row of large, rounded, nearly contiguous sigilla; large thickened distal rims of the paraprocts which are medially separated by the true free edge of the sclerites; densely setose prefemora of the first pair of male legs; and terminal modification of the gonopod telopodite.

Remarks: This genus cannot be closely matched with any other known to me. The setose prefemora of the first male legs are shared only with the West African genus *Tomogonus,* which however seems to have no other close affinity with *Exallostreptus.* Very few known American spirostreptids have sigilla, but even so the presence of these enigmatic markings cannot be used at present to trace relationships since the necessary comparative studies of their occurrence vis-à-vis other characters have not been made. It is known that sigilla are relatively characteristic of most African genera, so perhaps a line of affinity is suggested by this feature if it is anything more than a mere random parallel development. The termination of the gonopod telopodite, although superficially suggesting that of such genera as *Orthoporus* and perhaps *Tubostreptus,* is absolutely unique within the family: the partially rolled apical lamina does not seem to be homologous with the "calyx" of *Orthoporus.* The mandibular teeth are larger in *E. vanzolinii* than in any other spirostreptid known to me (admittedly a complete survey for the entire family has not yet been made), suggesting the possibility of a specialized diet. The modification of the paraprocts is likewise an autapomorphy for the genus, in the sense that the thickened marginal "lips" do not touch but are held apart in a parallel position by the deeply inset true margin of the valves. All of the characters referred to here seem to be highly derived conditions, with the possible exception of sigilla. The point is emphasized that little comprehension of spirostreptid relationships will be achieved until many more taxa have been accounted, and far more attention paid by systematists to such details as mouthparts, sterna, stigmata, anterior male legs, and the genitalia of both sexes. Eventually *Exallostreptus* will be correctly fitted into its place in the overall picture, for the present it remains a fascinating enigma.

Exallostreptus vanzolinii, sp. n.

(Figures 1-7)

Material: Male holotype (MZUSP) from Nova Esperança (11.32 S, 61.07 W), Edo. Rondonia, Brasil; P. E. Vanzolini leg. 2-9 December 1983 (field number MZ-Polonoroeste 83-1874).

Name: For the collector, doyen of Neotropical herpetology and patron of many other branches of systematic zoology in Latin America.

Description: A large, extremely slender, spirostreptid with 65 segments, body ca. 160 mm long, most body segments 8.8 mm in diameter (increasing to 9.0 mm at collum), W/L ratio 5.5%. Color of preserved specimen: posterior half of metazona dark olive to piceous, remainder of segment, including a narrow posterior edge of metazona, rufous. Face, antennae, and legs varying shades of yellowish-brown.

Head, particularly frontal region, notably convex, 6.2 mm in maximum width. Occipital region with numerous fine longitudinal striations and ridges; epicranium distinctly rugulose-vermiculate, with median and interocellarial sutures distinct; face smooth but with numerous irregular, moderately deep grooves giving a roughened appearance at low magnification. Temporal region with a network of coarse anastomosing sharp ridges. Labroclypeal region with numerous

fine integumentary pores. Labrum with one median tooth and two vaguely defined paramedians, the edge otherwise straight. Four clypeal setiferous pits. Ocellaria large (2.5 mm in length), reniform-triangular, separated by a distance (2.0 mm) slightly less than one length, each with eight rows of ocelli with a total of about 90 in each cluster, the exact distribution difficult to establish owing to irregular, intercalated, and very small marginal ocelli, but on the order of 16-14-13-12-10-9-8-5. Interantennal space broad (3.1 mm), 50% of head width, and substantially wider than the interocellarial space. Antennae almost as long as body diameter (8.3 mm), the 2nd article largest and longest as usual in the family, articles 3-5 much shorter and strongly clavate, as broad distally as their length, 6th suboval in outline, narrower than 5th, somewhat compressed, 7th article very short, with four sensory cones. Articles 5 and 6 with large suboval sensory pits on outer distal surface. First article glabrous, others becoming increasingly setiferous up to 6th.

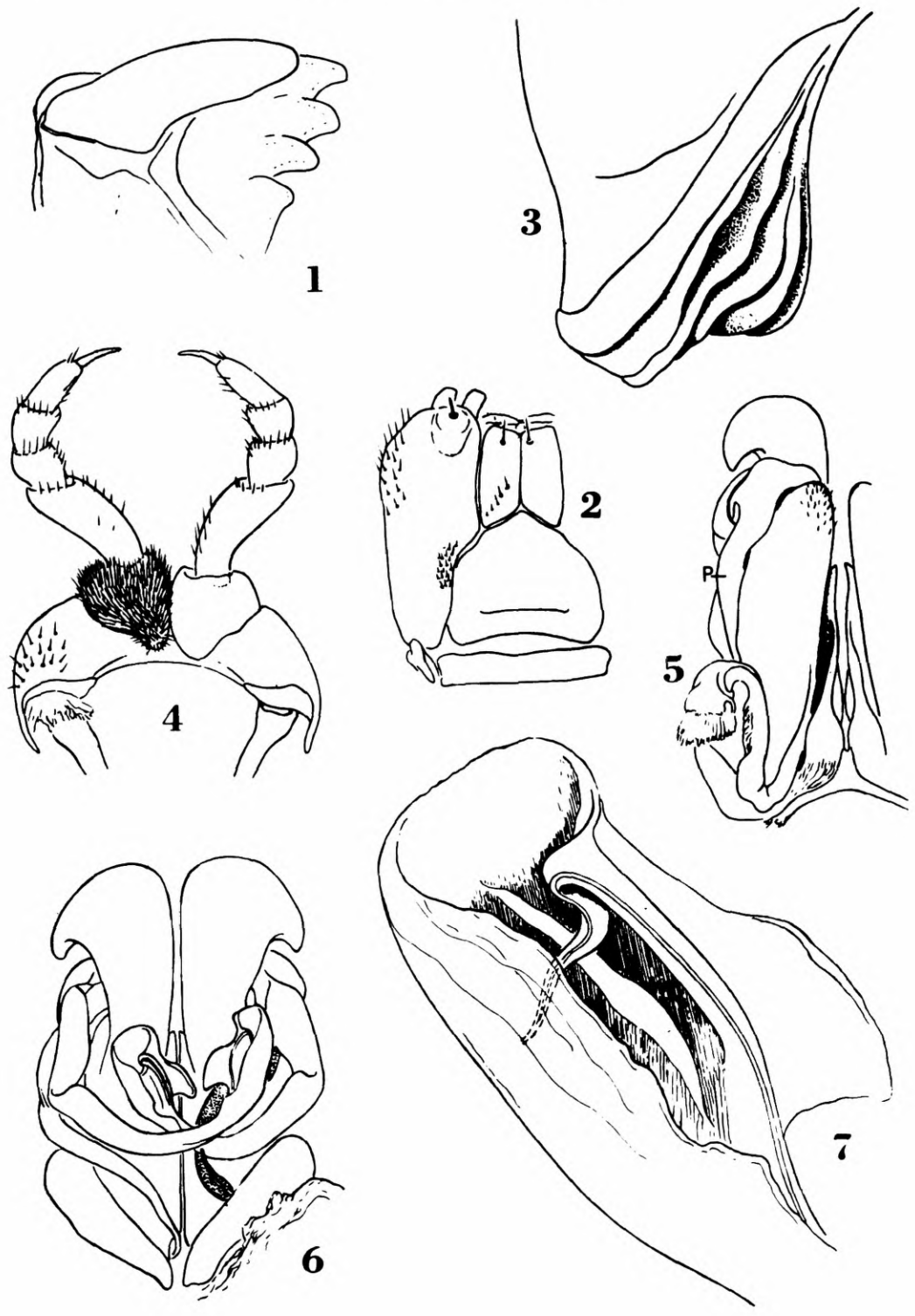
Mandible with ten pectinate lamellae, the dentate lamella with three unusually large and prominent "teeth" (Fig. 1). Gnathochilarium without special modifications, shape of its sclerites and distribution of setae shown in Fig. 2.

Collum very finely coriaceous in texture, its lateral ends strongly modified (Fig. 3): three heavy "complete" ridges on each side, plus smaller and shorter ridges at the anterior lobe: two on one side, one on the other.

Body segments of nearly uniform diameter, the prozona only slightly smaller and "telescoping" therefore minimal for a spirostreptid (less than 2/3rds of the prozonal length concealed in the preceding metazonum). Prozona with about 25 fine concentric striae, which become smaller and closer together anteriorly, not merging or anastomosing ventrally toward the sterna; metazona set off by an equally fine ridge, on either side of which segmental texture is about the same. Ozopores small, oval in shape, a little longer than high, set a little closer to strictural stria than to posterior edge of segment. Lower ends of metazona with about 25 longitudinal ridges, those nearest the sterna high, sharp, and complete; in going dorsal these ridges diminish in size and fade out as faint striae well below level of ozopores. A small, triangular, sharply-defined parastigmatic pit behind each anterior stigma, the outer edge not extending beyond end of adjacent coxa. Inner surface of metazona with a single row of large, round sigilla, placed close to strictural line and nearly in contact with each other. Sterna with from 20 to 30 very fine irregular transverse striations.

Epiproct short and blunt, with a transverse depression at about two-thirds of its length. Paraprocts nearly flat, with compressed distal margins ("lips") which become notably thicker in going ventrad toward the hypoproct, these thickened rims do not contact each other but are held apart and parallel by the deeply-included true edges of the valves (an apomorphy for this genus!). Hypoproct small, transverse, with a vague low projection medially, subtending a basally broadened interstice between the produced margins.

Walking legs rather short (6.3 mm at midbody), only the tarsi visible from above when legs are extended laterad; podomeres of the two pairs of each segment generally similar in size and shape, but coxae of the anterior pair tend to be more compressed, and those of the posterior are provided with a prominent, posteriorly-directed, basal conic tubercle. Prefemora subsimilar, but those of anterior pair more incrassate. Tarsus rather short, about equal to tibia. Postfemora and tibiae with eversible ventral pads, present on all legs but largest anteriorly where occupying entire ventral surface of these two podomeres. Coxae with one ventral seta, prefemora with two, postfemora and tibiae mutic, tarsus with two large and one small setae ventrally and two dorsally near base of claw.



Figs.: 1-7. *Exallostreptus vanzolinii*, sp. n., all drawings from holotype, made at several different magnifications. Fig. 1, apex of mandible showing the prominent lobes of the dentate lamella. Fig. 2, Gnathochilarium, stipe of right side omitted. Fig. 3, lateral lobe of collum. Fig. 4, first pair of legs, anterior view showing pilosity of prefemora. Fig. 5, left side of gonopods, anterior view (P = prefemoral process). Fig. 6, gonopods, posterior view (the prefemoral process on one side is stippled). Fig. 7, apical palette of telopodite, greatly enlarged, posterior view.

First pair of legs (Fig. 4) with small narrow sternal sclerites on anterior side distinct near lateral ends but fused with coxae medially forming a syncoxosternum, tracheal apodemes and stigmal openings distinct. Prefemora completely invested in long silky suberect hairs (unique for the Neotropical spirostreptids), the other podomeres of typical form; a long thin tarsal claw present. 2nd pair of legs apparently without narrow transverse sclerites behind bases of penes, the latter extending more than halfway to end of coxal element.

Gonopods rather elongated, dark in color, a small narrow sternum present, lateral coxal folds rounded and sparsely setose distally, apical end of telocoxite broadly rounded with small retrorse lateral lobe (Fig. 5); telopodites curved around laterally to broadly overlap on posterior side of coxae, prefemoral process large and elongated, branching off just proximad to region of torsion, rather sharply bent at about midlength, thence attenuated to end (Fig. 6); latter singular in form, prostatic groove running along one edge (where subtended by a large deltoid lateral lobe) to base of an abruptly reflexed solenomerite sinuously projecting into a cavity formed by rolling of the opposite edge of the distal expansion, "floor" of this chamber with a high thin laminate ridge (Fig. 7).

Remarks: The statements made in connection with the disjunct position of the genus apply naturally to this species also, certainly one of the most unusual spirostretids of the Neotropical Region.

Distribution: Known only from the type locality, in southeastern Rondonia.

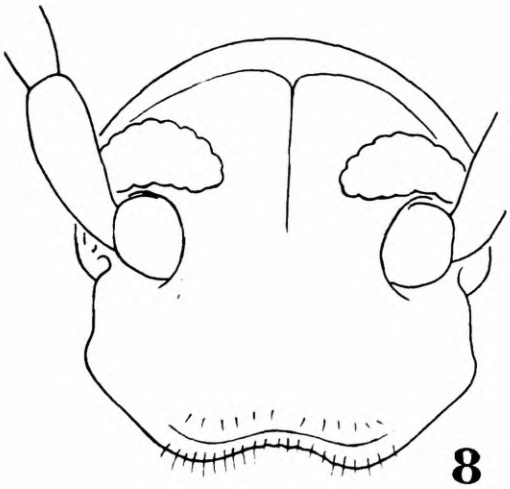
Guaporeptus, gen. n.

Type species: *Guaporeptus paradisius,* sp. n.

Name: A neologism composed of a fomer name applied to Rondonia (Guaporé) + the last two syllables of the generic name *Spirostreptus.*

Diagnosis: A genus of moderate-sized spirostreptids (length to about 85 mm) sharing the following characters with *Urostreptus:* prozona and metazona separated by a deep prominent stricture crossed by numerous fine sharp ridges which below level of ozopores are extended across length of metazona; texture of metazona finely rugulose-striate overlain with profuse fine punctation; epiproct terminating in a large distal carina; and paraprocts with unusually broadened marginal rims. Differences from *Urostreptus* occur mostly in gonopod structure, in particular the hypertrophied mesoproximal coxal lobe, the large lateral lobe of the telocoxite, the very short torsate region of the telopodite, and pronounced thickening of that structure near its midlength.

Remarks: This genus (and species) constitutes an interesting set of contradictions in its peripheral and gonopodal characters. An unassociated female might readily be assigned to *Urostreptus* by virtue of the former, while an isolated set of gonopods could scarcely be placed even in a tribal unit that contained *Urostreptus.* The case is instructive to anyone thinking about the definition of spirostreptid tribes: to which kind of data shall we assign the greater importance? The totality of outer body form, after all, seems far more compelling a criterion than local modifications of a single character system. If this point be granted, one must assume that the gonopod structure in *Guaporeptus* is very strongly derived from the urostreptid ground plan, and that the change was made completely independent of any influence on body form (except for a slight emphasis on size of the paraprocts). Anyone interested in pursuing this point may wish to compare the drawings (Figs. 12-14) of this paper with those of various urostreptid species in my several papers on that genus (1968, 1980). It is appropriate to mention at this time that my earlier (1968) reference of Chamberlin's nominal genus *Orthogoneptus* to the synonymy of *Urostreptus* may have been unjustified. The gonopods of the single male



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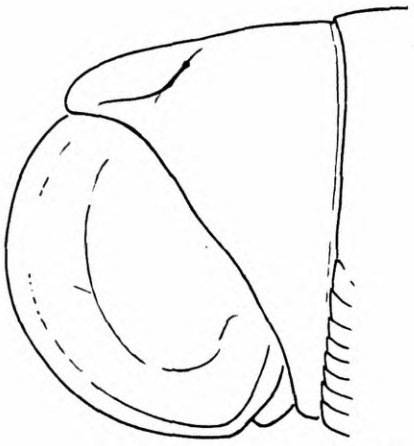

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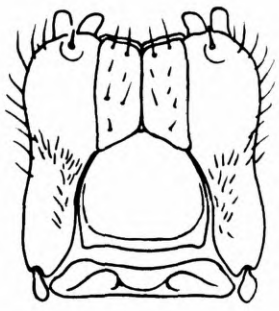

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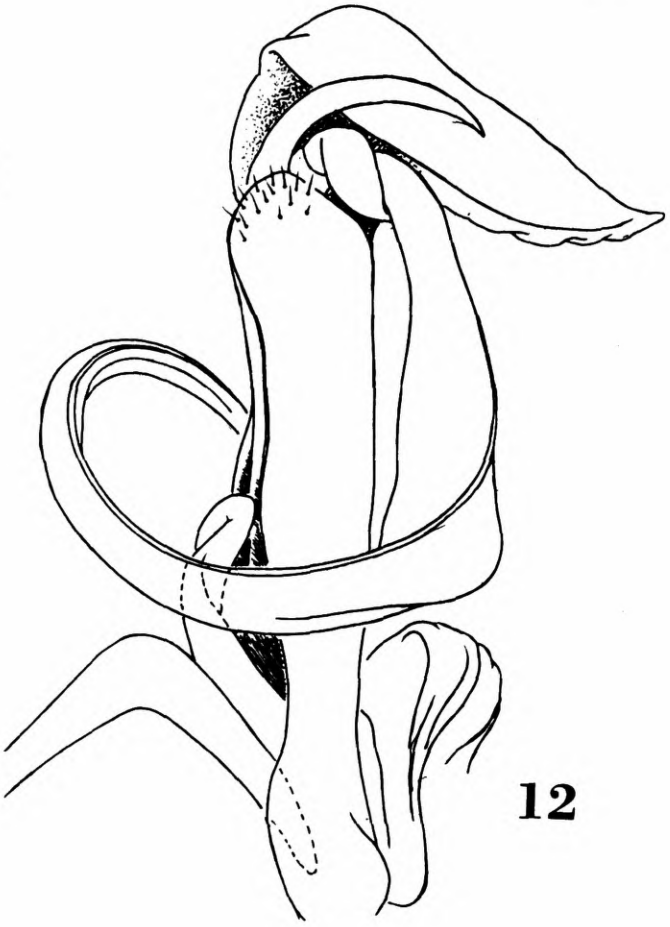

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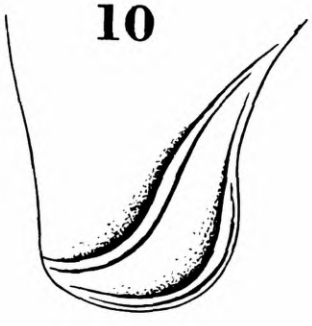

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Figs. 8-12. *Guaporeptus paradisius*, sp. n., drawings from holotype, made at different magnifications. Fig. 8, front view of head to show especially the unusual shape of the genae in males of this species. Fig. 9, Gnathochilarium, showing shape of sclerites and arrangement of setae. Fig. 10, lateral end of collum, right side. Fig. 11, posterior end of body, lateral view, showing the enlarged paraprocts. Fig. 12, right gonopod, anterior aspect, showing the normal curvature of the telopodite caudally *between* the coxae instead of laterally around them.

known of *O. mineri* Chamberlin, 1941, are damaged and incomplete, but the original crude drawings suggest that perhaps this taxon will be restored to generic status when topotypic males from Iquitos are available for study.

Guaporeptus paradisius, sp. n.

(Figures 8-14)

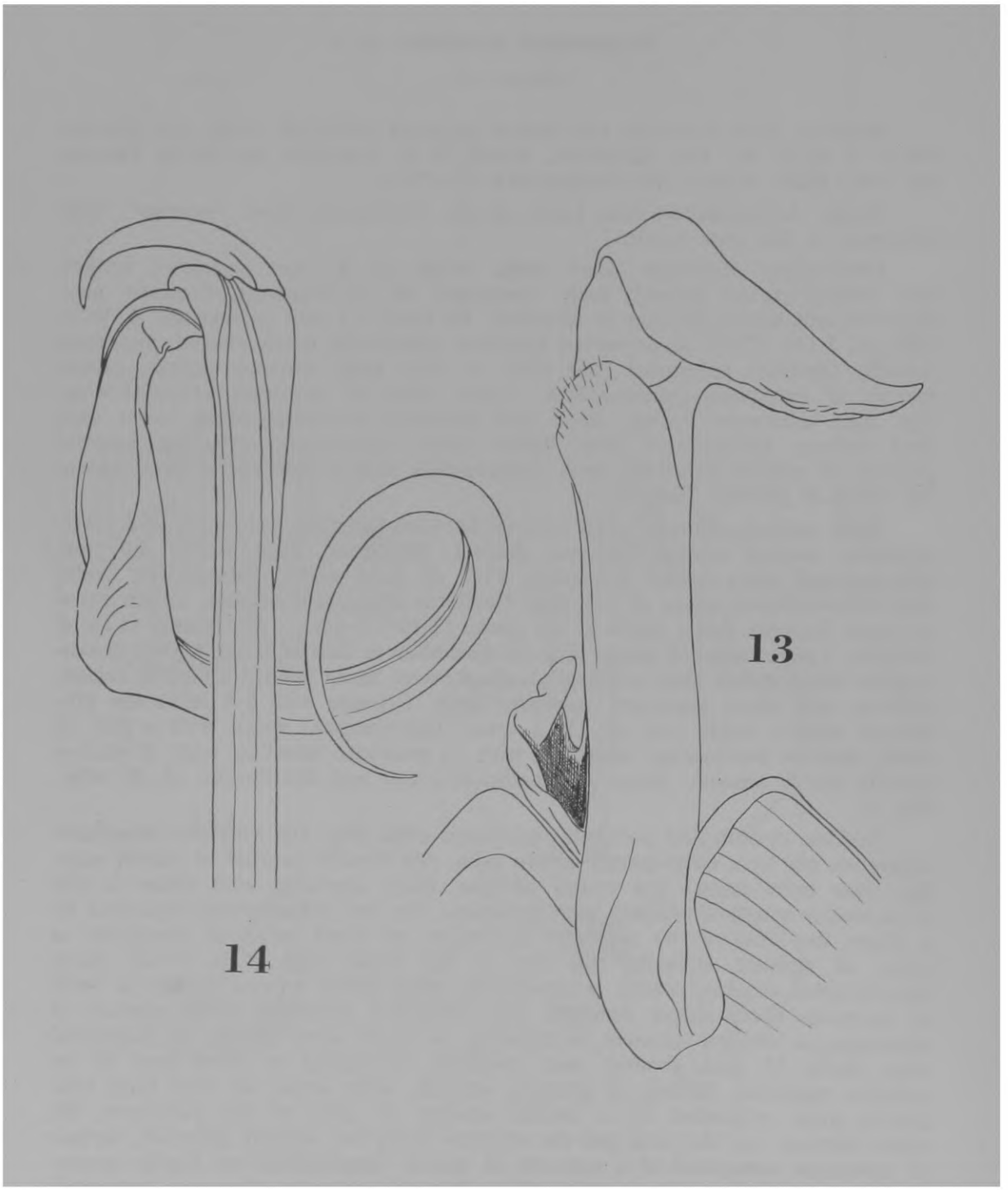
Material: Male holotype and female paratype (MZUPS) from Alto Paraiso (09.37 S, 63.27 W), Edo. Rondonia, Brasil; P. E. Vanzolini leg. 23-26. December 1983 (field number MZ-Polonoroeste 83-1741).

Name: A translation into Latin of the Portuguese word "paraiso", with reference to the type locality.

Description: Holotype, adult male, length ca. 85 mm (specimen broken into several curved pieces), body composed of 52 segments, broadest near posterior end where 6.0 mm in diameter, up from 5.3 mm at segment 8. W/L ratio ca. 7.1%. Color of preserved specimen apparently much altered, metazona dorsally (between ozopores) dark olive or slaty gray, prozona lighter, caudal margin of metazona golden-yellow. Lower sides of segments yellowishbeige, legs light testaceous brown. Head and antennae piceous-purplish, lower face (and collum) marmorated with lighter color (apparently reflecting internal patterns of muscle insertion), each antennomere with a light apical band except 7th which is entirely flavous.

Head entirely smooth, most convex between antenna; epicranial and interocellarial sutures evident but not distinct. Maximum head width, 4.0 mm, interantennal space broad (2.1 mm), 53% of head width, substantially wider than interocellarial space of 1.6 mm. Ocellaria elongate-triangular, length equal to space between them; ocelli in six rows: 11-10-9-8-6-3 = 47, largest as usual dorsally. Lateral edge of genae (Fig. 8) dissimilar to that of other known spirostreptids being widest near midlength and narrower again toward temporal region. Labrum with three moderate, subequal teeth. Clypeus with 8-8 setiferous pits, labrum with a single row of 13-13 setae. Interantennal space with a pair of small, shallow depressions. Mandible with 14 pectinate lamellae; edge of dentate lamella nearly smooth. Shape of gnathochilarium and distribution of its setae, Fig. 9.

Collum smooth and polished, the lateral ends (Fig. 10) with two prominent ridges set off by a deep groove above each, one closely parallel to lateral edge, the other more dorsal and nearly oblique. Body segments with about 2/3rds of prozonal length telescoped into metazona, the two subsegments separated by a sharp line formed by a slight depression of front edge of metazona at point of contact, dorsally this line is the front edge of a broad, deep, parallel-sided stricture which is crossed by many sharp narrow ridges; at level of ozopores these ridges suddenly are continued posteriad across surface of metazona as oblique grooves terminating as small acute points on segmental edge, about 15 such grooves near midbody, increasing to more than 20 on anterior segments. Surface of prozona smooth, with about six very faint concentric striae preceeded by a similar number of rows of tiny punctures, the space between the last stria and the stricture finely but densely punctate, surface of metaterga composed of a network of mostly longitudinal but highly anastomosing and heavily micropunctate, fine ridges and grooves. Ozopores extremely small and difficult to see with less than 90 X magnification, scarcely larger than an individual surface punctation, set near the middle of a small, slightly convex smooth area about halfway between stricture and caudal edge of segment. Interior of metazona without trace of sigilla. No distinct parastigmatic fossae adjacent to stigmata. Sterna with extremely fine transverse striae.



Figs. 13-14, *Guaporeptus paradisius*, sp. n., Gonopods from holotype, separated. Fig. 13, right coxoid, turned a little anterolaterad to better show the remarkable enlargement and excavation of the mesal coxal lobe. Fig. 14, telopodite of the same gonopod, posterior view.

Epiproct with strong median posterior carina; paraprocts with convex discal region and unusually broadened distal rims, the ventral rim of which extends below level of hypoproct (Fig. 11), latter very small, transverse, apparently partly coalesced with caudal edge of preceeding segment.

Walking legs long (about 6.0 mm at midbody) and slender, the tarsus, tibia, and postfemur visible from above when legs are extended to side. Distal podomeres similar in size and shape, the proximal two modified: coxa of anterior pair of each segment narrowed, almost carinate ventrally whereas that of posterior pair is flattened ventrally with a small bluntly conic tubercle on caudal side near base; prefemora virtually reverse the foregoing in that the dorsal side of anterior is broadly rounded while the posterior is strongly compressed dorsally. Ventral pads of tibiae and postfemora large, occupying about 2/3rds of ventral side of these podomeres, becoming smaller progressively posteriad, tibial pads disappearing from legs of segment 38, those of postfemora persisting as tiny apical lobes as far as legs of segment 42. Coxae with up to 18 short setae ventrally and others scattered on lateral and dorsal sides, prefemora with three large setae and several shorter ones, femora usually with two large and several smaller, postfemora with two or three setae along base of pad, tibiae with five or six in that position, tarsi with seven or eight pairs of stout ventral setae and two dorsal near base of claw, latter unusually long (at least half length of tarsus) and acicular in shape.

First pair of legs of male lost during dissection, but noted at the time as having no special modification; prefemora with small subtriangular proximal lobes.

Gonopods widely separated by large V-shaped sternum, coxae unusual because of large size of the proximal processes on median side, present as small lobes in most spirostreptids but here broad and concave with reflexed apical projection, overall larger than in any other known genus of the family (Fig. 13); lateral coxal fold long and slender, parallel-sided, with rounded and sparsely setose apex; medial fold (telocoxite) with large, elongate, subtriangular lateral lobe. Telopodite (Fig. 14) with torsate region directly at point of exsertion from gonocoel (Fig. 12), at which point the short falcate prefemoral process originates; telopodite torsate once, through 360°, beyond which it gradually thickens to near midlength, after which attenuated and unmodified to the fine tip. As with most American genera, the telopodites curve around to the posterior side of the gonopod complex.

Paratype: Adult female, body with 53 segments, slightly shorter than male (ca. 80 mm) but with equal body diameter (6.0 mm), W/L ratio slightly greater than male, 7.5%. Similar to male in most respects, but edge of genae nearly straight, more typical of spirostreptid form, and legs lacking pads on postfemora and tibiae.

Acknowledgements

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