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ON A NEW OCTOCHAETINE EARTHWORM SUPPOSEDLY FROM GUATEMALA

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INTRODUCTION

Twenty-four species of earthworms have been reported from Guatemala. One of them is widely distributed in North America where it presumably originated. Another, "pantropical," may have come from the south. Four are obviously exotic, probably introduced accidentally by man since 1500 A.D. The eighteen supposed endemics are known only from the original material.

As a result of one of those accidents that occasionally advance our knowledge of an infrequently collected group of animals, another presumed endemic now can be added to the list of species known only from a single specimen.

The author's thanks are extended to Dr. P. W. Oman for providing the present specimen and for assistance rendered in connection with problems arising from the study of various other species.

Family MEGASCOLECIDAE

Subfamily OCTOCHAETINAE

Genus RAMIELLA Stephenson 1921

RAMIELLA AMERICANA n. sp.

Guatemala. In soil with *Ceiba pentandra* in cargo on plane arriving at San Pedro, November 25, 1955, 0-0-1. U. S. Bureau of Plant Quarantine.

External characteristics. Length, 133 mm. Diameter, 8 mm. (through elitellum). Segments, 217 (+? possibly a recent posterior amputee). Body slightly compressed dorsoventrally and transversely elliptical in cross section behind elitellum. Unpigmented (formalin preservation). Prostomium, probobous. First two segments with numerous fine longitudinal grooves in both ventrum and dorsum. Secondary annulation, one presetal furrow each on iv-xii, one postsetal each on vi-xii, first presetal furrows deep but from ix less marked and like the postsetal; secondary furrows lacking behind the elitellum. Setae small, closely paired, only very slightly or not at all protuberant from epidermis, unrecognizable (lacking?) anteriorly; ventral couples first visible on vi, the lateral on xi, $CD < AB$, $AA < BC$, DD ca. = $\frac{1}{2}C$, both a and b present on left side of xviii, b only on right side, ventral couples of xvii and xix penial. Follicles of ventral couples larger than the others, ventral setae probably also larger. Nephropores unrecognizable. First dorsal pore on 11/12.

Clitellum reddish brown, saddle-shaped, reaching ventrally about to B , intersegmental furrows obliterated, dorsal pores occluded, setae retained, on xiii-xx. Epidermis 3-4 times as thick as rest of the body wall, cracking into blocks on slight tension.

Spermathecal pores transverse slits of about the same width as AB , centered at A , on 7/8-8/9. Female pore in a transverse groove in AA just in front of eq/xiv. Male pores minute, about half way between B and a furrow circumscribing a male field, at 17/18. Prostatic pores minute, on lateral wall of a common lumen containing both a and b penial setae, on xvii and xix.

Male field longitudinally and broadly elliptical, demarcated by a distinct circumferential furrow somewhat lateral to B and just behind eq/xvi but less obvious in front of eq/xx. Two small but conspicuous conical protuberances on each of xvii and xix, about in region of AB , might be either localized temporary elevations or eversions of slight parietal invaginations. The large aperture at the tip of each is filled by two penial setae. No other genital markings.

Internal anatomy. Septum 4/5 membranous and transparent; 5/6-9/10 thickly muscular, funnel-shaped, posteriorly directed; 10/11 and 11/12 much thinner though slightly strengthened, apposed at parietes laterally and ventrally but easily separable till

just lateral to hearts of xi and there strongly adherent, apparently united dorsally and without insertion on body wall so that gut, dorsal trunk and hearts of xi are invisible at first. Septum 12/13 and those following all membranous.

Pregizzard portion of gut *ca.* 10 mm. long, the thin-walled oesophagus sigmoid. Gizzard large, in v. Gut in vi-xiv slender; calciferous glands and lamellae unrecognizable. Intestinal origin in xv. Caeca vertically placed, 2.5-3 mm. long (high), slightly narrower dorsally, protuberant above dorsal face of gut so that the large dorsal trunk at first glance appears to be within a depression of intestinal roof, nine pairs in xxi-xxix. Typhlosole begins in xix-xx though a much lower ridge extends forward into xvi, reaching a height of 2 mm., lamelliform, anteriorly for a short distance with vertically lamellar lateral protuberances, ending abruptly in clxii. A fairly high and rather thick longitudinal ridge on each side in xxi-xxviii, between apertures into caeca and the median typhlosole, appears to be a lateral typhlosole. It probably does not function as a valve to close off lumen of gut from the caeca as the latter are filled with soil. (No supra-intestinal glands.)

Dorsal blood vessel single throughout, large, gradually dwindling anteriorly and disappearing into tissues of pharyngeal bulb. Supra-oesophageal vessel recognizable only in xi-xii. Ventral trunk unrecognizable anterior to viii. Subneural unrecognizable (lacking?). Extra-oesophageals or other longitudinal vessels not found. Hearts of xi-xii large, latero-oesophageal though presumed bifurcations to dorsal trunk have no blood. Hearts of x somewhat narrower and lateral, those of ix-viii still slenderer and also lateral. Paired vessels from dorsal trunk in vii-v cannot be traced to the ventral trunk. ("Lymph glands" lacking.)

Nephridia of iv represented by a large cluster of looped slender tubules on each side of anterior face of $\frac{4}{5}$ (ducts not found nor any funnels, possibly closed, enteronephric and opening into pharynx). Paired, smaller clusters of similar slender tubules present on anterior faces of septa ventrally in v-xi, in viii-ix also attached to posterior faces of spermathecal ducts (ducts and funnels not found). Nephridia, from xii posteriorly on the parietes, on each side one transverse row of short loops from A nearly to mD. Nephridial tubules are as slender as

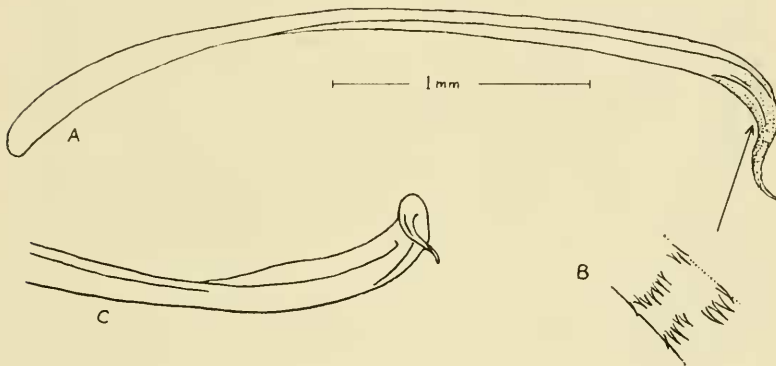
anteriorly in xii-xvi but from xvii much thickened and flattened without marked increase in length. The thickening appears to be due to presence of the same sort of tissue as conceals the slender tubules of the micronephridia in certain species of *Dichogaster*. Individual loops, 9-10 on each side in each segment, are connected by a slender transverse cord (blood vessel? or?) but similar cords may be recognizable passing from the loop into the parietes or to the gut. Nephrostomes apparently are lacking until well posteriorly. From the medianmost loop on each side, beginning about at cxxv, a slender cord passes anteromesially to and through the anterior septum, the anterior free end median to *A* very slightly widened. This cord and its slight terminal thickening presumably are neck and funnel respectively but even under highest power of the binocular definite funnel characters cannot be distinguished. Posteriorly the medianmost component of each transverse series becomes somewhat larger and of more than a single loop, and the larger widening of the free anterior end of the cord (neck) becomes definitely funnel-like. Typical, stomate exonephric holonephridia certainly are lacking throughout the entire length. Brain and circumpharyngeal connectives well anteriorly in iii.

Metandric (no funnels in x). Male funnels large, plicate. Male deferent ducts large (with muscular sheath?), with large lumen, on parietes in *BC*, passing into body wall about at level of 17/18, slightly narrowed in xvii and still more so within the body wall. Seminal vesicles, in xii, medium-sized, cut up into very many fine lobes. Prostates tubular, looped and coiled, ca. 20 mm. long, lumen central and recognizable clear to ental end, in xvii-xviii and xix-xx. Ducts 3+ mm. long, slightly narrower than gland, with smooth surface, muscular sheen, slit-shaped lumen, muscular layer much thicker than the lining epithelium. Penisetal follicles at first separated from prostatic duct in body wall by a thin vertical sheet of longitudinal muscle, united more deeply.

Penial setae have been studied by Mrs. Dorothy McKey-Fender. Her description is as follows:

“Penial setae (Fig. A) curved, especially proximally and distally, flattened in the plane of curvature and somewhat twisted, the apical, more strongly curved portion somewhat widened, forming an asymmetrical, spoon-shaped blade (Fig. C)

with attenuate, often spirally twisted, tip. Distal seventh of shaft, including tip, sculptured on sides and both faces. Sculpture (Fig. B), of interrupted rows of fine teeth that become slightly longer and fewer per group toward the apex of the shaft. Setae *a* and *b* of both xvii and xix alike, except that the tip of the *b* setae may be more strongly twisted. An apparently mature, unworn seta is 3.2 mm. long (disregarding curvature), 0.1 mm. wide and (being rectangular in section) 0.05 mm. thick."



Penial setae of *Ramiella americana*.

- A. Camera lucida drawing of an entire seta.
 Arrow indicates location of detail shown in B.
- B. Detail of edge of blade of same seta, showing character of sculpture
 (More highly magnified.)
- C. Face view of distal portion of a *b* seta from segment xix (sculpture omitted).

Drawings by Mrs. Dorothy McKey-Fender.

Spermathecae adiverticulate, *ca.* 5 mm. long, a band of connective tissue passing from each duct to the septum just in front. Ampulla narrowing somewhat entally, with several annular constrictions externally, ridging of inner wall and large lumen. Duct *ca.* 1½ mm. long, thicker than ampulla but asymmetrical, somewhat and gradually narrowed in parietes, lumen slit-like, wall thick, muscular. Seminal chambers, seven or eight on the bulged side, one or two smaller on the other side, com-

municate narrowly with duct lumen. Ovaries very small. (No ovisacs found.)

Reproduction. Testis sac with little coagulum and that within a forward pocket-like, median bulge of 10/11. Male funnels with iridescence recognizable only at margins of the folds. Flecks of red iridescence recognizable in each lobule of the seminal vesicles (sheen of muscles in connective tissue binding lobules together, green-red-orange). Clitellum probably at or near maximal tumescence. However, seminal chambers in spermathecal duct and the ampullae are empty. Iridescence is unrecognizable terminally in male deferent ducts. Obviously copulation had not taken place. Accumulation of mature sperm on male funnels presumably had begun only fairly recently though the clitellum appears to be already at maximal development. Sexual, and biparental, reproduction is anticipated.

Remarks. The gut, through xiii-xiv where coelomic cavities were filled with coagulum, is macerated but probably not enough so that intramural calciferous lamellae would have become unrecognizable. Extramural glands, since the intestine begins in xv, would have to be in xiii-xiv. In those segments, small slenderly-stalked glands, judging from experience with poorly preserved material of other species, could have been lost in washing out the coagulum, if disintegration had not been previously completed. Site of stalk-gut junction, in either case, probably would be indistinguishable. As there is no reason for believing that extramural glands had been present in the holotype, absence in the species must, for the present, be assumed.

The excretory system obviously is meronephric.

DISCUSSION

Absence of calciferous glands in ix-x, location of the male pores on xviii at some distance from external apertures of all prostatic ducts, and the meronephry require (cf. key in Pickford, 1937, p. 98) the Guatemalan species to go into the Octochaetinae. In that subfamily, only two genera now appear to require consideration.

The genus *Ramiella*, hitherto recorded only from India and Burma, is defined by its author (Stephenson, 1930, p. 845) as follows: "Setal arrangement lumbricine. All septa present (be-

hind their commencement). One oesophageal gizzard in one simple segment. No calciferous glands. Excretory system purely micronephridial, the micronephridia relatively large and few in number, from seven to one pair per segment. Sexual apparatus purely acanthodriline."

The phrase "purely micronephridial" was intended to convey the idea that holonephridia are lacking from one end of the body to the other. One word, meronephric, is sufficient for that purpose. Further characterization of the excretory system is not warranted at present¹ any more than previously, the supposed reduction of meronephry to a single pair of nephridia per segment being based, in one species at least, on the number of opaque white masses that were externally recognizable through a semi-transparent body wall. The definition accordingly should read, in part, only as follows: Excretory system meronephric.

Ramiellona Michaelsen 1935, also meronephric, differs from *Ramiella* only in having calciferous glands. The latter are characterized (p. 53) as follows: "segmental Erweiterungen des Ösophagus mit blutreichen Falten der Wandung im 12 Segment und einigen vorhergehenden." The small vascular folds on the inner wall of the oesophagus in *Ramiellona stadelmanni* Michaelsen 1935 (the only species) are not known to differ from similarly located ridges in *Ramiella bishambari* (Stephenson, 1914) and *R. nainiana* Gates 1945. As *Ramiellona* is not distinguishable morphologically, the Honduran *stadelmanni*, as well as the Guatemalan *americana*, must go into *Ramiella*.

The huge distributional discontinuity thus established is not exceptional in a system with geographical ranges such as the following: South India-Ceylon and Australia-New Zealand (*Notoscolex* and *Megascolex*), Australia-New Zealand and the Pacific coastal strip of the United States (*Plutellus* and *Megascolides*), temperate-zone North America and peninsular India (*Diplocardia*).

The two Central American species of *Ramiella* do not appear to be more closely related to each other, than to any of their

¹ Specimens of *Ramiella nainiana* Gates 1945, fixed and preserved in accordance with his instructions, were forwarded, along with other material, to K. N. Bahl for study of the nephridia. If his failure to publish thereon had been anticipated, some data would have been included in the original description while the worms were still available. Ever since, live individuals of any species of *Ramiella* have been unavailable.

oriental congeners. The anatomy, as known, lacks the uniformity one should expect in a good genus. *Ramiella* thus provides one more illustration of the inadequacy of the classical system and the futility of patchwork changes in generic definitions .

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