

DESCRIPTION OF *DIPLOCARDIA MACDOWELLI* A NEW  
MEGASCOLECID EARTHWORM FROM MISSISSIPPI  
(OLIGOCHAETA)<sup>1</sup>

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ABSTRACT

A new quadrithecate earthworm, *Diplocardia macdowellii* is described from Mississippi. This species is morphologically similar to *D. michaelsoni*, differing from that earthworm in size, number of segments, number of calciferous gland lamellae, form of the spermathecae, and the absence of modified spermathecal setae (*ab*) in IX.

This description is based upon earthworms collected June 17, 1959, along Route 18, six miles west of Bay Springs, Smith County, Mississippi. The holotype has been placed in the U. S. National Museum: USNM Cat. No. 32615. The species is named in honor of the late Harold D. McDowell, Ph.D.

***Diplocardia macdowellii* sp. n.**

Unpigmented, clitellum yellowish to buff (Formalin preservation). Size, 31 to 47 mm by 1.0 to 1.5 mm, with averages of 42 by 1.2 mm for length and width respectively (17 clitellate specimens). Somites 95 to 111, average 102. Small in size for genus, swollen in VIII and IX tapered anteriorly. Prostomium epilobic  $\frac{1}{2}$  to  $\frac{3}{8}$ . Secondary annulations strongest anterior to clitellum. Setal formula: aa:ab:bc:cd=10:3:7:4 (segment XXIII); dd=ca  $\frac{1}{2}$   $\mu$ . Clitellum XIII-XVII; of cingulum type, anterior and posterior margins distinct. Tubercula pubertatis absent. Glandular tumescences ventrally developed in VIII and anterior one-half of IX. Spermathecal pores 2 pair; variable in position, usually on VIII and IX, in varying combinations, even including segments VII and X. Spermathecal setae of VIII modified, tip hastate, distal half of shaft is sculptured; seta 0.420 mm in length. Reserve setae of VIII are 0.252 mm in length, shaft completely sculptured, tip hastate. Spermathecal setae of IX unmodified. Male field flattish, seminal grooves nearly straight to slightly sinuous from  $\frac{1}{2}$ XVIII to  $\frac{1}{2}$ XX; edges of grooves somewhat glandular. Male pore in anterior quarter of XIX; on outer edge of seminal groove. Prostatic setae not visible externally. Female pores paired, antero-medial to setal line *a-a* in XIV. Female field weakly developed. Nephropores are intersegmental at *d*.

Pharyngeal gland masses ending in IV. Esophagus narrow VII through XIII, and in XVI; swollen in XIV and XV. Calciferous gland-like development in XIV and XV; widest in XV; in-

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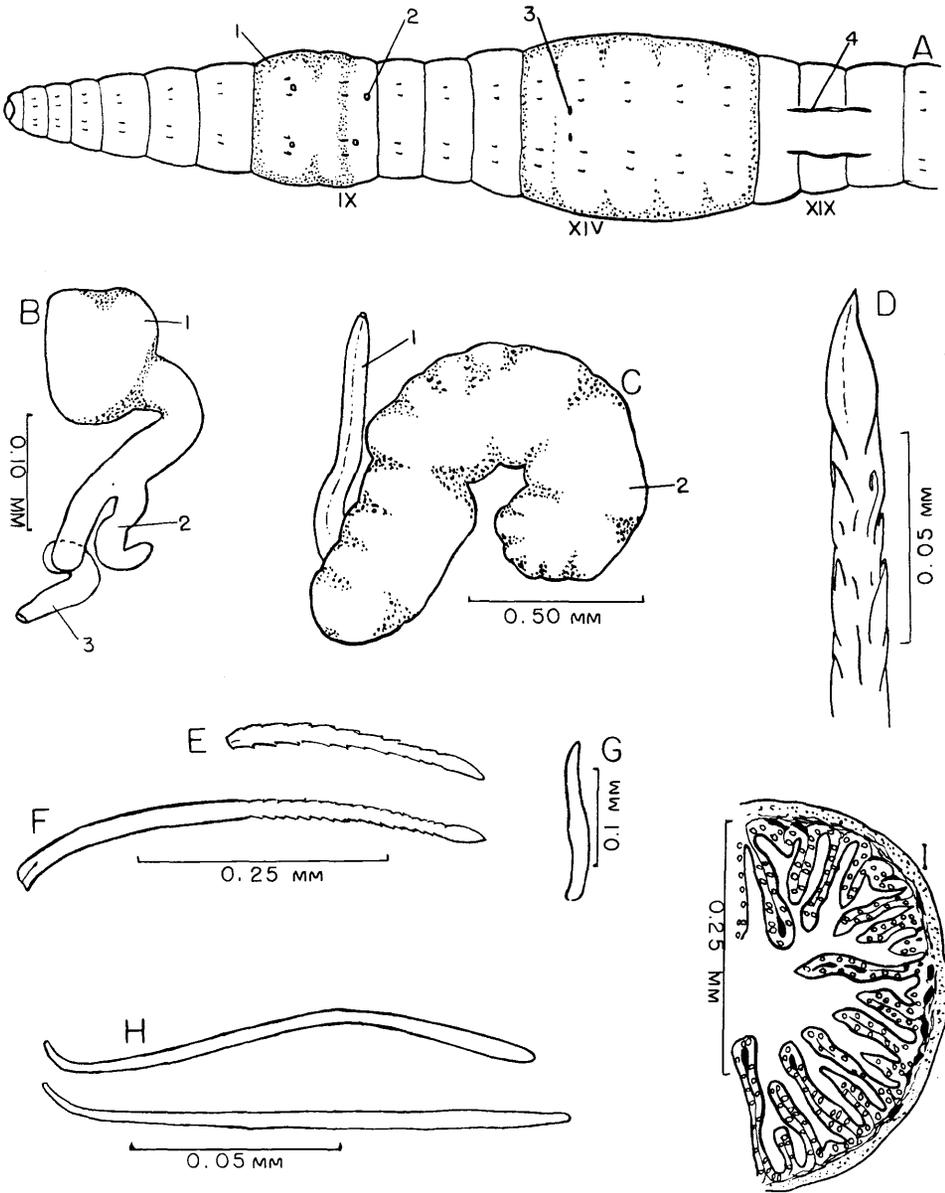


FIGURE 1

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| <p>A. Ventral surface of <i>D. macdowellii</i>.</p> <ol style="list-style-type: none"> <li>1. glandular tumescence of VIII.</li> <li>2. spermathecal pore in IX.</li> <li>3. oviducal pore in XIV.</li> <li>4. position of male pore in seminal groove.</li> </ol> <p>B. Spermatheca of VIII.</p> <ol style="list-style-type: none"> <li>1. ampulla</li> <li>2. diverticulum</li> <li>3. duct</li> </ol> | <p>C. Prostate gland of XX.</p> <ol style="list-style-type: none"> <li>1. duct</li> <li>2. body of gland</li> </ol> <p>D. Ectal portion of spermathecal seta <i>a</i> of VIII.</p> <p>E. Reserve seta <i>a</i> of VIII.</p> <p>F. Spermathecal seta <i>a</i> of VIII.</p> <p>G. Regular seta <i>a</i> of XII.</p> <p>H. Prostatic setae of XVIII.</p> <p>I. Cross section of calciferous gland in XIV.</p> |
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ternally with 35-40 lamellae, inner edges of these lamellae not joined to form wall of lumen; ventral lamellae longest. Gizzard in v and vi. Intestine expands abruptly at  $\frac{1}{7}$ ; esophageal-intestinal valve at  $\frac{1}{7}$ . Typhlosole simple fold, begins in xix, diminishes in height posteriorly, reduced to near-vanishing point ca. xlvi. Last hearts in xii. Supra-esophageal vessel in x-xii. Lateral parieto-esophageal vessel joins ventral esophageal wall in xiii. Dorsal vessel doubled intra-segmentally from ix into xvii. Sub-neural vessel absent.

Testes paired, from ventro-median wall in x and xi (from  $\frac{1}{10}$  and  $\frac{1}{11}$ ), small, rather flat. Male funnel compact, folded with strong iridescence. Sperm duct direct, on internal surface of parietes, contiguous, dorsal to setal line *b*. One pair of ovaries in xiii, with multiple strands of ova. Ovarian funnel auriculate, small, compact. Oviduct direct. Ovisac present, above and median to funnel, in xiv (from  $\frac{1}{4}$ ). Prostate glands compact, U-shaped, two pair, in xviii and xx, extending into xix and xxi respectively; muscular duct about one-half total length of gland. Prostatic setae vestigial, confined to surface of ectal portion of prostatic duct; hair-like, unsculptured; nearly straight, with curved distal portion, from 0.117 to 0.12 mm in length. Spermathecae two pair, in viii and ix; elongate, ampulla cordate, duct very thin especially the distal half; diverticulum digitiform, from anterior aspect of duct at mid-point; duct widening above point of origin of diverticulum; duct at least twice as long as ampulla. Meganephridial, avesiculate. Septa  $\frac{1}{2}$ ,  $\frac{1}{6}$ , and  $\frac{1}{11}$  somewhat thickened; septa  $\frac{1}{8}$  and  $\frac{1}{9}$  thickened.

The species *Diplocardia macdowellii* belongs to the "michaelseni-group" of diplocardians with: (1) doubled dorsal blood vessel, (2) last hearts in xii, (3) quadrithecate condition, (4) simple lamellar typhlosole, (5) calciferous gland lamellae not joined internally, (6) prostatic setae inconspicuous, and (7) spermathecal setae modified and hastate. This species differs from *D. michaelseni* Eisen (1899) in size, number of segments, form of the prostomium, number of calciferous gland lamellae, shape of the spermathecae, gland development in the spermathecal and prostatic regions, and the absence of modified setae in ix (*ab*). Unfortunately, Stephenson (1933) gives no information on his findings with regard to the calciferous gland lamellae in *michaelseni*, and sections made by Frank Smith (1924) do not permit any proper evaluation of the numbers. I have, however, histological preparations of both species at hand which show that, while the lamellae in *michaelseni* may approach 60 in number, a maximum of 40 would be found in *macdowellii*.

Similarities in setal structure between *Diplocardia macdowellii* and *michaelseni* are strong, but no stronger than those obtaining between *michaelseni* and *eiseni* (Michaelsen, 1894): indeed, if prostatic setae alone were considered, all of these would be considered conspecific. The distinctiveness of *eiseni* and *michaelseni* can scarcely be doubted if a number of somatic factors are compared, as for example, the last pair of "hearts" in *eiseni* occur in xiii, and in *michaelseni*, in xii. It seems unlikely that this constant difference (among others) in a somatic feature would be due to local variation.

The external spermathecal region is considerably more variable in *macdowellii* than in *michaelseni*; the spermathecal pores, considered as a pattern of two pair, rarely open in exactly the way way. While usually lined up between setal lines *a* and *b*, they may occur on various parts of segments viii and ix, even extending onto vii or x. Such variability in itself cannot be considered as necessarily a definitive condition. The absence of modified spermathecal setae in ix, and the fact that glandular development of ix is confined to the ventral region anterior to the setal arc (fig. 1-A) are constant among the examples of *macdowellii* studied. Internally, the spermathecae are markedly different from those of *michaelseni*. In the latter species, the duct is strongly swollen above the point of origin of the diverticulum, so swollen, in fact, that it appears to be a second ampulla or at least a lower section of that region. In *macdowellii*, the duct shows no such pronounced swelling (fig. 1-B). The pattern of glandular tumescences in the region

just behind the field differs. In *michaelseni*, glands are present on XXI and XXII, mid-ventrally; this area is unmodified in *macdowellii*. The spermathecal region on the other hand is glandular in both species, involving the entire mid-ventral areas between setal lines *c* and *c*. In *macdowellii*, this glandular swelling does not extend posteriorly beyond the setal arc of IX and, in segments VIII and IX of that species, the tumescences are somewhat more fused across % than in *michaelseni*.

*Diplocardia macdowellii* was collected from a moist, heavy clay-loam soil of a river forest area. Tree cover was quite heavy, with a forest comprised of oak, tulip poplar, elm, red maple, and pine trees. Associated with *macdowellii* in this somewhat swampy situation was the earthworm *Pheretima diffringens* (Baird) 1869.

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