

DESCRIPTION OF A NEW DIPLOCARDIAN EARTHWORM,  
*DIPLOCARDIA LONGISETA*

(OLIGOCHAETA: MEGASCOLECIDAE)

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Specimens upon which this description is based were collected June 17, 1960, along U. S. Route number 60, five miles west of Burbank, Osage County, Oklahoma. The original collection consisted of 22 clitellate worms; a number of acitellate individuals were also obtained but these have not been used in this description.

Additional records of this species include 13 clitellate worms collected June 17, 1960, on the shore of the Salt Fork of the Arkansas River at U. S. Route number 77, Kay County, Oklahoma, and a single clitellate specimen collected June 12, 1960, from a roadside area, five miles north of Maple Hill, Wabaunsee County, Kansas. Types and syntypes from the Osage County collection have been placed in the U. S. National Museum; holotype: USNM Cat. No. 30421; paratypes: USNM Cat. No. 30422.

*Diplocardia longiseta* sp. n.

Unpigmented, clitellum yellow-brown (formalin preservation). Size, 55 to 62 mm by 1.5 to 1.7 mm, with averages of 58 by 1.55 mm for length and width respectively (22 clitellate specimens). Somites, 81 to 122; average, 108. Worm rather slender in overall form, with segments IV through VIII somewhat swollen. Prostomium pro-epilobic, tongue broad, about  $\frac{1}{3}$  greatest width of prostomium; closed behind, grooves on segment I often giving pseudo-tanylobic appearance. Secondary annulations, I-IV absent; VI-VII triannulate; VIII-XII weakly biannulate; posterior to clitellum weakly triannulate. Setal formula:  $aa: ab: bc: cd = 2.6: 1.0: 2.2: 1.0$  (post-clitellar). Clitellum XII-XVIII dorsally, XIII-XVII ventrally; extends ventro-medially to setal line *b*. Tubercula pubertatis absent. Glandular tumescences usually paired, in setal lines, often fused medially producing transverse pad; invariable in 11/12, 17/18, and 21/22; often involving 20/21 and occasionally in 10/11, 22/23, and 23/24. Spermathecal pores presetal in VIII and IX, on anterior quarter of segment, in setal line *a*. Spermathecal setae not differentiated. Male field flat with slight glandular lip development on lunate seminal gutters; latter in *ab*, from  $\frac{1}{2}$  XVIII to  $\frac{1}{2}$  XX. Prostatic pores at ends of gutters in setal arc of XVIII and XX; male pores paired, on anterior edge of XIX, in gutter. Setae *a* and *b* of XVIII and XX modified as elongate penial setae, 2.5 x 0.01 mm in length and width; hair-like, without sculpturing, irregularly curved; reserve setae present and well developed. Female field is slightly developed, transverse, elliptical area on XIV, anterior to *aa*; distance between paired female pores equal to *ab*. Nephropores on anterior edge of segments in line *d*.

Pharyngeal glands ending in IV. Gizzards in V and VI. Esophagus is narrow and straight, from VIII through XVI; without calciferous gland development. Intestine expands in XVII. Typhlosole a simple fold, at greatest height, about one fourth of diameter of gut lumen; begins in XVIII, ends *ca* LV. Last hearts in XII. Sub-neural vessel absent. Supra-esophageal vessel free and clearly visible in X-XII.

Testes paired, branched, from ventro-median wall of X and XI; somewhat flat. Male funnels irregularly auriculate, with some iridescence. Sperm duct direct, without post-septal epididymal looping. One pair of large ovaries in XIII, with multiple strands of ova. Ovarian funnels rather small, auriculate; ovisac present, from 13/14, median to oviduct. Seminal vesicles rather aciniform; in IX and XII, from 9/10 and 11/12; posterior pair smaller. Prostate glands two pairs, opening to exterior in XVIII and XX; duct of gland is narrow and short (*ca.* 1.0 mm); glandular portion folded, extending posteriorly one or two segments; length about five times that

of the duct. Genital setae of XVIII and XX apposed to ectal portion of prostatic duct; follicles extending in open arc posteriorly through three segments (those of XVIII and XX into XXI and XXIII respectively). Spermathecae two pair in VIII and IX, opening in anterior quarter of segment at setal line *a*; large duct and ampulla, about equal in length; duct with knee-like fold on anterior wall, containing definite crypt; diverticulum on anterolateral wall of duct opening into duct below ampulla; diverticular duct is short, causing diverticulum to appear sessile or embedded in wall of spermathecal duct proper. Meganephridial, avesculate. Septa 7/8, 8/9, and 9/10 thickened; 6/7 and 10/11 somewhat thickened.

*Diplocardia longiseta* is to be included among those diplocardian species having: (1) single dorsal vessel, (2) last hearts in XII, (3) no calciferous gland development, (4) quadrithecate condition with presetal pores, (5) unmodified spermathecal setae, (6) spermathecae composed of ampulla, crypt, diverticulum, and duct, and, (7) elongate penial setae. The only described diplocardian with which *D. longiseta* could be confused is *Diplocardia smithii* Macnab and McKey-Fender, 1955. There are several basic differences between *D. longiseta* and *D. smithii*; for example, the spermathecae differ in overall form from those described and figured by Macnab and McKey-Fender (1955). Of special note here is the knee-like fold of the spermathecal duct which forms the crypt (fig. 1-D). In addition, the penial setae of XVIII and XX are enormously elongate (fig. 1-C) as compared with those described for *D. smithii* (Macnab and McKey-Fender, 1955). In *D. longiseta*, these setae are commonly extruded from the body for at least one third of their length. In contrast to the spermathecal setae (fig. 1-B), the penial setae may be described as hair-like. The spermathecal setae show no substantial differences from the general somatic setae, either in size or sculpture. A further, constant difference, is that of the tumescences, which, in *D. longiseta*, occur invariably on 11/12, 17/18, and 21/22. For *D. smithii*, these papillae are apparently segmental rather than intersegmental, and occur on "some or all of XV, XVI, XVII and XX, XXI, XXII, and XXIII" (Macnab and McKey-Fender, 1955). Other factors, such as size, typhlosolar structure, and form of the setal follicles are either subject to variation (size) or too poorly known in so many species that these characteristics can scarcely be used for comparative studies.

No previous species of *Diplocardia* has been described with genital setae as long as those of segments XVIII and XX of *D. longiseta*. Despite their great length, delicate structure, and tendency to be partially extruded, they appear to break off very rarely. Critical examination has not revealed any sculpturing on these setae. Internally, the setal follicles greatly exceed the prostatic duct in length, and arc posteriorly through several segments. The reserve setae are of the same form as the mature type and are also of striking length.

#### EXPLANATION OF FIGURE I

- A. Diagram of ventral surface of *D. longiseta*
1. glandular tumescence
  2. seminal gutter
  3. ventral margin of clitellum
  4. female genital field
  5. spermathecal pore of segment VIII.
- B. Seta *b* of segment number IX
- C. Penial setae of segment XX
1. mature seta
  2. reserve seta
- D. Spermatheca of segment VIII
1. crypt
  2. diverticulum
  3. ampulla
- E. Prostate gland of segment XVIII
1. duct
  2. gland

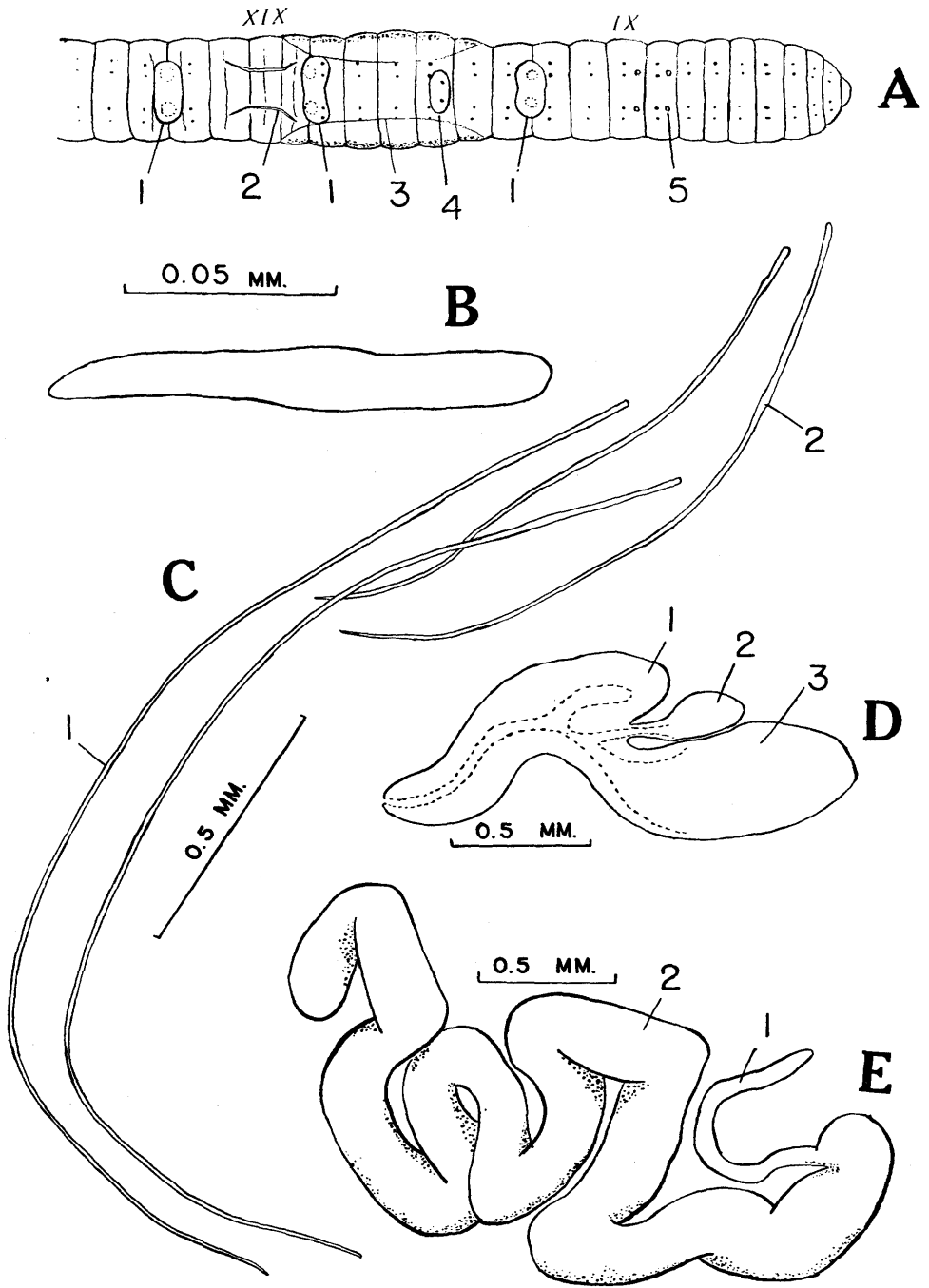


FIGURE 1

The spermathecal crypt is easily recognizable in histological sections; externally the crypt has the appearance of a large protuberance, or a fold of the duct itself. The diverticulum, which does contain sperm, is nestled in the space above the crypt proper and the base of the ampulla. The latter may be folded on itself or on the duct; it is not greatly enlarged and is about equal in length to the duct.

The esophageal wall shows no specializations save low papilla which, in XV and XVI, may form short, low ridges. There is no distinct calciferous gland formation nor other esophageal diverticula. The typhlosole is a simple fold, beginning in segment XVIII: the intestine itself begins at the septum 16/17.

All worms of this species, which have been identified to date, occupied the upper soil layers in low-lying areas. The majority was from stream or river banks, subject to seasonal flooding. No unique characteristics, insofar as ecological factors are concerned, were noted for *Diplocardia longiseta*.

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#### REFERENCES

- Macnab, J. A., and Dorothy McKey-Fender. 1955. Studies in the genus *Diplocardia* (Oligochaeta: Megascolecidae). *Wasmann J. Biol.* 13(1): 113-143.
- . 1959. Corrected setal measurements of *Diplocardia* and *Plutellus* (Oligochaeta: Megascolecidae). *Wasmann J. Biol.* 17(1): 159-160.
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