ON AN AUSTRALIAN SPECIES OF THE EARTHWORM GENUS **MEGASCOLEX** TEMPLETON, 1844

By G. E. Gates

Two small Australian collections contained earthworms that appeared externally to be referable to *Pheretima*. On dissection, the specimens were found to belong to another genus. As opportunity for further study of *Megascolex* is unlikely, the following account is submitted primarily to call attention to a species that may have a regenerative capacity of more than ordinary interest.

Miss Elisabeth Pope very kindly secured and forwarded the collections in response to a request for material of Australian lumbricids.

Megascolex newcombei

1887. *Perichaeta newcombei* Beddard, Proc. Roy. Soc. Edinburgh, 14; 170. (Type locality, Queensland. Types, none).
1895. *Megascolex newcombei,* Beddard, A Monogr. of the Order of Oligochaeta, Oxford, p. 378.
1900. *Megascolex newcombei,* Michaelsen, Das Tierreich, Berlin, 10, p. 226.
1903. *Megascolex laingii* Benham, Trans. New Zealand Inst. 35; 273. (Type locality, Norfolk I. Types, none).
1959. *Megascolex laingii,* Lee, New Zealand Dept. Sci. Indust. Res. Bull. 130, p. 283.

New South Wales

Northbridge, Sydney, suburban garden, November 26, 1961, 1-4-11. E. Pope.
Mt. Keira, Wollongong, private garden surrounded by bush, March 11, 1962, 4-1-3. J. Walsh per E. Pope.

External characteristics. Length, to 80 mm. (some specimens softened). Diameter, 3-3½ mm. Segments, 83 (posterior amputee?), 92, 93, 96 (3 specimens), 97 (2), 98, 103, 105. Body shape, transversely and shortly elliptical in cross section behind the clitellum. Colour, reddish, in dorsum only, in the prostomium present only in the tongue portion. Prostomium, epilobous, tongue open (all). Setae, in circles from ii, with or without an obvious gap at mV and mD, 32/xii, 32/xx, *ca.* 30 posteriorly, viii/4, xviii/0 (one specimen), the maximum counted in preclitellar segments 40, in postclitellar segments 35. First dorsal pore, at 4/5 (2), ?5/6 (3), 5/6 (10), 6/7 (1). Nephropores, microscopic, unrecognizable externally, in rather unsatisfactory preparations of the cuticle seemingly in the setal circle. Clitellum, annular, yellowish, setae retained at least in part in each segment, dorsal pores occluded only at maximal tumescence, intersegmental furrows still distinguishable at maximal tumescence, xiv-xvi. Slight yellowing sometimes is recognizable in a post-setal portion of xiii.

Spermathecal pores, very small but somewhat larger than the female pores, transversely slit-like, margins sometimes slightly tumescent, less than 1/3 C apart, about in *BC*, at 7/8-8/9. Female pore, median, very slightly in front of eq/xiv. Male pores, transversely slit-like depressions at eq/xviii. The depression, as indicated by a cuticular preparation, is shallow. From the depression the cuticle is continued internally as a tube about as long as the depth of the slit and with a thickness about one third the lateromesial width of the slit. The inner end of the tube was not jagged.

Genital markings, paired almost circular areas of epidermal thickening, centred at or near *B*, presetal, in xix (6), in xix-xx (1), in xx (1), postsetal in xviii and there slightly lateral to the male pore levels (1).

Internal anatomy. Septa, present from 4/5 at least, none thickly muscular. Pigment, red, in circular muscle layer and in special longitudinal muscle band at mD.

Gizzard, rudimentary, in v. Pharyngeal glands, extending back to 7/8. Calciferous glands, lacking. Esophagus, narrow and with low, longitudinal ridges that are not lamelliform in vi-xii, wider and moniliform in xiii-xiv where irregular, non-lamelliform ridges are gorged with blood, valvular in xv. Intestinal origin, in xvi (14). Typhlosole, lacking, or if present very rudimentary and represented (one specimen) by a slight ridge recognizable only through several segments behind xxix. Caeca and supra-intestinal glands, none found and probably lacking.

Dorsal blood vessel, single throughout, complete, bifurcating under the brain, the branches uniting over the subpharyngeal ganglion to become the ventral trunk which is also complete. Supra-esophageal trunk, present in viii-xiii. Extra-esophageal trunks, median to the hearts, recognizable only back through xi. Hearts, last pair in xii (14), those in x-xii possibly latero-esophageal though connectives to the dorsal trunk were not certainly identified, hearts of ix and anteriorly lateral. Subneural trunk, none found and presumably lacking.

Excretory system, meroic, the microic tubules seemingly astomate and avesiculate. Nephridia of the clusters in iv-vi certainly are longer than the parietal nephridial of posterior segments. Nephridia behind the clitellum are in transverse rows nearly reaching mD and mV. One row apparently is present behind each septum. Another row may be present in front of the septum (peritoneum of some specimens fragmented!).

Holandric, coelomic cavities of x-xi filled with a sticky coagulum (all clitellate dissected specimens)—annular testis sacs with membranous walls if present could have been unrecognised. Seminal vesicles, with several lobes of varying sizes, in ix and xii. Prostrates, small, lobed, flattened against the parietles and rather band-like, in xvii, xviii-xix. Prostatic ducts, short, rather slender, *ca.* 1 mm. long. Sperm ducts, passing into ental ends of prostatic ducts or into the glands anterior to point of emergence of the prostatic ducts. (Penial and copulatory setae, none found).

Spermathecae, fairly large relatively, reaching at most up to level of dorsal face of gut. Duct almost confined to parietes and rather narrow. Diverticulum, from anterior face of duct at parietes, sometimes shorter than the main axis, reaching to or beyond ental end of ampulla. A slightly widened terminal portion may be marked off as a spheroidal to ellipsoidal seminal chamber or an ental widening may be more gradual so that the diverticulum is slenderly club-shaped. Ovaries, fan-shaped, with numerous egg strings that have as many as ten ova in a string, at largest reaching up to dorsal blood vessel. Ovisacs, present in xiv.

Reproduction. Spermatozoal iridescence was recognizable in spermathecae of several specimens and in fewer individuals also on male funnels. As sperm are exchanged during copulation, reproduction is assumed to be biparental.

Regeneration. Normal head regenerate, as yet with but little pigment, of 3 segments at 3/4. An early regenerate, without pigment, metameric differentiation or terminal sculpturing, at 4/5.

Tail regenerates. (1) Of 7 segments at 81/82. (2) At 67/68, with dorso-terminal anus and four segments already demarcated proximally. (3) At 60/61, of ten segments. (4) At 75/76, with ten segments already demarcated but metameric differentiation incomplete, anus terminal. Appearance suggest a previous regeneration by the same worm at 62/63. Possible tail regenerates; last 19 of 73 segments, last 13 of 86 segments, last 13 of 87 segments.

Capacity for head regeneration may be much greater than is indicated above (*cf.* Abnormality).

Variation and *abnormality*. No. 1) An extra spermatheca, in vii on left side, with pore at 6/7. No. 2) An extra spermathecae, in vii on the right side. No. 3) An extra pair of spermathecae, with pores at 6/7. A gizzard was not distinguishable in this specimen with 105 segments, a condition that can be expected if a head had been regenerated at 5/6 or 6/7. Extra spermathecae, in these three specimens may have been developed during head regeneration. No. 4) Spermathecal pores, at 6/7-9/10. Female pores, in xv-xvi. Male pores, in xix. Clitellum, in xv-xvii. Genital markings, presetal in xx. Testes, in xi-xiii. Spermatozoal iridescence, on male funnels of xi and left funnel of xiii. Coelomic cavities of xi-xiii filled with the same sort of coagulum that is present in x-xi of normal individuals. Seminal vesicles, in x, xiii (small) and xiv. Ovaries, in xiv-xv. Ovisacs, in xv-xvi. Spermathecae, in vii-x, normal except in the right side of vii and the left side of x where each spermatheca has two diverticula arising from the anterior portion of the duct at the parietes.

Doubling of testis, ovary and spermathecal segments can result from halving of mesoblastic somites (*cf.* Gates, 1958). Several specimens do have in unregenerate intestinal regions metameric abnormalities that could have arisen from halving of mesoblastic somites. However, location of male pores in xix (of No. [4] shows that the only embryonic halving that could have taken place would be of the somite at the thirteenth level. Other doublings must have arisen in some other way. Regeneration, in the genus *Perionyx* (*cf.* Gates, 1943) does result in increasing number of gonadal as well as of spermathecal segments. If then, regenerative capacity of the present species approximates that of *Perionyx*, all abnormalities mentioned above could have arisen during head regeneration rather than during embryonic development.

Ingesta. Mainly vegetable matter, but with some sand grains and an occasional pebble of quartz. Three species of *Perionyx*, known to have a high regenerative capacity, also are selective feeders, swallowing little but organic matter.

Systematics. The present specimens differ from *newcombei* as characterized by Beddard in two ways: paucity of genital markings, location of the gizzard in v instead of in vi. The first difference can have little systematic importance, because of possibility of considerable individual variation, until very much more information is available. In view of other similarities, the second difference scarcely seems to warrant specific separation at present.

Megascolex laingii is known only from the original description of two aclitellate, anterior fragments. The gizzard was in v as in the New South Wales worms. Absence of genital markings in Benham's worms may be of no systematic significance because of immaturity. Moreover, inornate individuals are now known in many species that usually do have genital markings. Some support for the identification is provided by four macerated specimens from Hamilton, New Zealand. If prostrates were racemose, as does seem probable, the specimens were not distinguishable from the New South Wales *newcombei* by any recognizable character.

Remarks. Species of *Pheretima, Plionogaster*, and *Megascolex* may have so much similarity in macroscopically recognizable external characters that dissections are necessary for generic identification.

References

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