

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

ON AN INTERESTING PHILIPPINE SPECIES OF THE
EARTHWORM GENUS *PHERETIMA* KINBERG, 1866
(OLIGOCHAETA, ANNELIDA)¹

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Earthworm faunas of a few areas have been more or less thoroughly surveyed. Our knowledge of the megadriles of so many other parts of the world is fortuitous, a result of one or more accidental finds. The interest of a Peace Corps Volunteer was aroused by a bright blue earthworm of a size that to him seemed unusually large. As a result, several specimens became available from a small Philippine island.

The identifiable species was known hitherto only from an Italian description of the holotype. Although that account is better than many of the period, confirmation of some characters and information about others then ignored has been needed.

MEGASCOLECIDAE

Pheretima Kinberg, 1866

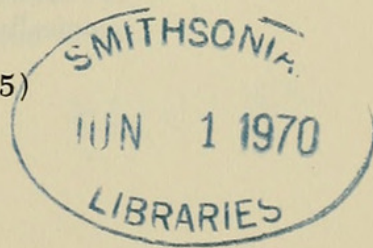
Pheretima mazarredoi Rosa, 1894

Pheretima "*mazarredoi*" Rosa, 1894. Atti Acad. Sci. Torino, 29, p. 765. (Type locality, Marinduque Island, Philippines. Holotype, originally in the Madrid Natural History Museum. No other information now available.)

Material examined: Marinduque I. Bathala, Santa Cruz, found on surface of ground near some caves, 2 March 1965, 2-5-0. Halford Jones.

External characteristics: Size, 250-325 by 15 mm (acitellates), of juveniles 60 by 5 mm. Segments, 114, 116, 120 (2 specimens), 122, 124, 131. Prostomium, epilobous, tongue closed. Color, very dark, almost midnight blue but with an obvious greenish tinge. Setae, small, numerous,

¹ From research financed by the National Science Foundation.



deeply retracted, not certainly recognizable in much of the dorsum. First dorsal pore, at 12/13 (7).

Octothecal, pores at 5/6–8/9. Male pores, minute, superficial, equatorial and rather widely separated, in xviii. Genital markings, paired, represented by whitish transverse depressions about in line with the male porophores and so rather widely separated, at 17/18, 18/19, or 18/19, 19/20, 20/21.

Internal anatomy: Septa, all present and complete from 5/6 posteriorly. Special longitudinal muscle band at mD, recognizable only from 12/13 posteriorly. Pigment, very dark, of a greenish blue appearance. Lymph glands (unrecognizable in the two small juveniles), present from xvi posteriorly. Brown bodies, numerous under the peritoneum.

Gizzard, in viii, *ca.* 6 mm long and 7 mm thick, the wall only *ca.* 1 mm thick, with a wider flange either in vii or adherent to 7/8. Esophagus, widened in x–xiii, valvular in xiv–xvi. Intestinal origin, in xvii (4). Intestine, deeply and variously sacculated, especially anteriorly but acaecal and atyphlosolate.

Dorsal blood vessel, unrecognized in front of 5/6, possibly because of absence of blood therein. Ventral trunk, complete, bifurcating over subpharyngeal ganglion, the branches passing up along the circumpharyngeal nervous connectives (presumably to dorsal trunk?). Extra-esophageals, median to segmental vascular arches, passing onto ventral face of gut in x, unrecognizable behind xiii (3), empty continuations of the vessels in one specimen seemingly passing into xvi (and then to the ventral trunk?). Supra-esophageal trunks, rather widely separated, in x–xiii, usually empty, connected with each other transversely at least once, just in front of 12/13. Subneural trunk, no trace recognized from one end of body to the other (1 completely dissected specimen). Hearts, of vi–ix slender, lateral (*i.e.*, connecting dorsal and ventral trunks only in each of those segments), of x–xiii lateroesophageal.

Holandric. Testis sacs, none (testes and male funnels obviously free in coelomic cavities). Male funnels, polyPLICATE. Male ducts, not seen, presumably intraparietal behind funnel septa. Seminal vesicles, two pairs, in xi, xii, vertically placed, *ca.* 10 mm long by 1 mm thick, with densely spongelike texture. Prostates, compact, confined to xviii, seemingly sessile. Ducts, 5 mm long, mostly within the parietes, recognizable only after dissecting prostates away from the body wall.

Spermathecae, size increasing posteriorly. Ducts, almost confined to the body wall. Diverticulum, small, heart-shaped to spheroidal, or very shortly ellipsoidal, on anterior face of duct just at, partly or wholly within parietes. Ovaries, vertically placed, *ca.* 2 mm long. Ovisacs and pseudovesicles, unrecognized.

GM glands, none visible in coelom, on or in body wall.

Reproduction: Specimens were too immature to provide any macroscopically recognizable evidence as to mode of reproduction. Texture

of seminal vesicles is not like that of mature specimens of many amphimictic species of the genus. Genital aberrations, such as are so often present in male sterile morphs, are lacking. Perhaps biparental reproduction should be anticipated.

Remarks: Many natives, according to Mr. Jones (*in lit.* to author), believe these worms to be snakes. Noteworthy, in that connection is the fact that *Pheretima ophioides* Michaelsen, 1930, has a similar blue color. *In vivo*, the pigment of *P. mazarredoi* probably was confined, except perhaps at the anterior end, to connective tissue between the epidermis and the circular muscle layer. Presumably then, after preservation, epidermis, brown bodies, spermathecal and prostatic ducts were selectively stained by the dissolved pigment. Alcohol in which the worms were received had a bright yellow color.

The parietal musculature was studied in microtome sections by Prof. W. J. Harman who has reported on its structure as follows (*in lit.* May 7, 1969). "The circular muscle is composed of 10–12 fibers each clearly separated from the others by abundant connective tissue. Individual fibers are 23 μ wide. The separating connective tissue is 33 μ thick. In the longitudinal musculature 8–20 fibers are enclosed in each thin connective tissue sheath. The Kastchen are not as clearly formed as in other pheretimas or any other earthworm that I have ever seen but the differences are only quantitative. I would have identified the slides as coming from a *pheretima* had I not known beforehand."

Coelomic fluid can be ejected from the dorsal pores of *P. ophioides* to a height of 1½ m. The fluid, according to native collectors, is corrosive and especially dangerous if gotten into the eyes. One of Mr. Jones letters indicates he had received similar warnings about his specimens of *P. mazarredoi*.

Systematics: Immaturity of each specimen obviates mention of several characters likely to be of systematic importance: Location and shape of clitellum. Presence or absence of ovisacs, pseudovesicles, GM glands. Spermathecal diverticula seem to have reached the same stage as in the clitellate holotype. Perhaps then, GM glands should not be expected.

Absence of intestinal caeca, typhlosoles, and testis sacs, completeness of septa 8/9–9/10, presence of a pair of complete lateral hearts in each of viii and ix, in the genus *Pheretima* are regarded as primitive characters. If a subneural trunk is lacking (the vessel often is unrecognizable when empty), that condition also will be considered primitive. Too little information is available to warrant a statement as to the duplex condition of the supra-esophageal trunk. Paired female pores, in *Pheretima* also is a character that seems primitive but the original account of the type indicates presence of a single, median aperture as in most species of the genus.

Absence of testis sacs in *Pheretima* has been recorded hitherto only from male sterile morphs and from juveniles of amphimictic forms.

Whether sacs would later have been developed by the Marinduque worms of course is unknown but now seems unlikely.

The clitellum, according to the original account of *P. mazarredoi*, extends through xiii, in addition to the usual three segments. That character was formerly regarded as primitive, but mainly because *Pheretima* was believed to be directly descended from *Megascolex* in which the clitellum often included more than segments xiv-xvi.

Presence of hearts in xiii, in *Pheretima*, now certainly seems to be an advanced rather than a primitive character.

A subgenus *Archipheretima* was erected by Michaelsen (1928) for holandric species with the following characteristics: Clitellum extending through more than segments xiv-xvi. Copulatory chambers and intestinal caeca lacking. Neither of those characters is diagnostic nor is the combination. Subsequent addition (Michaelsen, 1934) of two more characters added nothing of value to the definition. The only really important character in the definition is, "intestinal caeca absent," and that is shared with various species in other classical subgenera of *Pheretima*. Michaelsen did not put *P. mazarredoi* in his *Archipheretima* though it now seems more primitive than some that were included. All species of *Archipheretima* are too inadequately characterized for present needs.

Pheretima mazarredoi seems likely to be closely related to *P. iris* and *P. margaritacea* (Michaelsen, 1892) from the island of Samar and *P. ophioides* from Luzon.

Each species referred to *Archipheretima* is known today only from the original materials. Beyond the Philippines the only records are for Borneo.

Immature specimens, from a cave in the region where *P. mazarredoi* was secured, differ from that species in characters that often have been found to distinguish closely related taxa from each other. A short description is appended.

Pheretima sp.

Material: Marinduque Island. Bathala, Santa Cruz, cave, August 13, 1964, 0-2-0. Halford Jones.

External characteristics: Size, 235-385 by 20 mm. Segments, 120, 126. Body, shortly and transversely elliptical in cross section. Color, slate, uniform in ventrum as well as dorsum.

Spermathecal pores, very small transverse slits about 6-7 mm apart from each other. Female pores, nearly 2 mm apart (1 specimen). Male pores, very small transverse slits, equatorial in xviii, 9+ mm apart from each other ventrally, each at center of a circular area slightly protuberant from middle of a slightly depressed, longitudinally elliptical area of epidermal translucence about 2 mm wide that crosses slightly into xvii and xix.

A single preclitellar marking, about 7 mm wide and 2½ mm long, obliterates 9/10. A central translucent portion is distinctly demarcated

from a peripheral opaque band. Postclitellar markings, widely paired, nearly circular areas (of slight tumescence?), slightly median to male pore levels, *ca.* 2 mm wide, separated from each other mesially by a distance about equal to 4 mm, two pairs obliterating 19/20 and 20/21.

Internal anatomy: Pigment, slate-colored, in a layer between epidermis and circular muscle layer.

Esophagus, in x-xiii with low, thin, lamelliform, closely crowded ridges on inner wall. Esophageal valve, in region of 14/15. Intestinal origin, in xv.

Seminal chambers, in two vertical rows protruding slightly from anterior face of spermathecal duct.

Ingesta: Mostly organic matter, including one bit of wood 18 mm. long. A small tick-like arachnid also was found.

Parasites: Slate-colored brown-bodies in the coelom contained nematode eggs, pseudonavicella spores, variously shaped but poorly preserved bodies that may be gregarines, also organisms of unknown relationships, as well as numerous small setae and corpuscles of various sorts.

Remarks: Intersegmental furrows of the clitellar region were almost obliterated but no tumescence was externally recognized and dorsal pores still were functional.

Alcohol in which these specimens were preserved had become a dark and rather greenish color. Dissolved pigment may have stained the ventrum (to produce an appearance of uniform coloration) as it presumably did the brown-bodies (some subperitoneal) and prostatic ducts.

Fine diagonal ridges on inner wall of intestine run through several consecutive segments.

Nephridia, of the intestinal region, seem to be more numerous on posterior than on anterior faces of the septa and especially so ventrally.

Significance of certain differences from other Marinduque specimens, such as in the spermathecae and the intestinal origin, remains to be determined. A sufficiently long isolation of cave from exterior populations could have enabled specific distinctness for each.

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