

Three new species and new records of Oligochaeta, Glossoscolecidae, from the Venezuelan Andes

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Three new species and new records of Oligochaeta, Glossoscolecidae, from the Venezuelan Andes.— Five species of Oligochaeta, Glossoscolecidae, from Venezuela, Merida State (1,500 to 4,350 m a.s.l.) were studied by dissection and serial microscopical sections. *Andiorrhinus (Amazonidrilus) gavi* n. sp. is characterized by the space *aa* wider in XX–XXIII and seven pairs of hearts in VII–XIII. *A. (Meridrilus) rimeda*, n. sp. is notable for the pair of puberal bands lateral do *b* in XX–XXIII flanked by two longitudinal cords. *Rhinodrilus mucuba*, n. sp. has a typical arrangement of the setae and spermathecae. New observations are reported for the previously known *Onychochaeta windlei* and *A. (M.) kuika*; the variability of the latter species is recorded.

Key words: Oligochaeta, Glossoscolecidae, Venezuela, Andes, Taxonomy.

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Introduction

Awareness of *Oligochaeta* has been very general to date due to the great similarities in external appearance of the different species and a very thorough anatomical study is needed for their identification.

Knowledge of earthworm fauna in Venezuela and other neotropical countries is scarce and dependent on occasional collections.

The three new species and new records of earthworms presented here constitute the first part of a collection from the Venezuelan Andes made by Dr. Maurizio Guido Paoletti (Università degli Studi di Padova, Italy) in the course of his agro-ecological research.

The second and final part of the collection deals with earthworms from the Venezuelan Amazonia (RIGHI & ARAUJO, 1999).

Material and methods

The specimens were collected in June and July 1995, in Venezuela, Merida State, at 1,500 to 4,350 m a.s.l.

Sampling localities

A. Mérida City, under stones, 1,500 m a.s.l.; B. Páramo Gavidia, Bernabé Torres' Property, soil fallowed for two years, 3,300 m a.s.l.; C. Páramo Gavidia, Piñuela, 3,250 m a.s.l.; D. Páramo Escorial, 2,850–3,000 m a.s.l.; E. Páramo Escorial, under *Espeletia schultzei*; F. Páramo Mucubaji, under *Espeletia* sp.; G. Páramo Mifafi, under *Espeletia timolensis*; H. Páramo Mifafi, 4,200 m a.s.l., below *Espeletia semiglobulata*; I. Páramo Mifafi, summit, 4,350 m a.s.l.; J. Páramo Piedras Blancas.

The earthworms were obtained by digging and manual sorting, fixed and preserved in alcohol 80%. Following dissection, microscopic pieces were mounted in glycerine–water (1:1) and serial histological sections, 10–4 mm thick, were stained using the Mallory triple method (PANTIN, 1964).

The material is deposited in the Departamento de Zoologia, Instituto de Biociências, Universidade de São Paulo, Brasil.

Results

Onychochaeta windlei (Beddard, 1890)

Diachaeta windlei BEDDARD, 1890: 171, pl. 20, figs. 1–5.

Onychochaeta windlei, BEDDARD, 1891: 259, 261; MICHAELSEN, 1897: 378, pl. 33, fig. 15; 1918: 229, pl. 2, figs. 29–31; 1924: 6; 1936: 52; CORDERO, 1944: 4; RIGHI, 1989: 1079, figs. 39–47; ZICSI, 1995: 59.

Studied material

Locality B: 4 clitellate, 3 mature acitellate and 4 young specimens (ZU–1295). Locality C: 2 clitellate and 1 mature acitellate specimens (ZU–1296). Locality F: 4 clitellate, 6 mature acitellate and 3 young specimens (ZU–1306). Locality J: 1 mature acitellate specimen (ZU–1307).

Distribution

Venezuela, Miranda State, El Guayabo; Carabobo State: Puerto Cabello; Trujillo State, Boconó (2,500 m a.s.l., mountainous humid forest); Mérida State, Páramo Gavidia (3,250–3,300 m a.s.l., culture soil), Páramo Mucubaji (below *Speletia* sp). Surinam, Paramaribo. Saint Thomas Island. Haiti, Grand'Hanse. Cuba, Habana Province, Rincon. Bermudas Islands.

Andiorrhinus (Amazonidrilus) gavi n. sp. (figs. 1–12)

Studied material

Locality B: 1 clitellate specimen (holotype, ZU–1291A) and 4 clitellate specimens (ZU–1291B). Locality C: 3 clitellate specimens (ZU–1292).

Description

Length 179–413 mm. Diameter of mid-body region 6–12 mm. Number of segments 100–235. Dorsal colour variable from pale brown (n° 134 of Séguy, 1936) to dark violet (n° 494). Tentacular prostomium (fig. 1). Setae, four pairs per segment, disposed in regular longitudinal series. The ventral series starts from V–VII segments and the lateral series from X–XVI. The ventral setae of V and VI and occasionally those of X and XI are dislocated to the posterior third of the segments. The setae *b*, and occasionally the *a*, are more or

less displaced to the lateral and anterior or posterior region of the VII–IX segments and they are placed in a short transverse furrow of thick margins (fig. 1). The spaces *aa* and *ab* enlarge from XV, XVI–XX, they remain uniform to XXIII, decrease to XXIV, XXVI and are regular backwards. The setae of three animals are compared in table 1. The common setae are lengthened sigmoid with median to slightly proximal nodulus and unicuspidate apex. Their distal fourth presents four alternate series of semilunar excavations; there are 4–7 excavations per series. The length of the setae varies in the mid-body region from 1.17–1.26 mm ($M = 1.21$ mm) and in the posterior region from 1.30–1.50 mm ($M = 1.40$ mm); the shortest setae are lateral. The setae *b*, rarely the setae *a*, of VII–VIII, IX and the setae *a* and *b* of XVII, XVIII–XXIV are modified into genital setae. They are straight with small proximal curvature; the distal 2/3 present four alternate series of excavations becoming deeper and nearer to one another towards the simple apex (fig. 5); there are 18–24 excavations per series. The length of the genital setae varies between 2.64–4.0 mm ($M = 3.10$ mm); the longest are those in the *b* series and the setae of the spermathecal segments are longer than those of the clitellar segments. Voluminous groups of gland cells, prominent in the body cavity, are associated with the genital setae (fig. 6)

The clitellum lies in XVI–XXV (= 10 segments); it is turgid with neat intersegmental grooves and ring-shaped, opening ventrally in XX–XXIII where it is wider. A pair of puberal furrows are lateral to *b* in XX–XXIII (fig. 4). The lateral margin of the furrows may grow thick as puberal ridges in 1/2 XX–1/2 XXIII (fig. 3) or XX–1/2 XXIII (fig. 2) concealing the puberal furrows. The ventral surface of XX–XXIII is flat with cross fissions in *ab* region of every segment and covered with multiple longitudinal striae. The striae are slightly demarcated in the figure 4 specimen only. The ventral setae of XVII, XVIII–XXIII are surrounded by slightly differentiated areas. The nephridiopores are intersegmental in *cd* space and well-defined from 2/3 intersegment onwards. The three pairs of spermathecal pores are circular or like small cross slits in 6/7–8/9 on the nephridiopores line or immediately below. Female pores were not recognized. The microscopic male pores open in 19/20 at the anterior end of the puberal furrows.

Table 1. *Andiorrhinus (Amazonidrilus) gavi*, relations among the setae of two specimens from localitie B and one from locality C: Sp. Specimens. (*ab*, in μ m)

Andiorrhinus (Amazonidrilus) gavi, relaciones entre las cerdas de dos especimenes de la localidad B y uno de la localidad C: Sp. Especimen. (ab, en μ m).

Sp	<i>aa:ab:bc:cd:dd</i>	<i>ab</i>
Median region		
B1	5.0:1.0:7.3:0.7:15.7	667
B2	6.6:1.0:7.9:0.4:15.2	585
C	4.0:1.0:5.5:0.9:11.1	844
Posterior region		
B1	5.1:1.0:4.7:1.0:11.2	667
B2	6.8:1.0:6.6:1.2:19.2	414
C	6.5:1.0:6.8:1.6:15.0	464

The anterior septa appear as long interpenetrated cones up to 16/17 or 17/18. The septa 6/7–11/12 are very thin and fragile with several irregular adhesions. Consequently, the segmental position of the organs was ascertained by the nephridia, allowing that the only pair of ovaries lies in XIII. The first well-defined septum is the 12/13. the septa 12/13–16/17 are thick and muscular, 17/18 and 18/19 a little less and the following ones are thin. The ventral third of the septa 17/18–24/25 presents oblique muscular bands joining the ventral and lateral body walls. The pharyngeal bulb extends to IV; its pair of dorsal retractor muscular bands is the longest connecting to the body wall in VIII. The long anterior esophagus makes an S-shaped curve in the sagittal plane. The wide, very muscular egg-shaped gizzard lies in VI but, due to the shape and fragility of the anterior septa, it corresponds to the parietal VIII–IX, X segments. The posterior esophagus originates in the dorsal posterior half of the gizzard. Three pairs of calciferous glands lie in VII–IX; they

depart ventrally from the esophagus and are directed forwards and upwards. The glands are of similar size; the shape varies from pear-shaped to sac-like with ental appendix (figs. 9–11). The mid-cross sections of the glands of VIII present 25–32 parallel lamellae with some short and irregular transverse connections (fig. 12). The intestine widens in XXIII and the dorsal typhlosole begins at XXIV. In cross-section of XXX the typhlosole is S-shaped, almost as high as the diameter of the intestine.

The moniliform dorsal vessel follows an undulating course from XX–XI. There are three pairs of slender lateral hearts in VII–IX and four pairs of voluminous intestinal hearts in X–XIII. The hearts of X and XI are surrounded by the testis sacs. There is a pair of holonephridia per segment. The post-clitellar nephridia (fig. 7) consist of a simple pre-septal funnel and three post-septal loops. A discoidal glandular structure connects the common part to loops I and II with loop III (= bladder). The nephridiopore is medial in the bladder and has a strong sphincter. The VI and anterior nephridia are somewhat intermingled and latero-dorsally adjoined to the anterior esophagus. Two pairs of testis sacs are in X and XI. Each pair of sacs fuses ventrally and rises at the sides, covering esophagus and hearts; one specimen also has the sacs of X fused dorsally. Small seminal vesicles lie in XI and XII; the first pair of vesicles a little bigger. A pair of male ducts run together on each side of the body wall, somewhat lateral to b

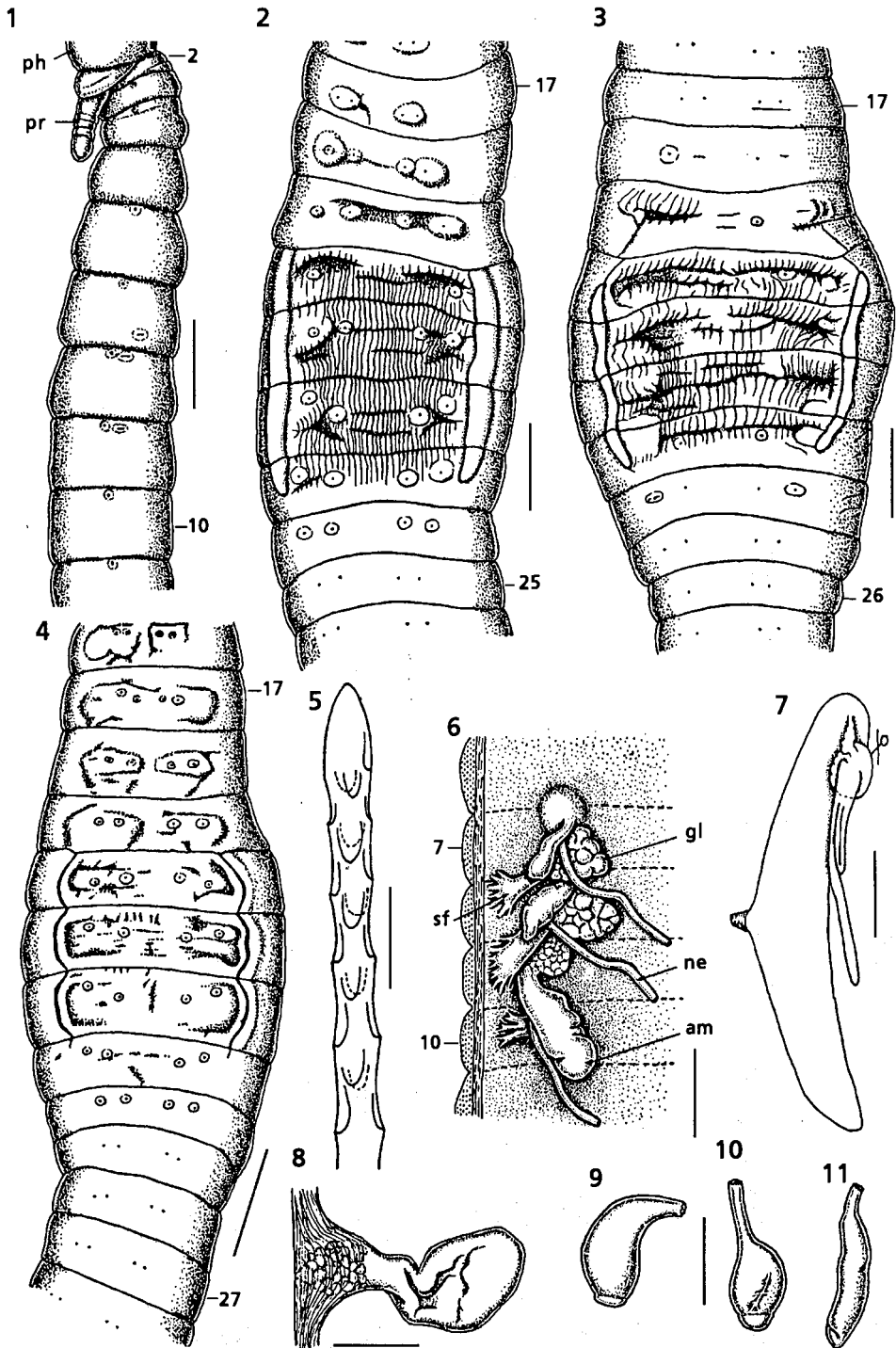
setae. They pierce the body wall behind in XIX and coalesce; the resulting wider duct opens through the corresponding male pore. One pair of blade-like ovaries is joined behind and ventrally to the 12/13 septum. There are three pairs of spermathecae in VII–IX (fig. 6), bigger from front to back ($1 < 2 < 3$). Each spermatheca (fig. 8) has a sacciform ampulla that is a little longer than the conical duct. The median 3/4 of the duct are surrounded by numerous seminal chambers. An outer connective-muscular covering gives a conical shape to the duct. The covering is well developed on the spermathecal ducts in VII and VIII; it is less well-differentiated in IX.

Remarks

The organization of *Andiorrhinus (Amazonidrilus) gavi* is very similar to that of *A. (Andiorrhinus) venezuelanus* (Cognetti, 1908) (COGNETTI DE MARTIS, 1908), known in Venezuela, Escorial, probably Páramo Escorial in Mérida State. The only characteristic to distinguish the two species is that which sets apart their respective subgenera. *Amazonidrilus* has intestinal hearts in X–XIII and *Andiorrhinus* s. s. has the last pair of hearts in XII (RIGHI, 1993). Small differences in the male genital field are probably due to different maturation stages. Among *Amazonidrilus* species showing lateral spermathecal pores, *gavi* has affinities with the Brazilian species *tarumanis* Righi et al. (1976) (RIGHI et al.,

Figs. 1–11. *Andiorrhinus (Amazonidrilus) gavi*: 1. Lateral view of the first 10 segments; 2–4. Ventral view of three specimens, segments XVII–XXV, XXVI, XXVII. 5. Genital seta of XXII. 6. Spermathecae and associated structures *in situ*, segments VII–IX; 7. Post-clitellar nephridium. 8. Spermatheca of VIII. 9–11. Calciferous glands of segments VII–IX: am. Ampulla of a spermatheca; gl. Glandular mass; ne. Nephridium; ph. Extroverted pharynx; pr. Prostomium; sf. Follicle of a genital seta. (Scale bars 1–4,6,7,9–11, 4 mm; 5, 100 μ m; 8, 2 mm.)

Andiorrhinus (Amazonidrilus) gavi: 1. Vista lateral de los primeros 10 segmentos; 2–4. Vista ventral de tres especímenes, segmentos XVII–XXV, XXVI, XXVII. 5. Cerda genital de XXII. 6. Espermatecas y estructuras asociadas *in situ*, segmentos VII–IX; 7. Nefridio post-clitelar. 8. Espermateca de VIII. 9–11. Glándulas calcíferas de los segmentos VII–IX: am. Ampulla de la espermateca; gl. Masa glandular; ne. Nefridio; ph. Faringe extravertida; pr. Prostomio; sf. Folículo de cerda genital (Escala 1–4,6,7,9–11, 4 mm; 5, 100 μ m; 8, 2 mm.)



1976) and *rondoniensis* Righi, 1986 (RIGHI, 1986) in the similar organization of the septa. The characteristics of these two species that distinguish them from *gavi* are:

A. (*Am.*) *tarumanis*. The space *aa* is shorter and *ab* wider in segments XX–XIII than in the adjacent segments. The region *ab* of XX–XXIII is plain without segmental depressions. The spermathecae have a tubular duct as long as the ampulla.

A. (*An.*) *rondoniensis*. The common setae are smooth, without ornamentation. The spaces *aa* and *ab* of XX–XXIII are like those of the adjacent segments. The calciferous glands are dorsal in origin. The spermathecae have a tubular duct with seminal chambers in the ental half.

The name of the new species is a corruption of the word *Gavidia*.

Andiorrhinus (Meridrilus) kuika Righi, 1993 (figs. 13–17)

Andiorrhinus kuika RIGHI, 1993: 129, figs. 9–15.

Studied material

Locality D: 5 clitellate and 1 young specimen (ZU–1297). Locality F: 2 clitellate and 3 young specimens (ZU–1298). Locality G: 9 clitellate and 2 young specimens (ZU–1299). Locality H: 6 clitellate, 2 young specimens and 2

cocoons (ZU–1300). Locality I: 3 clitellate, 1 mature aclitellate and 1 young specimen (ZU–1301).

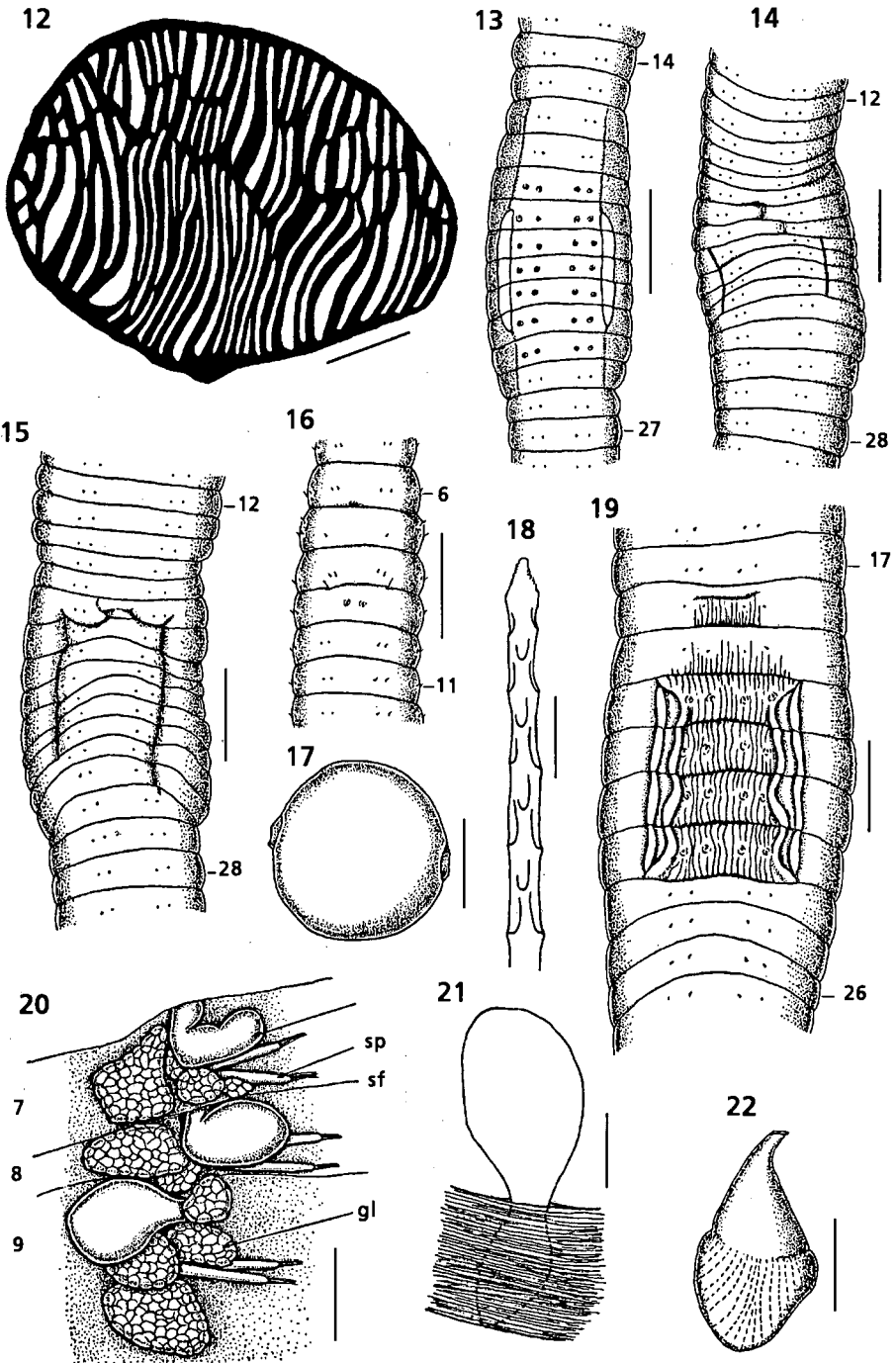
Observations

The species was known only from the original description. The variations observed in our material are presented. The majority of animals from F–I localities have a pair of puberal ridges in XX–XXIII (= 4 segments) laterally to *b* setae; the ridges vary from narrow, as in typical specimens, to twice as wide. The specimens from locality D present a pair of puberal furrows in XX–XIII (fig. 14), probably the result of the deepening of the puberal ridges. One specimen from D and another from I have a very turgid clitellum of ventral margin medial to a line in XVII and lateral to *b* line in XVIII–XXV so that the puberal ridges or furrows are not seen (fig. 15).

The *c* and *d* setae in VII–IX are slightly dislocated towards the back. The *a* and *b* setae of VII, IX and XVIII–XXV are modified as genital setae and are associated to gland masses that are prominent in the body cavity. The *b* setae of VII–IX are closer to *c* than to *a* setae. This characteristic, not recorded in the original description, was confirmed through the observation of the type-material. One species from G and another from H localities have puberal

Figs. 12–22. 12. *Andiorrhinus (Amazonidrilus) gavi*. Mid-cross section of a calciferous gland of VIII. 13–17. *Andiorrhinus (Meridrilus) kuika*: 13–15. Ventral view of three specimens, segments XIV–XXVII and XII–XXVIII two specimens; 16. Ventral view of segments VI–XI; 17. Cocoon. 18–22. *Andiorrhinus (Meridrilus) rimedia*: 18. Genital seta of XXI; 19. Ventral view of segments XVII–XXVI; 20. Spermathecae and associated structures *in situ*, segments VII–IX, right side; 21. Spermatheca of IX; 22. Calciferous gland of VIII: gl. Glandular mass; sf. Follicle of a genital seta; sp. Spermatheca. (Scales: 12, 21, 500 μ m; 13–17, 4 mm; 18, 50 μ m; fig. 19, 2 mm; 20, 22, 1 mm.)

12. *Andiorrhinus (Amazonidrilus) gavi*. Corte transversal mediano de una glándula calcífera de VIII. 13–17 *Andiorrhinus (Meridrilus) kuika*: Vista ventral de tres especímenes, segmentos XIV–XXVII y XII–XXVIII dos especímenes; 16. Vista ventral de los segmentos VI–XI; 17. Capullo. 18–22. *Andiorrhinus (Meridrilus) rimedia*: 18. Cerda genital de XXI. 19. Vista ventral de los segmentos XVII–XXVI; 20. Espermatecas y estructuras asociadas *in situ*, segmentos VII–IX, lado derecho; 21. Espermateca de IX; 22. Glándula calcífera de VIII: gl. Masa glandular; sf. Folículo de cerda genital; sp. Espermateca. (Escala: 12, 21, 500 μ m; 13–17, 4 mm; 18, 50 μ m; 19, 2 mm; 20, 22, 1 mm.)



ridges in 1/2 XIX–1/2 XXIII (fig. 13) and two other specimens from H present the ridges in 1/2 XIX–XXIII. These four specimens have the *b* setae of VII in front of *c*, the *a* setae of IX are medially displaced and the *b* setae emerge from 8/9 intersegment at midpoint between *a* and *c* (fig. 16). The specimens from locality D show a big difference between *a* and *b* setae. The *a* are 1.38–1.48 mm long and their distal 4/5 have four alternate series of semilunar excavations, 20–23 excavations per series. The *b* are 2.08–2.4 mm long and have 27–31 excavations per series.

The two cocoons (fig. 17) of locality H are almost spherical with hardly prominent poles. The polar axis is a little longer than the other two axes which are equal in length. Their measurements are 8.5x8.0x8.0 mm and 6.6x7.3x7.3 mm. The main surface of the cocoons is transparent pale brown (n° 705 of Séguy, 1936) and the poles are dark brown (n° 701).

Andiorrhinus (Meridrilus) rimeda, n. sp.
(figs. 18–23)

Studied material

Locality A: 1 clitellate specimen (holotype ZU–1305A) and 7 clitellate, 6 young specimens and 2 cocoons (ZU–1305B).

Description

The clitellate specimens are 97–125 mm long and 3.8–4.7 mm wide in the middle of the body; they have 159–173 segments. The tentacular prostomium presents ring-like grooves. The cylindrical body is light red (n° 60 of Séguy, 1936) on the back and whitish on the belly. Segment I has a membranous wall. One pair of nephrobuccal furrows runs on I–II segments. The milk-white clitellum occupies the segments XVI–XXV (= 10). The ventral side of XVIII–XXIII is flat or slightly depressed and crossed by thin longitudinal grooves more numerous and demarcated in XX–XXIII. One pair of not very thick puberal bands with narrow ends is situated in XX–XXIII (= 4) laterally to *b* setae (fig. 19). The bands are flanked by two longitudinal cords, one medial and the other lateral; the medial cord is somewhat higher. The cords of each side are juxtaposed at the ends. Groups of gland cells

associated with the puberal bands protrude into the body cavity. The lateral and sometimes the ventral surface of VII–IX, X is thick and milk-white. Small differentiated areas contain the lateral setae of VII–IX and the ventral ones of XX–XXIII. The nephridiopores are immediately after the intersegmental grooves in line with *cd*. The microscopic male pores open in 19/20 in front of the puberal bands. Female pores were not seen. Three pairs of spermathecal pores are in 6/7–8/9, a little over the nephridiopore line.

The setae are arranged in four pairs of regular longitudinal series; the ventral setae start from II and the lateral ones from V–VII. The *d* setae, sometimes the *c* too, of VII–IX are dislocated dorsally, rarely are they not dislocated. The relations among the setae in the mid-body region (segments XL–L) are $aa:ab:bc:cd:dd = 5.5:1.0:5.5:0.7:6.5$ and in the posterior region (segments CXL–CL) = $3.7:1.0:4.6:1.0:13.9$; in both regions $ab = 400$ mm. The common setae are elongated sigmoid with distal nodulus, unicuspidate and the distal 1/4 presents four alternate series of semilunar excavations, there are 2–5 excavations per series. The excavations are more marked in the concave side; few setae are smooth without excavations. The setae length in the mid-body region varies from 463–694 mm ($M = 572$ mm) and in the posterior region from 489–707 mm ($M = 582$ mm); the ventral setae are the longest. The setae *c* and *d* of VII–IX and *a* and *b* of XVIII–XXIV are modified as genital setae. They are straight with a proximal curving. The apex is triangular with a rhombic tip and two finely verrucous margins (fig. 18). The distal 3/4 of the setae present four alternate series of elongated excavations; there are 11–14 excavations per series. The genital seta length is 950–1,691 mm; the *b* setae of the clitellum are a little longer than *a* setae. The follicles of the genital setae are associated with pear-shaped gland masses protruding into the body cavity.

The anterior septa are very thin, fragile and barely distinguishable. The first well-defined septum is the 12/13. Septa 12/13–15/16 are inserted ventrally in their own intersegments but their dorsal insertion is displaced backwards by a decreasing distance from 1 1/2–1/2 segment. Septum 16/17 and

the following septa are regularly inserted in their corresponding intersegments. Septa 12/13–16/17 are the thickest and the most muscular; 17/18–23/24 are ventro-laterally thickened. The segmental position of the organs anterior to 12/13 was recognized by the nephridia on admitting that the ovaries are in XIII. The large pharyngeal bulb extends to segment V. The short anterior esophagus has the nephridia of VI and the preceding ones interwoven on each side. There then follows a voluminous crop and a very muscular cylindrical gizzard. The gizzard belongs to VI but, due to septal organization and lengthening of the fore-part of the digestive tube, it corresponds to the parietal segments VIII–IX. Three pairs of calciferous glands open dorsally into the esophagus in VII–IX and they are directed downwards and forwards. Each gland (fig. 22) has the shape of two cones with opposing bases; there is no appendix. The ental cone is the widest and its transparent wall reveals the inner lamellar structure. The cross sections of the glands present 24–26 inner lamellae; the lamellae are closer and parallel to one another in the ectal cone and divergent in the ental cone. The esophagus–intestine transition lies in XVIII. The intestine is narrow to 24/25 and wide towards the back. There are no intestinal caeca. The typhlosole begins at XXV; in cross sections it appears as a thin dorsal blade, making two loops; the lower loop is the wider.

There are three pairs of narrow lateral hearts in VII–IX and two pairs of large intestinal hearts in XII–XIII. The moniliform dorsal vessel ends in the hearts of VII. There is one pair of vesiculated holonephridia in every segment. The post-clitellar nephridia (fig. 23) have a pre-septal funnel and three post-septal loops. Loop I is half as long as loop III (= bladder) ending at the nephridiopore line. Loop II is as long as 3/4 of the bladder. The common link between loops I and II and the bladder is a glandular elbow bend structure. The nephridiopore, endowed with a small sphincter, is situated in the mid-part of the bladder. The pairs of testis sacs coalesce ventrally in X and XI and rise at the sides up to the mid-line of the esophagus. There are two pairs of wide seminal vesicles with a lobular surface, restricted to XI and XII. The grouping of seminal vesicles and testis sacs takes the

shape of two white valves ventro-laterally surrounding the esophagus. The group of male organs occupies the space of the parietal segments X–XIV because of the septal organization. The two male ducts at each side run juxtaposed to one another on the body wall; they fuse into a simple duct in the posterior region of XIX, piercing the body wall. The pair of ovaries is ventral in XIII, but corresponds to the parietal XV. Three pairs of spermathecae lie in VII–IX, in association with an apparatus of genital setae and annexed glands (fig. 20). Each spermatheca is constituted of a flat elongated to discoid ampulla which is well demarcated and longer than the duct. The duct (fig. 21) lies obliquely inside the body wall; its thicker mid-region has inner seminal chambers not visible on the surface.

The two observed cocoons have a transparent membrane and two rounded dark-brown poles. They are nearly round; the polar axis is a little longer than the other two axes. One cocoon has four embryos and the other is not embryoned. The measurements of their main axes are 6.75x6.25x5.75 mm in the cocoon with embryos and 6.25x6.13x6.13 in the other.

Remarks

Andiorrhinus (Meridrilus) kuika Righi (1993), *A. (M.) mukuci* Righi (1993) and *A. (M.) rimeda* constitute a very homogenous species group characterized by genital setae with a verrucous apex. The three species are known in Venezuela and may be distinguished as in table 2. The name of the new species is a random association of syllables.

Rhinodrilus mucuba n. sp. (figs. 24–30)

Studied material

Locality F: 1 clitellate specimen (holotype ZU-1303A) and 4 clitellate, 2 mature acitellate and 1 young specimens (ZU-1303B).

Description

Length 195–275 mm. Mid-body diameter 7.3–8.6 mm. Number of segments 124–143. Colour pale brown, more or less uniform throughout the body, probably due to preservation. Tentacular prostomium as long

Table 2. Comparisons between *Andiorrhinus (Meridrilus) kuika* (AMk), *A. (M.) mukuci* (AMm) and *A. (M.) rimedia* (AMr).

Comparaciones entre *Andiorrhinus (Meridrilus) kuika* (AMk), *A. (M.) mukuci* (AMm) y *A. (M.) rimedia* (AMr).

AMk	AMm	AMr
Characteristics		
Male genital field		
Simple puberal bands or furrows	Simple puberal bands	Puberal bands with lateral cords
Genital setae <i>b</i> of the clitellum, excavations per series		
25–37	17–26	11–14
Genital setae of the spermathecae, modification of setae		
<i>a, b</i>	<i>a, b</i>	<i>c, d</i>
Common setae, excavations per series		
6–10	4–10	2–5
Spermatheca pores		
on nephridiopore line	on nephridiopore line	above nephridiopore line
Spermatheca shape		
intracoelomic duct twice as long as the ampulla	Intracoelomic duct a little longer than the ampulla	Intraparietal duct shorter than the ampulla.
Seminal vesicles		
Present	Absent	Present
Calciferous glands		
Without transparent part	Transparent ental part	Transparent ental part

Figs. 23–30. 23. *Andiorrhinus (Meridrilus) rimedia*. Post-clitellar nephridium. 24–30. *Rhinodrilus mucuba*: 24–25. Ventral view of segments VII–X and XV–XXVI respectively; 26. Post-clitellar nephridium; 27. Calciferous gland of IX; 28. Inner view of the body-wall, segments XVIII–XXIII, with the male terminalia; 29. Genital seta of XIX; 30. Spermathecae of VIII–IX, *in situ*: gl. Glandular mass; md. Male ducts; nc. Nervous cord; ne. Sectioned nephridium; pr. Prostatoid glands; sp. Spermatheca. (Scales: 23, 1 mm; 24, 25, 4 mm; 27, 28, 2 mm; 29, 50 μ m; 30, 3 mm.)

23. *Andiorrhinus (Meridrilus) rimedia*. *Nefridio post-clitelar*. 24–30. *Rhinodrilus mucuba*: 24–25. *Vista ventral de los segmentos VII–X e XV–XXVI respectivamente*; 26. *Nefridio post-clitelar*. 27. *Glándula calcífera de IX*. 28 *Vista interna de la pared del cuerpo, segmentos XVIII–XXIII, con parte final masculina*; 29. *Cerda genital de XIX*. 30. *Espermatecas de VIII–IX, in situ*: *gl. Masa glandular*; *md. Conductos masculinos*; *nc. Cordón nervioso*; *ne. Nefridio seccionado*; *pr. Glándulas prostáticas*; *sp. Espermateca*. (Escala: 23, 1 mm; 24, 25, 4 mm; 27, 28, 2 mm; 29, 50 μ m; 30, 3 mm.)

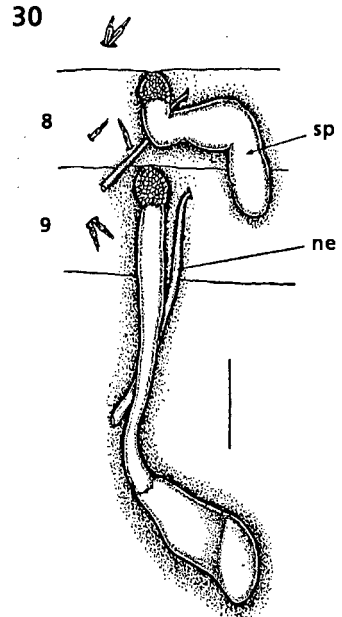
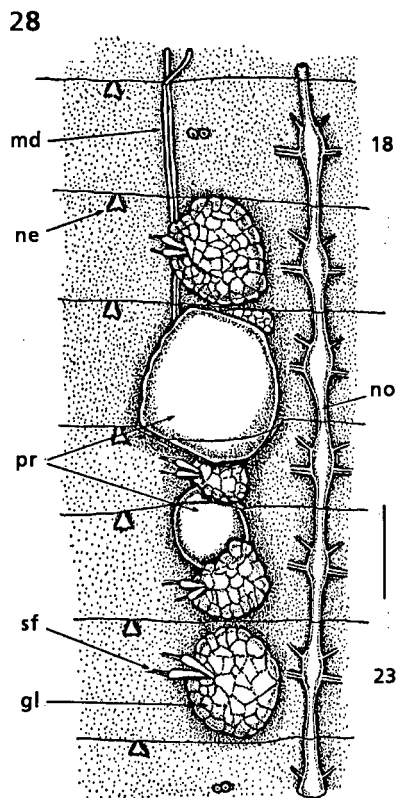
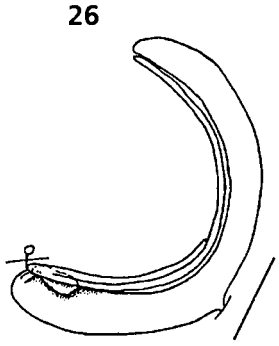
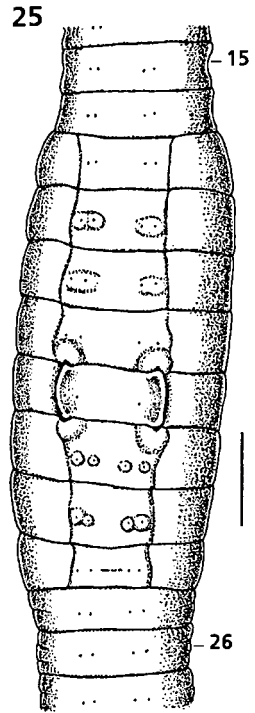
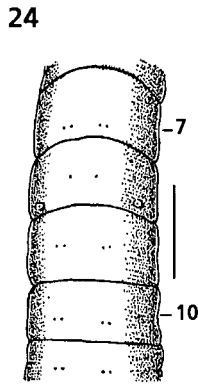
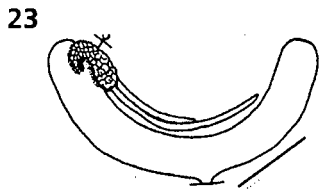


Table 3. *Rhinodrillus mucuba*, setal relations in the middle and posterior regions of four specimens (A, B, C, D): Sp. Specimens. (a,b in μm .)

Rhinodrillus mucuba, relaciones entre las cerdas en las regiones media y posterior de cuatro especímenes (A, B, C, D): Sp. Especímenes. (a,b en μm .)

Sp	aa:ab:bc:cd:dd	ab
Median region		
A	3.7:1.0:7.2:0.3:19.7	481
B	3.6:1.0:7.1:0.4:22.1	561
C	5.5:1.0:6.7:0.5:22.0	481
D	4.2:1.0:9.2:0.7:24.0	401
Posterior region		
A	3.1:1.0:5.4:0.4:16.4	561
B	4.0:1.0:6.4:0.4:21.8	561
C	3.1:1.0:5.6:0.4:16.0	641
D	2.4:1.0:5.0:0.4:15.1	561

as I-II segments. The first segment has a flaccid wall. A pair of nephrobuccal furrows go through I-II. The setae are arranged into four pairs of regular longitudinal series; the ventral setae are seen from VII and the lateral ones from XXVI backwards. The *a* and *b* setae of VII are displaced towards the posterior third of the segment and the *b* setae of VIII are displaced sideways (fig. 24). The space *aa* is greater in XIX-XXI (fig. 25). The relations between the setae of four specimens are shown in table 3. The elongated sigmoid common setae have the distal fourth ornamented with four alternate series of wide and not very deep semilunar excavations. There are 5-7 excavations per series in the ventral setae and 2-5 in the lateral ones. The nodulus is distal in the ventral setae of the mid body and medial in the other setae. Setae length varies *a*, *b* = 1.041-1.273 mm (*M* = 1.179 mm) and *c*, *d* = 0.501-0.617 mm (*M* = 0.544 mm) in the mid body

and *a*, *b* = 1.118-1.311 mm (*M* = 1.244 mm) and *c*, *d* = 0.630-0.733 mm (*M* = 0.697 mm) in the posterior region. The ventral setae of VII-IX and XIX-XXII are modified into genital setae. They are slightly arched; their distal 3/4 have four alternate series of semilunar excavations, the apex is thin and simple (fig. 29). The number of excavations is 13-26 per series and the setae length is 1.157-2.314 mm (*M* = 1.714 mm). The shorter setae are in XXI. The clitellum extends on XVII-XXV (= 9 segments) in four specimens and on XVI-XXV (= 10) in one other. It is saddle-shaped; their low borders are a little lateral to *b* setae. One pair of curved puberal furrows lies in XXI sideways on *b* setae (fig. 25). The medial margin of the furrows rises as a small fold and the *ab* region is somewhat depressed in XXI. The puberal furrows longitudinally connect the openings of the two prostatoid glands in *ab* of 20/21 and 21/22. The prostatoid pores are contracted and the adjoining area in XX and XXII is somewhat raised. Differentiated areas surround *a* and *b* setae in XVIII, XIX-XXIV and they are related with voluminous intracoelomic gland masses (fig. 28). The ventral surface of VII-IX is a little tumid. Intracoelomic gland masses surround the follicles of the *b* setae of VIII and also sometimes those of the other ventral setae in VII-IX; these gland masses are always smaller than the clitellar ones.

Septa 6/7-8/9 are very muscular and like long interpenetrated cones. Septum 9/10 is not so muscular; it is inserted ventrally in its own intersegment, but dorsally its insertion varies from 10/11-12/13 intersegments. Septa 10/11 and 11/12 are thin and fragile; 12/13-16/17 become gradually less muscular and less conical; the following septa are thin and flat. The pharyngeal bulb extends to parietal segment VI. The long anterior esophagus makes a dorso-ventral loop; it follows a voluminous crop. The gizzard is widely globular and very muscular; it belongs to the cavity of the VI segment but due to the elongation of the pharynx and anterior esophagus it occupies the space of the parietal XII-XV or XIII-XVI segments. Three pairs of calciferous glands open dorsally into the esophagus in VII-IX. The glands (fig. 27) are pear-shaped, slightly flattened on the sides and without

appendix; their structure is paniced-tubular. The intestine begins in 23/24, there are no intestinal caeca. The dorsal typhlosole begins in XXVI; in cross-sections it is a sigmoide blade as high as the diameter of the intestine. There are three pairs of narrow lateral hearts in VII-IX and two pairs of wide intestinal hearts in X-XI. There is one pair of holonephridia per segment of nephridiopores aligned with *cd*. The anterior nephridia to VI are intermingled at the sides of the anterior esophagus. The mid-body nephridia (fig. 26) have a pre-septal funnel and three post-septal loops. Loop I is half as long as the other two loops ending at the line of the nephridiopores. A milk-white pear-shaped structure connects loops I+II with III (= bladder). A nephridiopore sphincter is not seen.

The pairs of testis sacs fuse ventrally in X and XI rising at the sides of the esophagus. They can fuse dorsally, too, surrounding hearts and nephridia of these segments and the seminal vesicles of XI. The two pairs of seminal vesicles in XI and XII are latero-ventral, small, rounded and a little flattened from the back to the front. Two pairs of prostatoid glands (fig. 28) are fastened directly to the body wall posteriorly in XX and anteriorly in XXII. They have no differentiated duct and the glands of the first pair are twice as big as those of the second. The glands are rounded, with a smooth, thin connective-muscular covering. The wall of their lumen is formed by the juxtaposition of gland cell necks; the lumina open on the body surface in *ab* of 20/21 and 21/22. The two male ducts at each side are ventral and become juxtaposed to one another from XVIII back. They pierce the lateral side of the first pair of prostatoid gland, rise inside the gland and open side by side into the ental portion of the gland lumen. One pair of ovaries like undulating blades is ventral in XIII. Female pores are not seen. Two pairs of spermathecae are situated in VIII and IX and open in 1/2 *bc* of 7/8 and 8/9. Each spermatheca (fig. 30) has a muscular conic duct with a lot of seminal chambers that are either slightly prominent or not from the duct wall and that are full of spermatozoa. The spermatheca duct in VIII is followed by a long flat sac-like ampulla which is a little wider than the

duct; they are separated by a slight constriction. The ampulla does not contain spermatozoa. The duct of the spermatheca of IX is followed by a long flattened portion well separated from a wide ental part full of glandular secretions. One specimen does not have the first pair of spermathecae and the second pair in IX is shaped like that of VIII in other specimens.

Remarks

Rhinodrilus mucuba has affinities with *R. lavellei* Righi (1992) (RIGHI, 1992) known in Peruvian Amazonia. The two species are similar regarding the shape of the male genital field, the organization of the male terminalia, the muscular anterior septa and the number of spermathecae. The characteristics that distinguish *R. lavellei* from *R. mucuba* are: length 11-12 cm; *aa* = 12 *ab* in the posterior body region; reduced *aa* space in XVII-XXI; small spermathecae of short intraparietal duct that are not separated from the flattened pear-shaped ampulla; spermathecal pores in *b* line of 7/8 and 8/9.

The name of the new species is a random combination of syllables.

Resumen

Tres nuevas especies y nuevos registros de Oligochaeta, Glossoscolecidae, de los Andes de Venezuela

Del Estado de Mérida, Venezuela, entre 1.500 y 4.350 m sobre el nivel del mar, se estudiaron cinco especies de Oligochaeta, Glossoscolecidae mediante disecciones y cortes histológicos seriados. *Andiorrhinus (Amazonidrilus) gavi*, n. sp. se caracteriza por el espacio *aa* más ancho en XX-XXIII y por la presencia de siete pares de corazones en VII-XIII (figs. 1-12, tabla 1). *A. (Meridrilus) rimeda*, n. sp. presenta un par de fajas puberales laterales a las cerdas *b* de XX-XXIII, flanqueadas por dos cordones longitudinales (figs. 18-23, tabla 2). *Rhinodrilus mucuba*, sp. n. tiene disposición típica de cerdas y espermatecas (figs. 24-30, tablas 2, 3). Se dan citas nuevas para las ya conocidas *Onyxchochaeta windley* y *A. (M.) kuika*; se constata la gran variabilidad de esta última especie.

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