THE EARTHWORMS OF BURMA-VI

By G. E. Gates.

Introduction.

In the period between completion of the manuscript of part V (Gates, 1936) of the present series and 1942 when the war finally ended this project, the collecting of earthworms was continued, with funds supplied by the University of Rangoon, throughout Burma. Earthworms were eventually secured from most sections of the country, between Victoria Point at the very southern end and Putao in the far north, between Kawkareik, the Salween district, Karenni, Kengtung and Yunnan in the east across to Akyab, the Arakan Hill Tracts and the Chin Hills in the west. Many more earthworms certainly were obtained than have ever been collected for scientific purposes in any other part of the globe regardless of its size or location.

A portion of the material that was secured during the above-mentioned period, belonging to the family Ocnerodrilidae, the genera *Woodwardiella*, *Ramiella*, *Dichogaster*, one species of *Desmogaster*, and three of *Pheretima*, has been considered in two articles in other journals (Gates, 1942 and 1943). The present contribution reports on as much of the remainder of the material as is now possible, with the exception of that belonging to one genus in each of two families, *Drawida* of the Moniligastridae and *Eutyphoeus* of the Megascolecidae.

Types of species known only from a single specimen or a very short series were re-examined, sometimes with further dissection, to obtain certain important information, prior to packing them, in 1942 for protection against damage during air raids. The cuticle had become loosened from the epidermis during the years since some of that material had been collected so that certain previously unknown external characteristics, *e. g.*, segment of the first nephropores, sites of subsequent pores, etc., could then be determined.

Some close relatives of certain species that are common to Burma and India were studied while the author was resident in India after the evacuation of Burma. One of the results was recognisation of several supposed endemics as synonyms of peregrine forms. The names of three Burmese species, unfortunately, have had to be changed but that may be more than balanced by a clarification of certain zoogeographical problems.

The lists, in subsequent pages, of identified specimens have been shortened by omitting the name of the district when it was the same as the locality at which the worms were secured, by omission of the word district and putting the name of the district, other regional or political area in parentheses, and by indicating numbers of specimens of each of the usually recognized growth stages in a sequence of three figures. Thus, the expression "1-0-5 specimens", means, 1 juvenile, no

aclitellate and five clitellate specimens. In a few cases in which large juveniles were not segregated from aclitellate specimens, all juveniles as well as the aclitellate individuals were lumped so that a sequence such as "--13-5" means, five clitellate specimens and 13 others some of which were juvenile and some clitellate.

Family Moniligastridae.

Absence of typhlosole, presence of enterosegmental organs (of unknown function) and location of extra-oesophageal trunks of the circulatory system lateral to the hearts has now been found to characterize each Burmese species of this family except *H. browni* (Michaelsen) 1907 which is unlikely to be unique in respect of any of those characteristics.

The gut in several postgizzard segments does not appear, in this family, to be intestinal in the usual sense and at the end becomes valvular as at the end of the oesophagus in other families. The term intestine accordingly is for the present restricted, in the Moniligastridae, to that portion of the gut behind the valve. This leaves an unusually long pre-intestinal section of the gut which may not be comparable to the oesophagus of other oligochaete families.

Genus **Desmogaster** Rosa, 1890.

Desmogaster albalabia Gates, 1930.

External characteristics.—The nephropores of iii-ix are in *dd* but are still unrecognizable on xi-xii and posteriorly. The male pores are small, transverse slits, each in a transverse groove extending nearly across a white, nearly circular porophore.

Internal anatomy.—The postgizzard portion of the gut is slender, thick-walled, sigmoid. The intestinal origin is in xxvi or xxvii. Commissures from the extra-oesophageals are as in *C. doriae*. The proslatic capsule is approximately spheroidal, sessile on the parietes, with opaque, reddish wall and slit-like lumen, the inner lining of the capsule firm. The ceolomic cavity of xiii is closed off from the parietes.

Desmogaster doriae Rosa, 1890.

Karen hills (Toungoo), north of Thondaung, September, 1-5-2 specimens. G. E. Blackwell. From the Genoa Museum "*Desmogaster Doriae* Rosy Ann. Mus. Civ. Genova XXIX, 1890, p. 369. T. XII, f.2-11. Typus ! Meteleo (Carin Cheba) 1000-1400 m s/m. Giugno-Oottobre 1888. L. Fea Cat No. 52." 1-1-0 specimens.

External characteristics.—Length, 350 mm (+? the longest clitellate specimen a posterior amputee). Diameter, 14-16 mm. Nephropores are first recognizable on iii (2 specimens) or iv and are in *dd* to ix or x, usually at increasing distances from *d* lines posteriorly, lacking on xi-xii (adult specimens), from xiii posterior in the median half of *bc* very rarely in the lateral half of *bc*, or in *dd* and then in a position varying from just dorsal to *d* lines to just lateral to mid-dorsal line. On one clitellate specimen the pores are located in the median half of *bc* as follows : left side, 13, 16, 17, 23, 29, 37, 39, 40, 43, 47, 52, etc. ; right side, 24, 25, 28, 33, 34, 37, 41, 43, 45, 47, 49, 51, 52, 53, 56, 59, 62, etc. (otherwise in *dd*). The clitellar coloration, a very dark red, extends from a postsetal portion of x to 18-19.

Internal anatomy.—Gizzards, 9-12, in xvi-xxix. The postgizzard portion of the gut is sigmoid, the inner wall with closely crowded annular ridges gorged with blood. The valve is short, narrow, in xxxv (3). Intestinal origin in xxxvi (3), possibly in xxxv (1) or xxxvii (1).

The dorsal vessel is double anterior to 5/6 (3). An extra-oesophageal is first visible on the parietes anterolaterally from whence it passes under the subpharyngeal ganglia and thence posteriorly close to or in contact with the nerve cord, with a connective to the corresponding vessel on the other side in iv, receiving several large vessels in front of 6/7 after passing up from the parietes. A large vessel (commissure) from the extra-oesophageal passes upwards on the posterior face of 10/11 (and also 11/12), and after passing through the septum joins the heart of x (or xi). The hearts do not open directly into the dorsal vessel but are continuous with each other, in a segment, over the gut, a small vessel passing from the heart-commissure junction to the ventrolateral face of the dorsal trunk. Segmental commissures of vi-ix pass directly into the dorsal trunk. The commissures of v, also lateral, are about as large as those of vi-ix dorsally but are slender and transparent ventrally. A large vessel passes into the testis sac along the male deferent duct and for some distance ventrally is adherent to that duct.

All nephridial ducts apparently pass in to *ab* muscle gap. Nephridial funnels are small but slightly iridescent and easily recognizable. Nephridia were not found in xi-xii of adults.

The vas deferens is 35-40 mm long, drops ventrally median to the heart, crosses laterally in front of the heart, with a long hairpin loop (open ventrally) extending up to the testis sac on the posterior face of the septum, passes under the extra-oesophageal trunk and into the parietes through the *ab* muscle gap, emerging again into the coelomic cavity from the *cd* gap in front of the prostate to pass into the ental end of that organ. The prostate is shortly elliptical to nearly circular in cross section. The glandular investment is thicker than the capsule to which it is rather firmly adherent. The capsule is opaque, red, elongately and slenderly digitiform, lumen small, transversely elliptical in section. The lining of the capsule is firm and has a white (almost muscular) sheen.

The spermathecal duct is 15-20 mm long, not at all thickened within the parietes. The ovisacs extend into xix or xx. The coelomic cavity of xiii apparently is not closed off from the parietes (or if so closed was opened in each dissection).

Remarks.—Clitellar coloration is restricted to the epidermis, the circular muscle layer of the clitellar region, as well as elsewhere, white. Sperm masses in clitellate specimens are usually ventral in the testis sacs and attached to the male funnels, an iridescent column occasionally penetrating dorsally into spongy tissue. Testis sacs of the juvenile (160 × 8 mm) are represented only by small white thickenings of septa though spermathecal ampullae and ducts are fairly well developed.

Desmogaster ferina Gates, 1943.

External characteristics.—The nephropores of iii-x are all in *dd.*

Internal anatomy.—The postgizzard portion of the gut is sigmoid. The intestinal origin apparently is in xxxv.

Desmogaster planata Gates, 1931.

External characteristics.—Nephropores of iii-x are in *dd*, but in *dd* or *bc* and with no regular alternation posteriorly.

Internal anatomy.—The postgizzard portion of the gut is sigmoid. The intestinal origin is in xxix. The commissures from extra-oesophageals on the posterior faces of 10/11-11/12 are as in *D. doriae.*

Genus **Hastirogaster** Gates, 1930.

Hastirogaster livida Gates, 1930.

External characteristics.—Nephropores of iii-x are in *dd*, in *bc* or *dd* but not regularly alternated posteriorly.

Internal anatomy.—The postgizzard portion of the gut is sigmoid. The intestinal origin is in xlii.

Family Megascolecidae.

Genus **Plutellus** Perrier, 1872.

Absence of pigment, location of the first dorsal pore on 7/8 or 8/9, saddle-shape of the clitellum (on xiv-xviii), pairing of female pores, location of gizzard (when present) in v, absence of calciferous glands both intra-and extra-mural, absence of a definite typhlosole, absence of testis sacs and presence of receptacula ovorum in xiv, have now been found to characterize all Burmese species of the genus.

In the circulatory system the dorsal trunk is single in each species and is continued onto the pharyngeal bulb. The trunk can be traced in favourable conditions, *i. e.*, when filled with blood (unrecognizable anterior to 4/5 in all material of *ambiguus, leucaspis, macer, pauxillulus* and *subtilis*) to the region of the cerebral ganglia where it bifurcates. The branches pass ventrally along with the nervous commissures to a median point over the subpharyngeal ganglia where they reunite to form the ventral trunk. A supra-oesophageal trunk, apparently always single, which may be as large as or even larger than the dorsal trunk, is present at least in x-xii or xiii. Anteriorly the trunk disappears into the gut wall in ix or close to the insertion of 8/9 or close to the insertion of septum 7/8 (*compositus*). Posteriorly the trunk often is not recognizable behind the last pair of hearts in which case the trunk appears to be formed by union in the median plane of the anteror branches of the hearts of the segment (xii or xiii). Occasionally a positerior continuation is recognizable but it disappears into the gut wall at or near the insertion of septum 12/13 or 13/14. The extra-oesophageal trunks pass into the ventral face of the gut in viii or ix and may come into contact mesially or nearly do so but apparently without uniting. The trunks

disappear into the gut wall in xiv in *ambiguus* and *pandus* or are unrecognizable, in the other species, behind xii or xiii. Transverse connectives between the extra-oesophageals have not been found except as specially noted in the accounts below. The lateroparietal trunks have been recognizable only in an anterior portion of the body, from xxiv, xix or xviii forwards, in *cd* or just lateral to the *d* lines. These trunks pass up from the parietes in xiii to become continuous with the extra-oesophageals, or to join the extra-oesophageals (if the latter are continued posteriorly) in xiii or in xii after first passing through 12/13. The portion of the lateroparietal trunk in xiii is long, in *comptus*, and extended dorsally in a hairpin loop, the closed end of which is nearly at the level of the dorsal face of the gut but with no recognizable branch to the gut. The lateroparietal trunk in *pandus* may pass directly into the extra-oesophageal, or it may bifurcate just in front of 13/14 into equisized branches, one passing into the extra-oesophageal and the other passing onto the dorsal surface of the gut and apparently into the supra-oesophageal. Or, the branch to the extra-oesophageal may be lacking (merely empty and unrecognizable?) the whole lateroparietal trunk passing into the supra-oesophageal. A subneural trunk apparently is lacking in each of the species. Two or three pairs of small vessels pass out from the ventral trunk anterior to 4/5 and these vessels either cross or join the extra-oesophageals on the subpharyngeal mesentery but were too small to trace further. These small vessels appear to be the segmental commissures (or rather the ventral portions of them) belonging to ii-iv, the connectives at anterior ends of the dorsal and ventral trunks presumably belonging to i. The segmental commissures of v-ix are lateral loops. Those of ix, in *compositus*, *pandus* and *pratensis*, are as large as the hearts. The commissures of x-xii or xiii are latero-oesophageal hearts.

The nephridia of v-xi or xii (when recognizable) have been on the anterior faces of the septa and appear to be astomate, as nephridial funnels were never found in those anterior segments though they could be recognized posteriorly. Filaments on the coelomic face of the body wall which had been regarded as a " micronephridial fur " in several Indian species have been interpreted as shreds of disintegrated parietal peritoneum though poor preservation may have been responsible for inability to recognize nephridial characteristics.

Three Burmese and one Indian species apparently would have to go into the subgenus *Diplotrema*, the remainder into the subgenus *Plutellus*, according to the classifications of Michaelsen who also included in the same genus *Pontodrilus* and *Fletcherodrilus*. All of the Burmese (and Indian) species can go into *Plutellus* as redefined by Stephenson (1930) so as to exclude *Diplotrema* as well as *Pontodrilus*. Even, however, as limited by Stephenson, *Plutellus* remained a heterogeneous complex of species, some with a single and others with a doubled dorsal blood vessel, some without and some with calciferous glands, and in the latter case with extramural glands in x-xii, xiv-xv, etc. Unfortunately, when *Plutellus* can be reduced to morphologically homogeneous genera, the generic name of the Burmese and Indian species will have to be changed

Plautellus ambiguus Gates, 1931.

External characteristics.—Nephropores, when visible, are on *d* lines. Spermathecal pores are on or just median to *b* lines, a pore on one specimen just lateral to the *a* line. Female pores are presetal, on the *a* lines, not quite halfway towards 13/14. The male field is protuberant but not distinctly demarcated, extending from the postsetal secondary furrow of xvii to the presetal secondary of xix, widest at 17/18 where it reaches into *bc*, 17/18-18/19 not continued across the field. A deep groove, on site of the setal secondary, crosses the field on xviii into mid *bc*. A small, transversely elliptical protuberance with a central greyish translucent spot is on the site of 17/18 and about in *ab*. The male pores are still quite unrecognizable. A circular aperture in *ab* and about on the setal equator is left when the prostatic duct is dissected out from the parietes.

Genital markings, protuberant, fairly distinctly demarcated, transversely elliptical, with speckled surface, are in *aa* on 11/12 and 12/13.

Internal anatomy.—The oesophagus has fairly high, slightly lamelliform, longitudinal ridges on its inner wall in x-xiii. Although there is no definite typhlosole the roof of the gut at the median line is wrinkled and slightly raised.

Nephridia in xv and posteriorly are flattened against the parietes, in contact with both septa of a segment, reaching from mid *bc* to slightly lateral to *d* lines, but are slightly smaller in xiii-xiv, still smaller in xii, and in xi-v are vertically placed on the anterior faces of the septa. Very small, white, thread-like bodies that look, under highest power of the binocular, rather like micronephridia are present on the body wall in postprostatic segments. Microscopic examination failed to reveal any organization indicative of nephridial tubules and the threads are accordingly assumed for the present to be only shreds of peritoneum.

The prostates are sigmoid, elliptical in cross section. The vas deferens presumably is represented by a delicate filament which rises from the parietes anteriorly in xviii and passes to the ental end of the prostatic duct.

Spermathecae are small as in *P. compositus*.

The longitudinal musculature is uninterrupted over the genital markings. The epidermis of a presetal portion of xvi probably also is thickened in *aa*.

Remarks.—The slight softening that has now taken place permits recognition of ventral stumps of hearts of xii-xiii normally associated with the ventral trunk. The lack of a ventral bend (hooking) in an anterior portion of the body may be correlated with lack of a clitellum.

Intestinal origin in xv and presence of hearts in xiii indicate relationships to *P. pandus* from which *ambiguus* is distinguished by the octothecal battery and the more lateral location of the spermathecal pores,

Plutellus compositus Gates, 1933.

External characteristics.—Lateral setae of post-clitellar segments are longer and thicker than the ventral setae. Nephropores, when recognizable (on xii-v only), are on or just dorsal to *d* lines.

The male pores apparently are on or close to the *a* lines, in a field reaching laterally to *b* lines and similar to that of *P. pandus*. On each genital marking there is a rather indefinite, greyish translucent central area (5) or two such areas close to the midventral line.

Internal anatomy.—The gizzard is in v (5 specimens). Between the small pharyngeal bulb and the gizzard is a mass of loosely aggregated, soft, whitish glands. The oesophagus in ix-xii is moniliform, heavily vascularized, with closely crowded, somewhat irregularly longitudinal, low, non-lamelliform ridges (with a greyish translucent appearance) on its inner wall. The oesophageal valve is in the anteriormost portion of xiv, the intestinal origin also in xiv (5). A very sligh tridge at the median line on the roof of the intestine, is irregular interrupted, so slight as scarcely to be regarded as a typhlosole.

Nephridia from xii posteriorly are flattened against the body wall, small in xii-xiii, in postprostatic segments usually in contact with both septa, extending from slightly lateral to *b* to slightly lateral to *d* lines, with small amounts of a transparent, granular substance between the limbs of the loops. Funnels, which were recognized only from xv posteriorly are on the anterior faces of the septa just above the parietes and about over the *b* lines. The nephridia of xi-v are vertically placed on the anterior faces of the septa. A " fur " of very short white filaments is present on the body wall of postprostatic segments (peritoneal shreds or micronephridial fur ?).

The vas deferens may be represented by a slender but tough filament, with a very slight iridescence, that rises from the parietes anteriorly in xviii and runs along the prostatic duct but is continued on through 18/19 and disappears into the gland only in xix.

Two penisetal follicles, in a common, diagonal muscle band, are associated with each prostatic duct. The follicles separate ectally, one passing into the parietes on the median face of the prostatic duct, the other passing into a cleft in the longitudinal musculature slightly but definitely median to the duct. The setal shaft tapers to a rather sharp point, a short ectal portion often curved gently towards one side, and then curved back in the opposite direction. The tip is slightly flattened but not widened. Ornamentation is of about five circles of rather elongately triangular, closely crowded spines. Measurements, in mm., by Miss Chapman, are shown in the table, the diameters through the thickest region nearer the ental end.

Variation in size of penial setae.

Seta.	Length.	Diameter.
F	0·53	0·008
R	0·38	0·010

Variation in size of penial setae.

Seta.	Length.	Diameter.
F	0·52	0·011
F	0·53	0·009
F	0·51	0·008
R	0·35	0·010
F	0·50	0·010
R	0·35	0·008
F	0·58	0·009
F	0·48	0·009
R	0·33	0·008
F	0·53	0·012
R	0·30	0·008
F	0·55	0·010
F	0·48	0·009
F	0·43†	0·008
R	0·40	0·009

F=Functional seta, protuberant from follicle or more ectally located in the follicle.
R=Reserve seta, not protuberant from end of follicle, more entally located, from same follicle as seta immediately above it in the table.

Spermathecae, as in *P. pandus* and *inflexus*, are small, and just reach above the nerve cord against which they are crowded. The diverticulum usually passes to the median face of the duct.

Life history.—No spermatozoal iridescence is recognizable on the male funnels or in the spermathecae. The seminal chambers of the spermathecae may be filled with a white translucent or transparent material presumably indicating a late postsexual stage.

Remarks.—This species is distinguished from *P. inflexus* by the more median location of the spermathecal pores and the absence of transverse connectives between the extra-oesophageal trunks.

Plutellus comptus, sp. nov.

Hlegu (Insein), September, 0-4-0 specimens. K. John. Pegu, August, 0-1-0 specimens. K. John. Paukkaung (Prome), August, 0-0-1 specimens. K. John. Twante (Hanthawaddy), September, 0-1-0 specimens. K. John.

External characteristics.—Length, 24-57 mm. Diameter, 1-2 mm. Unpigmented. Prostomium epilobous, $<\frac{1}{2}$ (7). Anterior end not hooked. Setae begin on ii on which all are present; on xx, *ab* < or ca.=*cd*, *bc*<or ca.=*aa*. Nephropores on *b* lines (?). First dorsal pore on 7/8 2), 8/9 (5, but with a quite pore-like marking on 7/8, 1).

Bithecal, spermathecal pores minute, superficial, on *b* lines, on 8/9 (7). Female pores on *a* lines midway between 13/14 and the setal equator.

† Tip lacking.

Male pores minute, diagonally placed slits, on or just lateral to *b* lines. Male porophores may be quite unrecognizable, or each pore may be on a very slight elevation without definite demarcation, or each pore may be at the center of a grey, translucent, circular area within a transversely and shortly elliptical, distinctly demarcated porophore. Segment xviii is lengthened ventrally, on one specimen, and the epidermis between the *b* lines is slightly thickened but there is no definite demarcation of a male field.

Genital markings are small, raised, distinctly demarcated, transversely elliptical. A presetal marking in *ab* on xviii may come into contact with or even slightly indent margins of the male porophore (Hlegu specimens). Other markings are located as follows. Presetal on left side of ix, postsetal on right side of viii, with centers on or close to the *b* lines (Hlegu). Presetal on right side of viii, postsetal on right side of viii, centers on the *a* line (Hlegu). Presetal on right side of viii, center on *a* line (Hlegu). Presetal on ix, centers on or slightly median to *a* lines, postsetal on left side of ix in *aa*, on 17/18 on left side with center on *a* line, a pair of markings in *aa* on xviii slightly nearer to 17/18 (Pegu). Unpaired, median, postsetal markings in *aa* on viii, ix, xviii, a marking in *ab* on 17/18 on the right side (Paukkaung). A pair of markings on 17/18, centers about on the *b* lines (Twante).

Internal anatomy.—Septum 5/6 is membranous to slightly muscular, 6/7-8/9 muscular. The gizzard is in v (4). Glandular masses are present at sides of the gut in v-viii. The oesophagus in ix-xii has its inner wall marked off into small squarish patches by longitudinal and circular furrows. The intestinal origin is in xiv (4). No typhlosole (4). Last hearts in xii (4).

Nephridia from xvi posteriorly are flattened against the parietes, in contact with both septa of the segment, extending from mid *bc* or just median to *c* line well into *dd*, funnels about over *a* lines, ducts passing into parietes at *b* lines, in xiii-xv smaller but still on parietes, from xii anteriorly unrecognizable.

Holandric, seminal vesicles in xi and xii. Prostates sigmoid, in xix-xx, or looped rathers loosely or tightly and regularly and reaching into xxii-xxv. The ducts are nearly straight, slightly thickened and with muscular sheen ectcally. Vasa deferentia are unrecognizable anteriorly but in xvii a cord which appears to be the vas passes into the anterior face of the prostatic duct just ental to the parietes (3). No setae, penial or otherwise are recognizable ventrally in xviii (3).

Spermathecae are medium-sized and reach up at least to the oesophagus. The duct is shorter than the ampulla, slender in the parietes, but in the coelomic cavity nearly as thick as the ampulla from which it is distinctly delimited. The diverticulum which passes to the median face of the duct is almost spheroidal and nearly sessile, or with a shortly ellipsoidal seminal chamber distinguishable from a slightly narrower but very short stalk.

The longitudinal musculature is uninterrupted over genital markings.

Life history.—Spermatozoal iridescence is visible in one spermathecal

seminal chamber of one worm. Presumably in this case spermatozoa had not been absorbed before completion of clitellar regression.

Remarks.—The supposedly primitive vas-prostate junction segregates this from all but one of the Indian and Burmese species that have been known hitherto and the only further relationships to be considered are with two new species to be described below. From *P. exilis* Gates, 1945, *comptus* is distinguished by the bithecal battery.

Plutellus inflexus Stephenson, 1931.

External characteristics.—Spermathecal pores minute, superficial, on *b* lines (4), on 5/6-8/9. Female pores slightly presetal, on *a* lines, within a transverse area of epidermal thickening (3). Male pores slightly lateral to *a* lines. A ventral portion of xviii is slightly modified, the male area much like that of *P. pandus*.

Genital markings, on 11/12-12/13 (3), are indistinctly demarcated, slightly raised, shortly elliptical, in *aa*, reaching to the pre- and post-setal secondary furrows of the segments, intersegmental furrows lacking on the markings.

Internal anatomy.—Masses of white glands are present between the posterior end of the short pharyngeal bulb and the gizzard. The oesophagus has longitudinal, slightly lamelliform, grey translucent ridges closely crowded on its inner walls in x-xii. The ridges are continued anteriorly and posteriorly but are more opaque and less crowded. The intestinal origin is in xiv. A rudimentary (?) typhlosole is represented by a low rather broad ridge, semicircular in cross section. This ridge may in part be due to pressing of the dorsal blood vessel into the gut but the intestinal wall underneath the vessel does appear to be slightly thickened. The extra-oesophageal trunks are connected with each other beneath the gut by a transverse vessel in each of vi, vii and viii. The last hearts are in xii (3).

Nephridia from xiii posteriorly are flattened against the parietes, in contact with both septa of the segment, extending from just median to the *c* line well into *dd*, the ducts passing into the parietes at the *d* line. The size decreases slightly from xvii to xiii and from xii to v the nephridia are vertically placed on the anterior faces of the septa. White threads (peritoneal shreds or micronephridia ?) are present on the body wall posterior to xix.

The prostates are sigmoid, U-shaped, or practically straight, shortly elliptical in section. The lumen is central, recognizable nearly to ental end of gland, lined by a thin layer of opaque white tissue. The duct is nearly straight, thickened ectally, with marked muscular sheen. A filament, presumably the vas deferens, rises from the parietes anteriorly in xviii and passes into the prostate duct midway between the ectal and ental ends.

Spermathecae are small, only slightly larger than in *P. compositus*. The diverticulum passes into the median face of the duct.

The longitudinal musculature is uninterrupted over the genital markings.

Life history.—Brilliant iridescence on male funnels and in seminal chambers of the spermathecae of three specimens indicated, not only that the worms were sexually mature, but that they had copulated.

Plutellus leucaspis, sp. nov.

Yandoon (Maubin), October, 0-1-0 specimens. Maung Ohn Maung.

External characteristics.—Length, 25+mm. (+ ? incomplete posteriorly). Diameter, *ca.* 2 mm. Unpigmented. Prostomium epilobous, tongue open. Nephropores on or near *d* lines (?). Setae begin on ii on which all are present, ventral setae enlarged anteriorly ; on xxii, *aa* *ca.*=2*bc*, *ab* slightly > *cd*. First dorsal pore on 8/9, a pore-like but apparently imperforate marking on 7/8.

Quadrithecal, pores on 7/8-8/9, on *b* lines. Female pores ? Male pores minute, on xx, on *b* lines close to lateral margins of a transversely placed, markedly protuberant, clearly delimited male field reaching almost to 20/21 but not quite so close to 19/20. Within the field, with centers about on *a* lines, are two transversely and shortly elliptical, postsetal genital markings.

Genital markings of xv, also with centers on *a* lines, are within a presetal area of epidermal thickening of about the same size and shape as the male field, slightly dislocating 14/15 anteriorly and with the ventral setae on the posterior margin. Preclitellar genital markings are slightly smaller, not in special fields, and are located as follows : a postsetal pair on vii in *aa*, in contact mesially and not reaching to the *a* lines laterally, close to site of 7/8 which is unrecognizable ventrally ; a single postsetal median on viii, nearer site of 7/8 than to the setal are.

Internal anatomy.—Septum 5/6 membranous, 6/7-8/9 muscular.

The gizzard is rudimentary, in v. The oesophagus has its inner wall in ix-xii marked off into small patches by longitudinal and circular furrows, the patches gorged with blood in ix-x, white in xi-xiii. The intestinal origin is in xiv. There is no typhlosole. The last hearts are in xii. (Lateroparietal trunks are unrecognizable.)

The nephridia from xv posteriorly are flattened against the parietes, in contact with both septa of a segment, extending from *b* lines about half way to mid-dorsal line, the funnels close to the parietes over *b* lines, the ducts passing into the parietes at the *a* lines.

Holandric, seminal vesicles in xi and xii, the posterior vesicles about twice the size of the others. The prostates are looped, in part irregularly, in xxi-xxiv, and are shortly elliptical in cross section. The duct is nearly straight, transversely placed in xx, thickened ectally and with slight muscular sheen. The vas deferens passes into the anterior face of the prostatic duct just ental to the parietes. The penisetal shaft is nearly straight except for an almost right angled bend of the tip portion (artefact ?). The tip is flattened but not widened, truncate. Ornamentation, visible only with oil immersion, is of three to five rows of rather triangular teeth. Measurements (in mm. by Miss Chapman) are as follows : *a* seta 0·37 (length)×0·009 (thickness, base), 0·010 (midshaft), 0·002 tip ; *b* seta 0·36×0·010, 0·010, 0·002.

Spermathecae are medium-sized, reaching up to the oesophagus. The duct is slightly shorter than the ampulla, narrowed in the parietes, gradually thickened entally and at its thickest about half the width of the ampulla from which it is distinctly demarcated. The diverticulum is shorter than either duct or ampulla and comprises a shortly ellipsoidal seminal chamber and a shorter, slightly narrower stalk with a very narrow lumen, the stalk passing into median face of the duct just below the ampulla.

The longitudinal musculature is uninterrupted over the genital markings.

Life history.—Spermatozoal iridescence on male funnels and in the seminal chambers of the spermathecae is brilliant. The worm is thought to be postsexual, clitellar regression having been completed before resorption of sperms that were self produced or received in copulation.

Remarks.—An ectal junction of vas with prostatic duct indicates relationships with *comptus* and a new species described below, from both of which *leucaspis* is distinguished by location of the male pores on xx, the primitive quadrithecal battery, and location of those genital markings that are not included in an area of epidermal thickening. From *P. exilis* Gates the other oriental species with ectal vas-prostatic duct junction, *leucaspis* is distinguished by the location of the male pores on xx (+2) and little else. Such a posterior homoeosis is unlikely to have resulted from regeneration as all organs, except the terminalia, are in the usual segments which is not to be expected in hypermeric regeneration. Nothing is known of regenerative capacity in any species of *Plutellus* but replacement of all of a pre-intestinal region with included gonads is very rare, and at present is known in earthworms only in two genera, *Criodrilus* and *Perionyx*. The probability that the only specimen of the species that has been secured in twenty years of extensive collecting in Burma is a variant only with reference to the terminalia and as a result of some unusual individual anomaly in development seems low as such variation has not yet been recorded in any species of *Plutellus*.

Plutellus longus, sp. nov.

1933. *Plutellus sp.*, Gates, *Rec. Indian Mus.* XXXV, p. 484. (Type locality, Chaukan, near Pegu).

This worm is distinguished from all other Burmese and Indian species of the genus by a combination of three characteristics : length (250 mm), enlargement of setae on ii-vii, and intestinal origin in xvii. Either characteristic alone is sufficient to distinguish this from other Burmese species. Since each of the characteristics is so rarely found, the combination is not to be expected in another local species. As these characteristics not only enable future recognition but also keying, the species is now named without further waiting for clitellate material.

Definition.—Male pores on *a* lines. (Genital field ?) (Quadrithecal ?) Setae of ii-vii much enlarged and with blackened tips. (Segments ?) Length 250 (± ?)mm. Diameter, 2 mm.

Gizzard ? Intestinal origin in xvii. Last hearts in xiii.

Plutellus macer, sp. nov.

Lashio (Northern Shan States), September, 0-0-1 specimens. H. Young.

External characteristics.—Length, 32 mm. Diameter, through clitellum, *ca.* 1 mm., less elsewhere. Unpigmented. Prostomium epilobous $< \frac{1}{2}$, tongue open. Setae begin on ii ; on xxi, $ab<cd<bc<aa$. Dorsal pores unrecognizable. Clitellum light brownish, saddle-shaped, reaching ventrally into *ab* except on xvii, onto xiii and xviii but markedly protuberant only on xvi-xvii ; dorsal pores and intersegmental furrows lacking, setae present. The anterior end is not hooked and is nearly straight.

Quadrithecal, pores represented by transversely slit-like depressions the anterior and posterior margins of which are slightly swollen, with centers on *c* lines, postsetal on vii-viii, about halfway between setal equators and intersegmental furrows. Female pores on *a* lines, nearly midway between setal equators of xiii and xiv. Male pores on *b* lines, each pore on the tip of a very slight, conical elevation from a nearly circular porophore that extends to *a* line and into median portion of *bc* without reaching 17/18 and 18/19.

No genital markings.

Internal anatomy.—Gizzard lacking, the gut wall in v almost transparent. Oesophagus widened and moniliform in ix-xii, heavily vascularized, with low ridges on its inner wall, valvular in the posteriormost portion of xiii. Intestinal origin in xiv just behind 13/14. No typhlosole. (Lateroparietal trunks unrecognizable.) Last hearts in xii.

Nephridia from xiv posteriorly flattened against the parietes, in contact with anterior septa only ; in xiii-xii smaller and slightly more median, from xi forwards on anterior faces of the septa.

Holandric, seminal vesicles in ix and xii. Prostates loosely looped in xviii-xxi, elliptical in cross section. Prostatic duct with no muscular sheen, bent into a J-shaped loop, the short and ental limb posteriorly, scarcely thickened ectally. A delicate filament with slight iridescence (presumably the vas) rises from the parietes in xviii and passes into the ental portion of the duct just below the prostate gland. Penial setae 0·32 and 0·37 mm. long, 0·018 and 0·019 mm thick. Shaft with short ectal portion gently curved. Tip tapers to a sharp point. No definite ornamentation recognizable under oil immersion, slight transverse irregularities somewhat ental to the tip presumably artefacts.

Spermathecae are fairly large, reaching up above level of dorsal face of gut. The duct is nearly as thick as and longer than a shortly ellipsoidal ampulla from which it is distinctly delimited, the lumen narrow but just below the diverticulum slightly widened. The diverticulum is spheroidal and apparently sessile on the median face of the duct just below the ampulla.

Life history.—Brilliant spermatozoal iridescence on male funnels and in seminal chambers of spermathecae indicates, with the clitellar development, full sexual maturity.

Remarks.—*P. macer* is distinguished from all other quadrithecal Burmese species by a postsetal location of spermathecal pores on vii and viii. Relationships, as indicated by location of the anterior seminal vesicles in ix presumably are with a new species described below.

Plutellus has not hitherto been found anywhere on the Shan Plateau.

Plutellus pandus Gates, 1933.

Rangoon (Hanthawaddy), October, 0-8-0 specimens. K. John. Twante (Hantha waddy), September, 12-12-18 specimens. K. John. Hmawbi (Insein), September, 0-10-2 specimens. K. John. Wanetchaung (Insein), September, 0-1-0 specimens. K. John. Yandoon (Maubin), October, 0-5-3 specimens. Maung Ohn Maung. Henzada, October, 0-1-3 specimens. Maung Ohn Maung. Pegu, "jungles to the east", 0-9-28 specimens. K. John.

External characteristics.—Length, to 115 mm. Unpigmented clitellum reddish to brownish. All clitellate worms are hooked anteriorly. Setae *c* and *d* are longer and thicker than *a* and *b*.

Spermathecal pores are always on or median to the *a* lines, often at *a* lines on 5/6, gradually more closely paired till 8/9. Male pores are on or very slightly median to *a* lines. A ventral portion of xviii is always slightly modified but variably and often so slightly as not to permit concise characterization. The area may be bounded at 17/18 and 18/19 by a transverse strip of greyish translucence, laterally and close to *b* lines by a diagonal opaque strip with the posterior end very slightly nearer to the midventral line. A very small region bearing the minute male pore may be very slightly tumescent, slightly more opaque and whiter than the rest of the area except the lateral strips.

On each genital marking and on or near the *a* line there is usually a rather indefinite, greyish translucent area.

Internal anatomy.—Gizzard in v (15 specimens). Oesophagus with closely crowded, low, longitudinal, nonlamelliform ridges on its inner wall in x-xiii. These ridges usually have a dark grey translucent appearance due to the accumulation of blood beneath translucent tissue. Intestinal origin in xv (15), oesophageal valve in a posterior part of xiv and anteriomost portion of xv. Typhlosole apparently lacking, occasionally a very low and interrupted ridge recognizable. Last hearts in xiii (15).

Nephridia from xiii posteriorly are flattened against the parietes, in contact with both septa of a segment, extending from *b* to slightly beyond *d* lines; from xii anteriorly smaller, on the anterior faces of the septa but close to the parietes and about in *ab*.

The prostates are sigmoid, elliptical in cross section. The duct is about $\frac{3}{4}$ mm long. A filament often with slight iridescence, presumably the vas, rises from the parietes in xviii and passes along the prostate, on the surface or in a slight groove, to the duct at a point about half way from the ental end from whence it is no longer recognizable. The penisetal shaft has a slight curvature at either end, or none entally, or strongly curved like the handle of a cane entally. A short ectal portion about 0·02 mm. long may be flattened or occasionally hollowed on one side. The tip is bluntly rounded to pointed. Ornamentation is of

15-20 somewhat irregular circles (?) of a few rather triangular teeth. Measurements (in mm. by Miss Chapman) are given below.

Variation in size of penial setae in *Pluteilus pandus*.

Length.	Thickness.				
	Base.	Midshaft.	Across flat surface of tip.	Through side of tip.	
0·58	0·005	0·006	0·005	0·002	
0·54	0·006	0·007	0·005	0·002	
0·52	0·006	0·007	0·006	0·003	
0·44R	0·009	0·007	0·004	0·002	
0·60	0·009	0·007	0·005	0·003	
0·38	0·011	0·006	0·004	..	Tip truncate.
0·45R	0·006	0·007	0·005	0·002	
0·43R	0·010	0·005	0·004	0·002	Tip truncate.
0·50	0·006	0·007	0·005	..	
0·48	0·006	0·007	0·004	0·002	
0·44R	0·005	0·006	0·005	0·002	
0·42*	0·007	0·007	..	..	
0·50	0·010	0·007	0·005	..	
0·30R	0·010	0·006	0·004	0·003	
0·26R	0·010	0·005	0·004	0·002	
0·13R	0·023	..	..	..*	
0·10R	0·022	..	..	..*	

Spermathecae, six (21 specimens) or seven pairs (2, Rangoon), are small, as in *P. compositus* and *inflexus*, in xi as well as in xii usually with diverticula which may have a brilliant spermatozoal iridescence (aclitellate Pegu specimens).

Genital markings are areas of epidermal thickening only. When genital markings are present on 9/10 and 10/11 spermathecal pores are included.

Life history.—Brilliant iridescence characterized male funnels and seminal chambers of spermathecae of all clitellate specimens that were dissected. Aclitellate worms with similar iridescence are assumed to be postsexual.

Remarks.—In measurements of penisetal length in the original description (Gates, 1933, p. 483) the decimal point is obviously one place to the left of its proper position.

R=Reserve seta.

* Tip not flattened, tapering to a sharp point like a pencil.

Presence of hearts in xiii and the intestinal origin in xv indicate relationship to *ambiguus* from which *pandus* is distinguished by addition of two pairs of spermathecae with pores in the very unusual location (for the Megascolecidae) of 10/11-11/12, as well as by the more median location of the spermathecae.

Plutellus pauxillulus, sp. nov.

Aungsaing (Thaton), September, 0-0-1 specimens. K. John.

External characteristics.—Length, 28 mm. Diameter, *ca.* 1 mm. Unpigmented. Anterior end hooked ventrally in clitellar region. Prostomium prolobous. Setae; on xxi, $ab<cd<bc<aa$, dd slightly $<\frac{1}{2}$C, posteriorly *d* setae progressively nearer the mid-dorsal line until $dd=$ or $<\frac{1}{4}$C. First dorsal pore on 8/9. Clitellum light brownish, saddle-shaped, reaching ventrally about to *b* lines, extending across xvi-xviii just onto xix and xiii though thinner there; intersegmental furrows and dorsal pores (except those of 13/14 and 18/19 lacking, setae present.

Sexthecal, spermathecal pores minute, superficial, on 6/7-8/9, on or just lateral to *b* lines. Female pores on *a* lines midway between setal equator of xiv and 13/14. Male pores on xix, on *b* lines, each pore on a tiny central, rather conical protuberance from a circular porophore that extends less than half way into *ab* and to an equal distance lateral to *b* lines.

A transverse area of grey translucence, on xx, on the setal equator, may be a genital marking.

Internal anatomy.—The oesophagus is heavily vascularized in ix-xii and with low ridges on its inner wall, valvular anteriorly in xiv. Intestinal origin in xiv. No typhlosole. Last hearts in xii.

Nephridia from xv posteriorly are flattened against the parietes, in contact with both septa of a segment, extending from *c* to lateral to *d* lines; apparently lacking in xiv; in xiii-x still flattened against the body wall but progressively smaller. A small portion of each nephridium, in postclitellar segments, has a light yellowish and granular appearance.

Holandric, seminal vesicles in xi (?) and xii. Prostates elliptical in cross section, in xxi-xxv, the loops compacted into a flattened mass that has a superficial resemblance to a racemose gland. The duct is about 1 mm. long, in xix-xx, a major portion slightly bowed and with a marked muscular sheen, a very short ental portion slenderer and in a u-shaped loop. No penial setae.

Spermathecal ampulla elongately ellipsoidal, in contact with the dorsal parietes, much longer than and sharply delimited from the slender duct which has a thick wall and narrow lumen. The diverticulum, which is nearly as long as the main axis and passes into the median face of the short coelomic portion of the duct close to the parietes, is rather club-shaped and without external definition of a stalk and seminal chamber. The lumen gradually narrows ectally, the wider ental portion filled by a shortly ellipsoidal mass without iridescence.

Life history.—A brilliant spermatozoal iridescence characterizes the male funnels but is lacking in the spermathecae.

Remarks.—The type is not normal. Assuming (as in the account above) that the female pores are, as usual, on xiv, there are only 11 normal segments anterior xiv. Between ii and iii however there is a short, asetal " segment " marked off by a very slight furrow into two portions. A somewhat similar " segment " has occasionally been observed in head regenerates of *Perionyx sansibaricus* Michaelsen, 1891. Possibly the anterior end of the type was lost in the region of 4/5 or 5/6 and in regeneration of a new head only segments i-ii or i-ii and v developed normally, the anlage of iii-iv failing to be completely differentiated into normal segments. If the regenerate was developed at or just behind 6/7, by analogy with *P. excavatus* E. Perrier, 1873 the anterior spermathecae could be an extra pair and the species normally quadrithecal.

Behind segment vii there is no indication of abnormality and from there posteriorly at least the type is assumed to be normal. The gut in the region anterior to vii is soft (as might be expected in a recent regenerate) and broke into pieces on manipulation so that gizzard characteristics could not be determined.

With all organs of x-xv normal it would appear unlikely that location of male pores on xix is due to hypermeric regeneration (*vide* remarks, *P. leucaspis* above).

Relationships, as indicated by the ectal junction of the vas with the prostatic duct, are with *comptus* and *leucaspis*, from both of which *pauxillulus* is distinguished by the sexthecal battery and location of the male pores on xix.

Plutellus pratensis Gates, 1932.

Toungoo district, in the hills seven miles southwest of Toungoo, September, 0-0-1 specimens. G. E. Blackwell. Toungoo district, " Pegu Yomas, No. 1," September, 0-0-2 specimens. G. E. Blackwell.

External characteristics.—Length, 55-85 mm. Diameter, 3½-4 mm. Setae : behind the clitellum *aa* much larger than *bc* throughout. First dorsal pore on 7/8 (3). Nephropores, on the clitellar segments on *c* lines, anteriorly occasionally displaced nearer to the *b* lines, posteriorly not definitely identifiable but probably on the *c* lines.

Male pores minute, on or lateral to *b* lines, each on a very small, circular tubercle on the lateral wall of a depression extending from *a* line into *bc* and deepest laterally. Spermathecal pores minute, superficial, on viii and ix, on or very close to *b* lines, very slightly but definitely behind the intersegmental furrows.

Preclitellar genital markings presetal, in *ab*, on viii, ix and x (3). Posterior markings small, transversely elliptical tubercles, each with an opaque white rim indistinctly delimited peripherally, and a grey translucent central portion centered in *ab*, intersegmental or apparently such as furrows may be unrecognizable ; on 16/17, 17/18, 18/19, and 19/20: Markings of 18/19 are rudimentary and on the posterior wall of male pore depressions, markings of 17/18 on the anterior wall.

Internal anatomy.—Septum 5/6 membranous, 6/7 muscular, 7/8-9/10 thickly muscular, 10/11 and possibly the next two slightly muscular.

Gizzard in v (3). Oesophagus with low, longitudinal but not lamelliform ridges, which may be crossed by very slight circular furrows, on its inner wall in vii-xiii. Intestinal origin in xv (3). Typhlosole (?) begins in or near xxiv(3) and is a very low, slightly irregular, non-lamelliform ridge, interrupted or low midsegmentally, highest at region of septal insertion, terminating gradually (1) about five mm. from hind end (length 75 mm). Last hearts in xii (3). A transverse connective between the extra-oesophageals is present just in front of 4/5, also in vi and likewise in vii.

Nephridia in postclitellar segments are long slender loops, extending from *a* to slightly beyond *d* lines; in xvii-xiii or xii the loops gradually shortened; from xii or xi to v much smaller, on the anterior faces of the septa near the ventral parietes, and about in *ab*.

Prostates looped in xviii-xxi, shortly elliptical in cross section, a central lumen recognizable with binocular only in the ectal portion. The duct is about 2 mm. long, slightly thickened and with muscular sheen ectally. A filament, presumably the vas, passes to an ental portion of the prostatic duct slightly below the gland. Penial setae are 0·44, 0·46, 0·58, 0·62, and 0·65 mm. long, 0·010-0·011 mm. thick. The shaft is slightly curved at each end, both curves on the same side or with two gentle curves, that in the ectal half in an opposite direction to that of the ental half. The tip is simple (5) or terminating in a very delicate almost filamentous spine (1). The ornamentation is of 6-11 circles of fine spines, recognizable only under oil immersion, near the tip. In addition there are on two setae, slight marginal serrations between circles of spines and about 0·008 mm. apart.

The spermathecal duct is much shorter than the ampulla from which it is distinctly delimited, abruptly narowed in the parietes, with slight muscular sheen and rather thick wall; lumen in the coelomic portion slit-like, shortly elliptical or almost circular in section. The diverticulum is pear-shaped to club-shaped, occasionally nearly as long as the main axis. Seminal chamber, with thin wall, or with slight ridge-like thickenings (contraction ?) contains an ellipsoidal to sausage-shaped mass of sperm. The stalk is shorter than the chamber, not clearly delimited externally but is recognizable on clearing by its thicker wall and narrow lumen, usually bent into a shortly u-shaped loop, passing into median face of the duct close to the parietes.

Genital markings are areas of slight epidermal thickening only.

Life history.—The brilliant spermatozoal iridescence on the male funnels and in the seminal chambers of the spermathecae, together with the development of the clitellum, demonstrate full sexual maturity.

Remarks.—This species has no apparent relationships with other Burmese forms. It has retained the supposedly primitive quadrithecal battery, but with some slight posterior dislocation of the spermathecal pores, lacks hearts in xiii but does have the oesophagus extended back into xv.

Plutellus subtilis, sp. nov.

Kyaikto (Thaton), August, 0-0-1 specimens. K. John.

External characteristics.—Length, 40 mm. Diameter, ca. 1 mm. Anterior end hooked ventrally. Unpigmented. Setae begin on ii; on postclitellar segments *ab*<*cd*, and *aa*<*bc*, but ratio of *aa* to *bc* varies at different levels. (First dorsal pore ?) Nephropores possibly are on or near the *c* lines. Clitellar boundaries rather indistinct but probably at 13/14 and 17/18, a brownish clitellar coloration lacking and intersegmental furrows visible in *bb*; intersegmental furrows and dorsal pores lacking, setae present.

Quadrithecal, spermathecal pores on 7/8-8/9, on or immediately lateral to *b* lines. Female pores on *a* lines and ca. half way between 13/14 and the setal equator of xiv, in a transverse area of epidermal thickening. Male porophores very small, transversely oval, with pointed ends reaching mesially nearly to *a* lines. Male pores about on *b* lines and on lateral portions of porophores. The tip of a penial seta protrudes to the exterior slightly median to each male pore.

Genital markings are a pair of shortly elliptical, transversely placed, rather indistinctly demarcated areas, a trifle larger than the male porophores with which they are almost in contact, presetal on xviii, with centers about on the *b* lines, not reaching mesially to *a* lines. Just antero and postero-median to each male porophore there is a slight depression.

Internal anatomy.—Septum 4/5 membranous, 5/6-7/8 with a few muscular fibres. Gizzard rudimentary, in v. Masses of iridescent (glandular ?) material are present at the sides of the gut in iv-vii, larger in v-v. The oesophagus has longitudinal rows of rather shortly pyramidal protuberances on its inner wall in x-xii. The intestinal origin is just behind 13/14. No typhlosole. The last hearts are in xii.

The nephridia are flattened against the parietes, in contact with both septa of a segment, extending from *b* line into *cd* or to *d* line; funnels unrecognized, ducts apparently passing into parietes at or close to *c* lines. Nephridia in xii-x are on the anterior faces of the septa but from ix anteriorly were not recognized.

Holandric, seminal vesicles in ix and xii (one vesicle containing several spheroidal brown bodies). Prostates in xix-xxi, regularly looped with limbs of the loops in contact, the gland shortly elliptical in cross section. The duct is ca. $\frac{1}{2}$ mm long, nearly straight, transversely placed in xviii just in front of 18/19. The vas though small is clearly visible, looped on the parietes in xiv-xviii, slightly iridescent, passing into the prostatic duct slightly ectal to the middle of the coelomic portion. Penial setae are 0·37 and 0·38 mm long, 0·005 mm thick. The shaft is slightly curved towards the ectal end. The tip is bluntly rounded. Ornamentation apparently is lacking but at the margins of the shaft dark areas are visible under oil immersion as if a fairly broad band passed spirally around the shaft, the region between the bands as wide as the band.

Spermathecae are large, reaching into contact with the dorsal parietes. The duct is longer than the ellipsoidal ampulla from which it is clearly

delimited, slightly bulbous, or spindle-shaped; lumen narrow ectally and entally, widened in a middle portion into which, on the lateral face, the diverticulum opens. The diverticulum is much shorter than the duct, with a shortly ellipsoidal to spheroidal seminal chamber and a stalk slightly longer and nearly as thick as the chamber.

Life history.—Brilliant iridescence on the male funnels and in the seminal chambers of the spermathecae, together with the clitellar development demonstrates that the animal was fully sexual.

Remarks.—Penisetal follicles, in this species, apparently open to the exterior independently of the male pores. Determination of exact relationships between penisetal follicles and prostatic ducts in this and other species of the genus may provide information of taxonomic value.

Relationships, as indicated by location of the anterior seminal vesicles in ix rather than in xi, are with *P. macer* from which *subtilis* is distinguished by a more ectal junction of the vas with the prostatic duct, more median location of the spermathecal pores, and the presumably primitive intersegmental location of those pores.

Plutellus thanbulanus, sp. nov.

Thanbula (Thayetmyo), August, 2-2-0 specimens. K. John

External characteristics.—Octothecal, spermathecal pores minute, superficial, on 5/6-8/9, exactly on *b* lines. Male pores minute, superficial, about on *b* lines, on an indistinctly delimited, very slightly tumescent area of greyish translucence reaching from *a* line to slightly lateral to *b* line but not reaching to 17/18 or 18/19. No genital markings.

Internal anatomy.—Oesophagus with inner wall marked off by longitudinal and circular furrows into small, rather squarish areas in ix-xiii. Intestinal origin in xiv (2). No typhlosole (2). Last hearts in xiii (2).

Nephridia posteriorly are flattened against the parietes, in contact with both septa of a segment, extending laterally to or just beyond *d* lines.

Holandric, seminal vesicles in xi (?) and xii. Prostates sigmoid-elliptical in cross section, in xix.

Spermathecal duct almost confined to the parietes. The diverticulum which passes to the median face of the duct has a seminal chamber containing a spheroidal, to ellipsoidal mass of sperm which may be continued for a short distance into the narrow lumen of the stalk.

Life history.—Brilliant spermatozoal iridescence in seminal chambers of the spermathecae (aclitellate specimens) demonstrates that copulation had taken place. Unless copulation can take place before development of the clitellum, absence of a clitellum indicates that the worms were in a postsexual stage after completion of clitellar regression.

Remarks.—No information is available as to penial setae. The "andry" and location of the anterior seminal vesicles require confirmation, presence of a very sticky coagulum in x-xi having rendered determination of certain characteristics difficult.

P. thanbulanus is distinguished from the other octothecal species as follows : from *inflexus* and *compositus* by presence of the hearts of xiii, from *ambiguus* by the primitive intestinal origin in xiv and the absence of genital markings.

This is the first record of an octothecal species south of Mandalay, though *pandus*, present in a still more southern part of the country, presumably had an octothecal ancestry.

Genus **Ramiella** Stephenson, 1921.

Ramiella bishambari (Stephenson), 1914.

1914. *Octochaetus bishambari* Stephenson, *Rec. Indian Mus.* XVI, p. 347.(Type locality, Saharanpur, United Provinces, India. No. types.).

1920. *Octochaetus pachpaharensis* Stephenson, *Mems. Indian Mus.* VII, p. 239 (Type locality, Pachpahar, near Kotah, South Rajputana, India. Types in the Indian Museum.).

1923. *Ramiella bishambari* +*R. pachpaharensis*, Stephenson, Oligochaeta, in : The *Fauna of British India*, pp. 398 and 400.

1931. *Ramiella cultrifera* Stephenson, *Rec. Indian Mus.* XXXIII, p. 187. (Type locality, Rangoon, Burma. Types in the British Museum.).

1935. *Ramiella cultrifera* Michaelsen, *Anns. Mag. Nat. Hist.* (10), XV p. 10 (Christmas Island near Java.).

1942. *Ramiella cultrifera* Gates, *Bull. Mus. Comp. Zool.Harvard*, LXXXIX, p. 122. (Four districts of Burma.).

R. cultrifera has been distinguishable hitherto from two less adequately characterized species of the genus only as follows. From *R. pachpaharensis* by the rolled tube structure of the penial setae. From *R. bishambari* by the presence of more than one pair of nephridia per segment posteriorly and by the absence of seminal vesicles in x. Examination of the types of *pachpaharensis* has now shown that the penial setae are of the rolled tube type. Indeed, one seta from a type actually unrolled in a drop of water while it was being observed under the microscope. The presence of only a single pair of nephridia per segment in *bishambari* apparently was inferred from appearances of internal organs as seen through the transparent body wall. Supposed seminal vesicles in x (possibly also in xi) may well have been only hardened masses of testicular coagulum such as the supposed vesicles in one segment of *O. pittnyi* were found to be. Types of *bishambari* were lost long ago. Material collected for the author at the type locality, Saharanpur, has characteristic rolled tube penial setae and is indistinguishable from *cultrifera*.

Genus **Lennogaster** Gates, 1939.

Lennogaster chittagongensis (Stephenson) 1917.

Ramree (Kyaukpyu), " Hill," September 0-0-5 specimens. I. M. Ismailjee.Sandoway, " Doedaung Hill ", September, 0-0-1 specimens. I. M. Ismailjee.

Lennogaster yeicus (Stephenson), 1931.

Sandoway, " Doedaung Hill ", September, 0-0-1 specimens. I. M. Ismailjee.

This worm is 52 mm. long and 1 mm. thick. It is proandric, the testis sacs vertically ovoidal. Penial setae have truncate or simply pointed tips.

Genus **Octochaetoides** Michaelsen, 1921.

Octochaetoides beatrix (Beddard), 1902.

1902. *Octochaetus Beatrix* Beddard, *Anns. Mag. Nat. Hist.*(7), IX, p. 456. (Type locality, Calcutta. Holotype, if still in existence, probably in the British Museum.)

1907. *Octochaetus Fermori* + *O. Hodgarti* Michaelsen, *Mitt. Mus. Hamburg.* XXIV, pp. 171 and 172. (Type locality of *fermori*, Raniganj, Burdwan district, Bengal. Type locality of *hodgarti*, Gowchar, Nepal. Types of both species in the Indian and Hamburg Museums.).

1909. *Octochaetus beatrix* + *O. fermori* + *O. hodgarti*,Michaelsen, *Mems. Indian Mus.* 1, pp. 204, 212, 213.

1910. *Octochaetus Beatrix* + *O. Fermori* + *O. Hodgarti* + *O. Pittnyi* Michaelsen, *Abh. Nat. Hist. Ver.* Hamburg, XIX, (5) pp. 12 and 86. (Type locality of *pittnyi*, Trivandrum, Travancore. Types in the Indian and Hamburg Museums.).

1914. *Octochaetus fermori* + *O. dasi* Stephenson, *Rec. Indian Mns.* X, pp. 344 and 346. (Type locality of *dasi*, Baroda. Types in the Indian Museum.).

1923. *Octochaetus* (*Octochaetoides*) *beatrix* + *O. fermori* + *O. hodgarti* + *O. pittnyi*, Stephenson, Oligochaeta, in: The *Fauna of British India*, pp. 376, 378, 381, 391.

1929. *Octochaetus lunatus* Gates, *Proc. U. S. Nat. Mus.* LXXV (10), p. 24. (Type locality, Mandalay, Burma. Types in the Indian, British and U. S. Nat. Museums.).

Kyaikmaraw (Amherst), August, 0-0-1 specimens. K. John. Duyinzeik (Thaton), September, 0-0-3 specimens. K. John. Thaton, September, 0-0-6 specimens. K. John. Kyaikto (Thaton), August, 0-0-1 specimens; September, 0-0-7 specimens; October, 0-0-32 specimens. K. John. Bilin (Thaton), September, 0-0-2 specimens; October, 0-0-11 specimens. K. John. Taungzun (Thaton), August, 0-0-1 specimens. K. John. Thinbawgyin (Bassein), October, 0-0-15 specimens. K. John. Henzada, October, 0-0-1 specimens. Maung Ohn Maung. Shwegyin (Toungoo) October, 0-0-21 specimens. Marshall Shwin. Buthidaung-Maungdaw (Akyab), September, 0-0-1 specimens. I. M. Ismailjee. Magwe, August, 0-0-21 specimens. K. John. Minbu, August, 0-0-1 specimens. K. John. Mt. Popa (Myingyan), September, 0-0-1 specimens. K. John. Meiktila, September, 0-0-3 specimens. K. John. Kyaukse, " two miles to the west ", September, 0-0-4 specimens. K. John. Tada-U (Sagaing), September, 0-0-2 specimens. K. John. Myotha (Sagaing), September, 0-0-2 specimens. K. John. Ye-U (Shwebo), September, 0-0-1 specimens. Saw San Thwe. Kin-U (Shwebo), September, 0-3-4 specimens. Saw San Thwe. Kyaukmyaung (Shwebo) " nearby hills ", September, 0-2-21 specimens. " Town ", 0-0-1 specimens. Saw San Thwe. Naba (Katha), " nearby hills ", September, 0-0-2 specimens. Saw San Thwe. Indaw Lake (Katha), September, 0-0-9 specimens. Saw San Thwe. Wuntho (Katha), " hills to the west ", September, 0-0-3 specimens. Saw San Thwe. Mohnyin (Myitkyina), " jungle ", October, 0-0-8 specimens. R. C. Sharma. Myitkyina and vicinity, September, 0-0-10 specimens. K. John. Weshi (Myitkyina), November, 0-0-1 specimens. F. D. Forbes. Bhamo and vicinity, September, 0-0-56 specimens. K. John. Lashio (Northern Shan States), September, " bare and rather dry soil in bamboo grove ", 0-0-1 specimens. " Banyan grove. Ground with thin covering of leaves and grass ", 0-0-6 specimens. " Woods, ground covered with leaves, 8 miles on the Hsenwi road from Lashio ", 0-0-1 specimens. H. Young. Namkham (Northern Shan States), December 1926, 0-0-1 specimens. H. S. Rao. (Indian Museum).

Lucknow (United Provinces, India), a number of clitellate specimens. K. N. Bahl. Bombay, August, 0-0-8 specimens. K. N. Bahl. Udaipur (Rajputana), August, 1-0-14 specimens. Miss Ella Macleavy.

The following material from the Indian Museum has also been examined.

" *Octochaetus* (*Octochaetoides*) *fermori* Michaelsen. Saharanpur, U. P. Lt.-Col. Stephenson, W. 36/1.", 2 aclitellate and 9 clitellate (1 dissected) specimens. " *Octochaetus hodgarti* Michaelsen. Gowchar, Nepal. Hodgzrt. ZEV 2852/7. Types.", 1 juvenile and 1 clitellate (dissected) specimens. " *Octochaetus pittnyi* Michaelsen. Trivandrum, Travancore. R. S. N. Pillay/ZEV 3174/7. Types,", 1 aclitellate and 2 clitellate (1 dissected) specimens. (The tube also contained a juvenile specimen with perichaetine setae.). " *Octochaetus pittnyi* Michaelsen, Mangalore, Malabar. G. Matthai. ZEV 3491/7.", 1 clitellate (dissected) specimen. " *Octochaetus dasi* Stephenson. Baroda. Lt.-Col. J. Stephenson W 34/1. Types.", 3 clitellate specimens (2 dissected). " *Octochaetus beatrix* Beddard Bombay. Prof. J. P. Mullan. W 704/1.", 1 clitellate (dissected) specimen.

The following material from the Hamburg Museum has also been examined.

"*Octochaetus fermori* Michlsn. L. L. Fermor. Bengalen. V 7136", 4 clitellate (2 dissected) specimens.

External characteristics.—Pigment is lacking in the body wall which is transparent in live worms except for the clitellum. The latter is usually bright orange to red in life.

Penial setae of *a* and *b* follicles emerge from the epidermis separately. prostatic pores, if distinct from apertures of *b* follicles, have been unrecognizable. A narrow region immediately lateral to each seminal furrow is slightly tumescent and if extended laterally on xviii and/or xix may be marked off into a circular central area (slightly depressed in a regularly concave fashion and greyish translucent) and a peripheral rim so as to have an appearance of a small genital marking.

Internal anatomy.—Calciferous gland stalks are slender, about three-fourths mm. long, passing to gut wall dorsolaterally at site of insertion of 15/16. Apertures of the ducts into the oesophageal lumen are small and each is covered over by a lamella or ridge, with free dorsal margin, that is attached just below the aperture. The intestinal orgin is in xvii. The typhlosole begins in xxii-xxv, is one to two mm high. The ventral bifurcations decrease in height posteriorly and usually have become unrecognizable at xc but the lamella still remains high for several segments and usually ends abruptly in cviii-cxii. No lateral or ventral typhlosoles or ridges were found.

Septa 10/11 and 11/12 are bound together peripherally. A portion of the reduced coelomic cavity of xi is closed off by a delicate, transparent membrane to form a testis sac which is small, u-shaped with limbs reaching up to the gut. The male funnels of xi frequently have a spermatozoal iridescence that has always been lacking on the funnels of x in every specimen dissected.

The spermathecal diverticulum, which passes into the anterior face of the duct, often rests on the parietes against which it may be flattened in a shelf-like fashion. It is frequently covered by septal and nephridial tissues and invisible until they have been removed.

Abnormality.—No. 1. The right anterior spermatheca lacking. No. 2. Three spermathecae, each with own pore, in viii on left side. The ducts of the spermathecae of ix unite in the circular muscle layer to open to the exterior through a single, median, transversely slit-like pore.

Parasites.—Two insect larvae, each about six mm long and two mm thick (preserved, contracted) crawled out of the mouth of a worm that had just been killed in spirits.

Remarks.—No adiverticulate spermathecae have been found though a considerable number of specimens were examined for information on this particular point. Coverage by nephridia explains the failure to recognize the diverticula in Stephenson's specimens of *beatrix* and *dosi* and presumably also in the type of *beatrix*. The supposed seminal vesicles in xi of *pittnyi* are hard masses of testicular coagulum.

Octochaetoides aitkeni (Fedarb) 1898 from Travancore, which was unfortunately designated as the genotype, still is inadequately characterized. Except for the apparent absence of a typhlosole and several minor characteristics the species could be united with *beatrix*.

Octochaetoides surensis (Michaelsen), 1910.

1910. *Octochaetus surensis* Michaelsen, *Abh. Nat. Hist. Ver.* Hamburg, XIX. (5), p. 88. (Type locality, Sur Lake, Orissa. Type in the Indian Museum.)

1916. *Octochaetus surensi* (sic), Stephenson, *Rec. Indian Mus.* XII, p. 338. (Barkul, Sur Lake, Orissa.).

1923. *Octochaetus* (*Octochaetoides*) *surensis*, Stephenson, Oligochaeta, in: The *Fauna of British India*, p. 394.

1925. *Octochaetus* (*Octochaetoides*) *birmanicus* Gates, *Anns. Mag. Nat. Hist.* (9), XVI, p. 55. (Type locality, Rangoon. Types in the Indian, British and U. S. Nat. Museums.).

Kyaikmaraw (Amherst), August, 0-2-0 specimens. K. John. Moulmein (Amherst), August, 0-0-3 specimens. October, 14-0-11 specimens. K. John. Mupun (Amherst), October, 6-6-29 specimens. K. John. Kyaikto (Thaton), August, 8-12-23 specimens September, 0-0-10 specimens; October, 0-0-68 specimens. K. John. Sittang (Thaton), October, 0-17-165 specimens. K. John. Mokpalin (Thaton), October, 0-0-16 specimens. K. John. Thongwa (Hanthawaddy), September, 0-0-11 specimens. K. John. Kyauktan (Hanthawaddy), September, 4-2-3 specimens; August, 72-11-7 specimens. Saw San Thwe and K. John. Kungyangon (Hanthawaddy), August, 0-18-22 specimens. K. John. Twante (Hanthawaddy), August, 25-10-4 specimens. K. John. Pegu, " jungle 2 miles to the east," August, 2-13-10 specimens. " Jungle to the west," 4-3-4 specimens. " Town ", 0-9-3 specimens. K. John. Thanatpin (Pegu), August, 16-10-9 specimens. K. John. Thameintaw (Pyapon), September, 4-12-21 specimens. Maung Ohn Maung. Pyapon, September, 18-3-2 specimens. Maung Ohn Maung. Kyaiklat (Pyapon), September, 0-0-1 specimens. Maung Ohn Maung. Dedaye (Pyapon), September, 1-0-1 specimens. Maung Ohn Maung. Bogale (Pyapon), September, 2-0-0 specimens. Maung Ohn Maung. Wakema (Myaungmya), October, 1-0-0 specimens. Maung Ohn Maung. Yandoon (Maubin, October, 0-0-1 specimens. Maung Ohn Maung. Danubyu (Maubin), October, 0-0-1, specimens. Maung Ohn Maung. Pantanaw (Maubin), October, 0-0-1 specimens. Maung Ohn Maung. Henzada, October, 0-0-2 specimens. Maung Ohn Maung. Bassein, October, 65-11-191 specimens. K. John. Thinbawgyin (Bassein), October, 0-1-73 specimens. K. John. Padaukchaung (Bassein), October, 0-0-17 specimens. K. John. Hmawbi (Insein), September, 5-7-9 specimens. K. John. Taikkyi (Insein), September, 8-3-36 specimens. K. John. Hlawga (Insein), September, 5-9-21 specimens. J. John. Wanetchaung (Insein), September, 2-4-19 specimens. K. John. Pyinmana (Yamethin), October, 5-2-14 specimens. K. John. Toungoo, October, 0-1-23 specimens. K. John. Kyaukse, September, 0-0-9 specimens. K. John. Naba (Katha), " nearby hills ", September, 5-0-1 specimens. Saw San Thwe. Bhamo, " waste land beyond town " October, 0-0-47 specimens. S. C. Paul.

Cuttack, Orissa, India, February, 0-0-2 specimens. H. F. Chaudhry.

The following material from the Indian Museum has also been examined :

" *Octochaetus surensi* Mchlsn. Barkul, 0-1,000 feet, Orissa. Dr. F. H. Gravely ZEV/6526/7." 2 clitellate dissected specimens.

Remarks.—Septa 5/6-7/8 are lacking in the Cuttack and Barkul specimens, as in the Burmese and Assam specimens and as also in *beatrix*. This was clearly demonstrated in the Cuttack and Barkul specimens by the presence between septum 8/9 and 4/5 of four pairs of vessels from the dorsal trunk, one pair immediately in front of 8/9, another slightly further forward, a third passing to the postgizzard enlargement of the oesophagus or to the gizzard, and a fourth in front of the gizzard. These obviously represent the segmental commissures of v-viii. With the recognition of the first muscular septum in *surensis* as 4/5, of the next septum as 8/9, and of the presence of hearts in xiii there is no longer any justification for maintenance of *birmanicus*.

Genus **Tonoscolex** Gates, 1933.

Tonoscolex depressus (Gates), 1929.

Hopin (Myitkyina), October, 0-0-3 anterior fragments. R. C. Sharma.

Calcareous granules were still present in the calciferous glands when these specimens were examined, preservation having been in spirit instead of formalin as usual. The typhlosole begins abruptly in the first intestinal segment and is a simple lamelliform ridge, about one mm. high at first, gradually decreasing in height posteriorly.

Genus **Perionyx** E. Perrier, 1872.

Perionyx excavatus E. Perrier, 1872.

Moulmein (Amherst), October, 4-0-0 specimens. K. John. Mupun (Amherst), October, 13-1-1 specimens. K. John. Thaton, September, 0-0-4 specimens. K. John. Bilin (Thaton), September, 1-0-0 specimens. K. John. Kyaikto (Thaton), October. 0-9-3 specimens. K. John. Sittang (Thaton), October, 7-0-4 specimens. K. John. Twante (Hanthawaddy), August, 32-0-1 specimens. K. John. Kyauktan (Hantha, waddy), September, 1-0-0 specimens. K. John. Syriam (Hanthawaddy), August. 0-0-1 specimens. Saw San Thwe. Kungyangon (Hanthawaddy), August, 0-0-4 specimens. K. John. Wanetchaung (Insein), September, 3-0-2 specimens. K. John. Hlegu (Insein), September, 3-0-0 specimens. K. John. Hmawbi (Insein), September, 1-0-0 specimens. K. John. Pyapon, September, 4-0-0 specimens. Maung Ohn Maung. Thameintaw (Pyapon), September, 3-0-0 specimens. Maung Ohn Maung. Bogale (Pyapon), September, 1-0-0 specimens. Maung Ohn Maung. Dedaye (Pyapon), September, 2-0-0 specimens. Maung Ohn Maung. Kyaiklat (Pyapon), September, 2-0-0 specimens. Maung Ohn Maung. Pegu, August, 0-0-12 specimens. " Jungle to the west ", 0-0-2 specimens. K. John. Bassein, October, 4-0-0 specimens. K. John. Thinbawgyin (Bassein), October, 0-0-6 specimens. K. John. Mayungmya, October, 2-0-0 specimens. Maung Ohn Maung. Wakema (Myaungmya), October, 7-0-0 specimens. Maung Ohn Maung. Pantanaw (Maubin), October, 2-0-0 specimens. Maung Ohn Maung. Danubyu (Maubin), October, 3-0-0 specimens. Maung Ohn Maung. Ingabu (Henzada), October, 4-0-0 specimens. Maung Ohn Maung. Zalun (Henzada), October, 1-0-0 specimens. Maung Ohn Maung. Henzada, October, 9-0-0 specimens. Maung Ohn Maung. Sandoway, " hills ", September, 0-2-2 specimens. I. M. Ismailjee. Kyaukpyu, September, 0-0-1 specimens. I. M. Ismailjee. Akyab, September, 0-0-1 specimens. I. M. Ismailjee. Myohaung (Akyab), September, 0-2-0 specimens. I. M. Ismailjee. Buthidaung-Mungdaw (Akyab), September, 0-3-2 specimens. I. M. Ismailjee. Paukkaung (Prome), September, 0-2-0 specimens. K. John. Prome, September, 3-0-0 specimens. K. John. Laboo (Prome), " under leaves ", August, 0-12-0 specimens. K John. Thayetmyo, September, 0-1-0 specimens. K. John. Taungdwingyi (Magwe), September " in cow manure in jungles to the east ", 0-0-6 specimens. " In the town," 0-2-2 specimens. K. John. Pauk-taw-gwin (Salween), October, 0-1-0 specimens. Marshall Shwin. Daylo (Toungoo Karen Hills), September, 0-1-0 specimens. H. I. Marshall. Toungoo, October, 3-0-0 specimens. K. John. Pyinmana (Yamethin), October, 4-0-4 specimens. K. John. Mt. Popa (Myingyan), September, 0-9-3 specimens. K. John. Mogaung (Myitkyina), October, 0-20-8 specimens. R. C. Sharma. Bhamo, " banks of lake ", October, 0-0-1 specimens. S. C. Paul.

Perionyx sp.

Kyaiktiyo (Thaton), October, 10-0-0 specimens. K. John. Kumingyaung (Thaton), October, 12-0-0 specimens. K. John. Bilin (Thaton), October, 5-0-0 specimens. K. John. Thaton, September, 5-0-0 specimens. K. John. Naung-gala (Thaton), September, 7-0-0 specimens. K. John. Pegu, " jungles to the west ", August, 7-0-0 specimens. K. John. Thanatpin (Pegu), August, 2-0-0 specimens. K. John. Kyaukpyu, September, 0-0-8 specimens. I. M. Ismailjee. Akyab, September, 2-0-0 specimens. I. M. Ismailjee. Myohaung (Akyab), September, 89-0-0 specimens. I. M. Ismailjee. Pathichaung (Toungoo Karen Hills), September, 0-0-4 specimens. H. I. Marshall. Daw Pakko, near Thandaung (Toungoo Karen Hills), September, 0-23-0 specimens. H. I. Marshall. Shwenyaungbin bungalow on road to Thandaung (Toungoo Karen Hills), " in tree 20-30 cubits from the ground ", September, 0-24-0 specimens. H. I. Marshall. Daylo (Toungoo Karen Hills), September, 0-17-0 specimens. H. I. Marshall. Lalawata Ferry (Toungoo Karen Hills), September, 0-19-0 specimens. H. I. Marshall. Pelachi

village, (Toungoo Karen Hills), September, 0-37-0 specimens. H. I. Marshall. Sah Der village (Toungoo Karen Hills), " on epiphytic ferns 15 feet from ground." October, 6-0-0 specimens. " On fern roots on branches of tree ", 57-0-0 specimens. H. I. Marshall. Shwe-ta-dah (Toungoo Karen Hills), October, " in hollow of tree, five feet from ground " 61-0-0 specimens. " In hollow of tree, eight feet from ground ", 53-0-0 specimens. H. I. Marshall. Myasawni Bridge (Toungoo Karen Hills), October, " on tree, ten feet from ground ", 37-0-0 specimens. H. I. Marshall.

Genus **Lampito** Kinberg 1867.

Lampito mauritii Kinberg 1867

Moulmein (Amherst), October, 19-2-5 specimens. K. John. Mupun (Amherst), October, 2-3-4 specimens. K. John. Syriam (Hanthawaddy), August, 0-1-0 specimens. Saw San Thwe. September, 0-3-0 specimens. K. John. Pyapon, September, 0-6-1 specimens. Maung Ohn Maung. Kyaiklat (Pyapon), September, 14-39-21 specimens. Maung Ohn Maung. Bassein, October, 6-2-4 specimens. K. John. Sandoway, "river side", September, 0-1-0 specimens. I. M. Ismailjee. Kyaukpyu, September, 3-6-5 specimens. I. M. Ismailjee. Akyab, September, 2-4-7 specimens. I. M. Ismailjee. Buthidaung-Maungdaw (Akyab), September, 0-4-4 specimens. I. M. Ismailjee. Prome, August, 0-10-3 specimens. K. John. Thayetmyo, August, 3-2-4 specimens. K. John. Thanbula (Thayetmyo), 0-1-1 specimens. K. John. Allanmyo (Thayetmyo), September, 1-3-0 specimens. K. John. Toungoo, October, 4-4-6 specimens. K. John. Pyinmana (Yamethin), October, 24-14-17 specimens. K. John. Magwe, September, 1-20-6 specimens. K. John. Taungdwingyi (Magwe), 1-0-14 specimens. K. John. Natmauk (Magwe), August, 0-3-3 specimens. K. John. Minbu, August, 0-6-17 specimens. K. John. Myingyan, September, 0-67-16 specimens. K. John. Taungtha (Myingyan), September, 0-15-20 specimens. K. John. Meiktila, September, 0-10-4 clitellate specimens. K. John. Kyaukse, "to the west", September, 12-12-16 specimens. K. John. Myotha (Sagaing), September, 1-0-17 specimens. K. John. Tada-U (Sagaing), September, 1-0-0 specimens. K. John. Sagaing, September, 16 juvenile and aclitellate specimens. Saw San Thwe. Monywa (Lower Chindwin),—116-35 specimens. West of Monywa, September, 1-0-0 specimens. Saw San Thwe. Kyaukmyaung (Shwebo). September,—54-3 specimens. Saw San Thwe. Kin-U (Shwebo),—14-3 specimens. Saw San Thwe. Shwebo, September,—34-15 specimens. Saw San Thwe. Ye—U (Shwebo), September, 1-11-11 specimens. Saw San Thwe. Katha, September,—46-5 specimens. Saw San Thwe. Indaw Lake (Katha), September,—34-4 specimens. Saw San Thwe. Bhamo, "banks of lake", October, 0-28-5 specimens. Bhamo, October, "banks of lake", 0-28-5 specimens. "Banks of river", 0-18-5 specimens. "Town", 0-19-2 specimens. "Waste land beyond town", 0-5-13 specimens. S. C. Paul.

Genus **Pheretima** Kinberg, 1867.

Pheretima alexandri (Beddard), 1900.

Mayan Chaung (Tavoy), "near Tavoy River", September, 0-0-1 specimens. W. D. Sutton. Posoe Chaung (Tavoy), "near Tavoy River", September, 0-0-2 specimens W. D. Sutton. Nyaungdonle Chaung (Tavoy), "plains", September, 0-0-3 specimens W. D. Sutton. Pyinthadaw (Tavoy), "plains", September, 0-0-1 specimens. W. D. Sutton. Kamaungthwe River east (Tavoy), September, 0-0-10 specimens. W. D. Sutton. Moulmein (Amherst), August, 0-0-4 specimens, K. John. Kyaikmaraw. (Amherst), August. 0-0-2 specimens. K. John. Kinmunsakhan (Thaton), October, 0-0-9 specimens. K. John. Kyaiktiyo (Thaton), October, 0-0-3 specimens. K. John. Kyaikto (Thaton), October, 0-0-7 specimens. K.John. Taungzun (Thaton), October, 0-0-36 specimens. K. John. Bilin (Thaton), September, 0-0-3 specimens ; October, 0-0-31 specimens. K. John. (Thaton), September, 0-0-26 specimens. K. John. Duyinzeik (Thaton), September, 0-0-14 specimens. K. John. Aungsaing (Thaton), 0-0-9 specimens. K. John. Twante (Hanthawaddy), August, 0-0-2 specimens. K. John. Wakema (Myaungmya), October, 0-0-3 specimens. Maung Ohn Maung. Danubyu (Maubin), October, 0-0-2 specimens. Maung Ohn Maung. Prome, August, 0-0-1 specimens. K. John. Laboo (Prome), 1-0-6 specimens, August. K. John. Toungoo, October, 0-0-1 specimens. K. John. Daylo (Toungoo Karen Hills), September, 0-0-1 specimens. H. I. Marshall. Daylo Stream (Toungoo Karen Hills), October, 0-0-1 specimens. H. I. Marshall. Ler-mu-htee (Salween) October, 0-0-19 specimens. Marshall Shwin. Pauttaw-gwin (Salween), October, 0-0-10 specimens. Marshall Shwin. Mewaing (Salween), October, 0-0-19 specimens. Marshall Shawn. Thayetmyo, August, 0-0-10 specimens. K. John. Thanbula (Thayetmyo), August, 0-0-8 specimens. K. John. Magwe,

August, 0-0-6 specimens. K. John. Pyinmana (Yamethin), October, 0-0-6 specimens. K. John. Mt. Popa (Myingyan), September, 0-0-9 specimens. K.John. Kin-U (Shwebo), September, 8-0-27 specimens. Saw San Thwe. Kyaukmyaung (Shwebo), September, 0-1-4 specimens. Saw San Thwe. Naba (Katha), "hills", September, 0-0-12 specimens. Saw San Thwe. Indaw Lake (Katha), September, 0-0-4 specimens. Saw San Thwe. Wuntho (Katha), "hills", September, 0-0-24 specimens. Saw San Thwe. Katha, "hills", September, 0-1-1 specimens. Saw San Thwe. Lashio, September. "Open grassy ground", 0-0-7 specimens. "Grassy ridges of paddy fields", 0-0-9 specimens. "Soil under banyan tree", 0-0-10 specimens. "Dense jungle near water", 0-0-5 specimens: "Open grassy ground, soil red and rather dry", 0-1-12 specimens. "Lantana thicket, soil covered with leaves", 0-0-5 specimens. "Hard, red earth in open ground of old highland field", 0-0-10 specimens. "Leaf covered soil on well wooded, rocky crag 5 miles southwest of town", 0-0-4 specimens. "Gravelly soil in densely wooded ravine on Hsenwi road 10 miles fron town", 0-2-18 specimens. "Rich soil covered with leaf mould at base of cliff 10 miles from town", 0-0-16 specimens. Richly manured soil in Shan garden at E Nai village", 0-0-2 specimens. "Muddy ground covered with water cress at Wan Hu Mone village", 0-3-0 specimens. H. Young. Man Meh Hang village (Hsipaw State), "bullock caravan camp", September, 0-3-0 specimens. H. Young. Na Hko Sheh village (Pang Long State), "thatch grass, soil dry and red", October, 0-06 specimens. H. Young. Pang Noi village (Pang Long State), "rich dark soil under clump of trees", October, 0-0-2 specimens. H. Young. Hpa Cha village (Pang Long State), "rocky soil in woods", October, 0-0-2 specimens. H. Young. Meung Nawng village, Salween Ferry (Pang Long State), "manured ground in low and damp Shan garden", October, 0-0-1 specimen. H. Young. Meung Nawng (Pang Long State) "sandy soil in woods along bank of Salween", October, 0-0-1 specimens. H. Young Tan Yang (Mong Yai State), September, 0-0-7 specimens. H. Young. Nawnglon Mang Lun State), September. "Bamboo thicket", 0-0-7 specimens. "Grassy ground near bank of stream", 0-0-16 specimens. H. Young. Man Peng (Mang Lun State), September, "Sandy soil covered with leaves on wooded hillside", 0-0-5 specimens. H. Young. Tan Yang (Mong Yai State), September. "Bamboo grove", 0-0-3 specimens, "Open ground at Pa Mung village", 0-0-5 specimens. H. Young. Taungyi (Shan States), "tall grass", August, 0-0-24 specimens. H. Young. Mogok (Katha), September, 0-0-22 specimens. Mrs. A. C. Hanna. Myitkyina and vicinity, September, 0-1-38 specimens. K. John. N Sop Zup (Myitkyina), November, 0-0-1 specimens. F. D. Forbes. Hopin (Myitkyina), October, 0-0-16 specimens. R. C. Sharma. Bhamo and vicinity, September, 0-3-14 specimens. K. John. "Banks of lake", October, 0-0-9 specimens. S. C. Paul. "Town", October, 0-0-101 specimens. S. C. Paul. "Waste land beyond town", October, 0-0-1 specimens. S. C. Paul. Lawng Neu (Mong Lem State, Yunnan), "red soil in bamboo grove", October, 0-0-2 specimens. Ca La per H. Young. Selan (Northern Shan States), "ca. 2500-2700 feet", December 1926, 0-0-3 specimens. H. S. Rao. (Indian Museum) Namkham (Northern Shan States), "streams and pools on the north bank of the Shweli River ca. 2500 feet", December 1926, 0-0-6 specimens. H. S. Rao (Indian Museum).

Also examined.

"*Amyntas alexandri*. Type. 1904. 10-5-757. India. coll. Beddard.", 0-0-1 specimens. (British Museum).

Pheretima analecta Gates, 1932

Kyauk-kyi (Toungoo), October, 0-0-2 specimens. Marshall Shwin. Sah Der (Toungoo Karen Hills), September, 0-0-1 specimens. H. I. Marshall. Daylo Stream, (Toungoo Karen Hills), September, 0-0-9 specimens. H. I. Marshall. Paut-taw-gwin (Salween), October, 0-0-1 specimens. Marshall Shwin.

External characteristics.—Setae : vi/20, vii/25, viii/26, xvii/22, 77/viii 77/xii, 80/xx (Sah Der) ; vi/33, vii 35, viii/36, 83/viii and vi/32, vii/37, viii/38, 89/viii (Daylo) ; xviii/16-35 xviii/16-35, viii/48-52 (Kyauk-kyi) ; vi/44, vii/50, viii/47, xvii/36, xviii/12, xix/20, 132/viii, 123/xii, 118/xx (Pauttaw-gwin).

In genital markings (Kyauk-kyi and Paut-taw-gwin) the ratio of width to length is 2 : 1. Markings of two Daylo specimens are located as follows ; right 19/20 and left 20/21, left 19/20 and right 18/19.

Internal anatomy.—Vertical ridges on the inner wall of the oesophagus in xi-xiii are interrupted at mid-dorsal and mid-ventral levels. The

valve is anteriorly in xv. The typhlosole begins abruptly in the caecal segment (represented anteriorly only by a very slight, whitish line) and gradually decreases in height posteriorly, the hinder half translucent, unrecognizable behind xcii.

The nerve cord is included within the testis sac of xi but is excluded from the sac of x (Pau-taw-gwin).

Remarks.—Daylo and Kyaukkyi, specimens appear to be in an unhealthy condition, with gaps in the setal circles where setae had been dehisced.

Pheretima andersoni Michaelsen, **1907.**

Nyinmaw (Tavoy), September, 0-0-1 specimens. W. D. Sutton. Migyaunglaung (Tavoy), "plains", September, 0-0-1 specimens. W. D. Sutton. Pyinthadaw (Tavoy), "hills", September, 0-0-1 specimens. W.D. Sutton. Siyigyan (Tavoy), "plains",) September, 0-0-1 specimens. W. D. Sutton. Zinba (Tavoy), September, 0-0-1 specimens. W. D. Sutton. Thaton, September, 0-0-7 specimens. October, 0-13-0 specimens. K. John. Naung-gala (Thaton), October, 0-7-0 specimens. K. John. Bilin, (Thaton), October, 0-0-14 specimens. K. John. Kyaiktiyo (Thaton), October, 0-0-4 specimens. K. John.

Pheretima anomala Michaelsen, 1907

Sitpye (Tavoy), September, 0-0-1 specimens. W. D. Sutton. Nyaungdon (Tavoy), September, 0-0-5 specimens. W. D. Sutton. Posoe Chaung (Tavoy) "near Tavoy. River", September, 0-0-1 specimens. W. D. Sutton. Kawlet Chaung (Tavoy), "hills' September, 0-0-1 specimens. W. D. Sutton. Siyigyan (Tavoy), "plains", September, 0-0-1 specimens. W. D. Sutton. Kamaungthwe River east (Tavoy), October, 0-0-2'7 specimens. W. D. Sutton. Moulmein (Amherst), October, 0-0-3 specimens. K. John. Mupun (Amherst), October, 0-0-2 specimens. K. John. Bilin (Thaton), September, 0-0-1 specimens. October, 0-0-1 specimens. K. John. Kyaikto (Thaton), August, 0-0-1 sepcimens. September, 0-0-1 specimens. October, 0-0-4 specimens. K. John. Kumingyaung (Thaton), October, 0-0-33 specimens. K. John. Thaton, September, 0-1-21 specimens. K. John. Duyinzeik (Thaton), September, 0-4-8 specimens. K. John. Twante (Hanthawaddy), August, 0-0-4 specimens. K. John. Kyaiklat (Pyapon) September, 0-0-5 specimens. Maung Ohn Maung. Myaungmya, October, 0-0-3 specimens. Maung Ohn Maung. Myohaung (Myaungmya), October, 0-0-1 specimens. William Law. Bassein (October), 0-0-2 specimens. K. John. Danubyu (Maubin, October, 0-0-1 specimens. Maung Ohn Maung. Maubin, October, 0-0-1 specimen. Maung Ohn Maung. Yandoon (Maubin), October, 0-0-1 specimens. Maung Ohn Maung Damsite (Insein), September, 0-0-2 specimens. K. John. Hmawbi (Insein), September, 0-0-1 specimens. K. John. Wanetchaung (Insein), September, 0-0-5 specimens. K. John. Pegu, August, 0-1-8 specimens. "Jungles to the west" 0-0-2 specimens. K. John. Ingabu (Henzada), October, 0-0-13 specimens. Maung Ohn Maung. Zalun (Henzada), October, 0-0-2 specimens. Maung Ohn Maung. Henzada, October, 0-0-5 specimens. Maung Ohn Maung. Prome, August, 1-1-0 specimens. K. John. Kyaukkyi (Toungoo), October, 0-0-1 specimens. Marshall Shwin. Maw Pah Der, (Toungoo Karen Hills), October, 0-0-5 specimens. H. I. Marshall. Daylo Stream (Toungoo Karen Hills), September, 0-0-1 specimens. H. I. Marshall. Pauk-taw-gwin (Salween), October, 0-0-2 specimens. Marshall Shwin. Pyinmana (Yamethin), October, 0-0-16 specimens. K. John. Akyab, September, 0-0-2 specimens. I. M. Ismailjee. Buthidaung-Maungdaw (Akyab), September, 0-0-1 specimens. I.M. Ismailjee. Thanbula (Thayetmyo), August, 0-0-1 specimens. K. John. Maymyo, (Northern Shan States), September, 0-1-9 specimens. Miss Laura Johnson. Lashio (No rthern Shan States), September. "Open grassy ground, red and rather dry soil", 0-22-9 specimens. "Lantana thicket soil covered with leaves", 0-1-0 specimens. "Leaf covered soil on well wooded, rocky crag, 5 miles southwest of town", 0-0-2 specimens. "Richly manured soil in Shan garden at E Nai village", 0-34-7 specimens. "Richly manured Shan garden", 0-16-13 specimens. "Manure pile in Nam Hkai Shan village," 0-0-1 specimens. "In black leaf mould at entrance to Nun's cave west of town", 0-10-14 specimens. "Banana garden, nunnery", 0-0-1 specimens. "Bare and rather dry soil in bamboo grove", 0-9-6 specimens. "Shaded, muddy ground at edge of paddy field in Ta Pung village", 0-6-0 specimens. "Tall thatch grass at 6'th mile on the road to Hsenwi", 0-1-0 specimens. "Damp soil in wooded ravine at 6'th mile on Namtu road", 0-1-8 specimens. "Dense thicket in woods at 15th mile on the Namtu road", 0-1-11 specimens. "Bamboo jungle on high

hill north of town" 0-0-1 specimens. "Mud along banks of Nam Yao river 6 miles northeast of town' 0-30-29 specimens. H. Young. Man Meh Hang village (Hsipaw State), "bullock caravan camp", September, 0-0-1 specimens. H. Young. Man Hung (Pang Long State), "rocky soil covered with leaves in woods", October, 0-0-1 specimens. H. Young. Nam Hpen village (Pang Long State), October, 0-1-13 specimens. H. Young. Na Kho Sheh village (Pang Long State), "thick woods near water 1 mile to the north", October, 0-0-1 specimens. H. Young. Ha Hta village (?), "damp soil in wooded ravine near village", October, 0-0-2 specimens. H. Young. Meung Nawng (Pang Long State) October. "Manured ground in low and damp Shan garden", 0-0-1 specimens. "Sandy soil in woods along bank of Salween", 0-0-6 specimens. Naba (Katha), September "hills", 0-0-4 specimens. Saw San Thwe. Mogaung (Myitkyina), October, 0-0-3 specimens. R. C. Sharma. Mohnyin (Myitkyina), October, 0-0-3 specimens, R. C. Sharma Sumprabum (Myitkyina), November, 0-0-2 specimens. F. D. Forbes. Bhamo, October, 0-0-1 specimens. S. C. Paul.

Pheretima austrina Gates, 1932.

Migyaunglaung (Tavoy), "plains nearby", September, 0-0-3 specimens. W. D. Sutton. Siyigyan (Tavoy), "plains", September, 0-0-3 specimens. W. D. Sutton. Kamaungthwe River east (Tavoy), September, 0-0-4 specimens. W. D. Sutton. Kyaiktiyo (Thaton), September, 0-0-1 specimens. K. John. Kumingyaung (Thaton), September, 0-0-2 specimens. K. John. Ler-mu-htee (Salween), October, 0-0-1 specimens. Marshall Shwin. Paut-taw-gwin (Salween), October, 0-0-1 specimens. Marshall Shwin.

Remarks.—A pair of presetal genital markings is present on ix of one of the Siyigyan specimens. The typhlosole begins in the caecal segment and is a fairly high, simple lamella.

Pheretima birmanica (Rosa), 1888.

Maw Pah Der (Toungoo Karen Hills), October, 0-0-2 specimens. H. I. Marshall, Naba (Katha), "hills", September, 0-0-2 specimens. Saw San Thwe. Katha, "hills" September, 0-0-7 specimens. Saw San Thwe. Mogok (Katha), September, 0-0-4 specimens. Mrs. A. C. Hanna. Bhamo and vicinity, September, 0-0-22 specimens. K. John. Myitkyina and vicinity, September, 0-0-79 specimens. K. John. Kutka. (Northern Shan States), September, 0-0-55 specimens. G. J. Geis. Lashio, September "Dry, red earth", 0-0-3 specimens. "Open grassy ground, red and rather dry soil", 0-0-2 specimens. "Lantana thicket, soil covered with leaves", 0-0-1 specimens. "Banana garden, Nun monastery", 0-0-3 specimens. "Grassy ridges of paddy field", 0-0-9 specimens. "Manure pile, Nam Khai Shan village", 0-0-17 specimens. "Corn field in Gurkha village", 2½ miles to the south", 0-0-1 specimens. "Shaded, muddy ground at edge of paddy field, Ta Pung village", 0-0-1 specimens. "Richly manured soil in Shan garden, E Nai village", 0-0-2 specimens. "Bamboo jungle toward top of high hill, north of town", 0-0-3 specimens. "Muddy ground covered with water cress, Wan Hu Mone village", 0-0-1 specimens. "Gravelly soil in densely wooded ravine on Hsenwi road 10 miles from lown", 0-0-1 specimens. "Rich soil covered with leaf mould at base of cliff 10 miles from town", 0-0-2 specimens. "Gravel pit on the Namtu road 5 miles from town", 0-0-1 specimens. "Open ground, bullock cavan camp on the Namtu road 11 miles from town", 0-0-7 specimens. "Mud along banks of Nam Yao River, 6 miles northeast of town", 0-0-1 specimens. H. Young. Tan Yang (Mong Yai State), September, 0-0-1 specimens. "Open ground, Pa Maung village", 0-0-1 specimens. H. Young. A Kin De village (Pang Long State), "loose, dark soil in richly manured garden", October, 0-0-2 specimens. H. Young. Na Kho Sheh village (Pang Long State), "thatch grass, soil dry and red", October, 0-0-1 specimens. H. Young. Pang Noi village (Pang Long State), "rich dark soil under clump of trees", October 0-0-1 specimens. H. Young. Hpa Cha village (Pang Long State), "rocky soil in woods", October, 0-0-1 specimens. H. Young. Meung Nawng village, Salween Ferry (Pang Long State), "manured ground in low and damp Shan garden", October, 0-0-1 specimens. H. Young. Nawng Kham (Mang Lun State), "bare ground under banyan tree", September, 0-0-1 specimens. H. Young.

Pheretima oslifarnica Kinsbery, 1867

Meung Nawng village, Salween Ferry (Pang Long State), October, 0-0-1 specimens. Khamko (Myitkyina), October, 0-0-3 specimens. F. D. Forbes. Lawanga (Myitkyina), October, 0-0-3 specimens. F. D. Forbes. Nawangkai (Myitkyina), October, 1-0-2 specimens. F. D. Forbes. Putao (Myitkyina), November, 0-0-13 specimens. F. D. Forbes. Kankiu (Myitkyina), November, 0-0-12 specimens. F. D. Forbes.

Remarks.—The extra-oesophageal trunks are on the ventral face of the gut from just behind the gizzard, turning laterally in xiv. Hearts of x-xiii open into the supra-oesophageal trunk and in xii-xiii at least also into the dorsal trunk.

Pheretima campanulata (Rosa), 1890.

Kamaungthwe River east (Tavoy), October, 0-0-80 specimens. W. D. Sutton Nyinmaw (Tavoy), September, 0-0-21 specimens. W. D. Sutton. Nyaungdonle Chaung (Tavoy), "plains", September 0-0-12 specimens. W. D. Sutton. Migyaunglaung (Tavoy), "nearby plains", September, 0-0-3 specimens. W. D. Sutton. Pyinthadaw (Tavoy), "nearby hills", September, 0-0-32 specimens. "Plains", 0-0-16 specimens. W. D. Sutton. Posoe Chaung (Tavoy), "near Tavoy River", 0-0-13 specimens. W. D. Sutton. Mayan Chaung (Tavoy), "near Tavoy River", 0-0-21 specimens. W. D. Sutton. Kawlet Chaung (Tavoy), "nearby hills", September, 0-0-2 specimens. W. D. Sutton. Zinba (Tavoy), September, 0-0-7 specimens. W. D. Sutton. Siyigyan (Tavoy), "plains", September, 0-0-2 specimens. W. D. Sutton. Mupun (Amherst), October, 0-0-2 specimens. K. John. Moulmein (Amherst), October, 0-0-2 specimens. K. John. Sittang (Thaton), October, 0-0-2 specimens. K. John. Boyagyi (Thaton), October, 0-0-1 specimens. K. John. Kyaikto (Thaton), "hills nearby", October, 0-0-25 specimens. K. John. Kyaikto (Thaton), August, 0-0-3 specimens. October, 0-0-7 specimens. K John. Kyaktiyo (Thaton), October, 0-0-3 specimens. K. John. Taungzun (Thaton), October, 0-0-3 specimens. K. John. Kumingyaung (Thaton), October, 0-0-22 specimens. K. John. Thaton, September, 0-3-11 specimens. K. John. Duyinzeik (Thaton), October, 0-0-2 specimens. K. John. Naung-gala (Thaton), October, 0-0-3 specimens. K. John. Kungyangon (Hanthawaddy), September, 0-0-4 specimens. K. John. Kyauktan (Hanthawaddy), September, 0-0-1 specimens. K. John. Twante (Hanthawaddy), September, 0-1-1 specimens. K. John. Hlegu (Insein), September, 0-0-1 specimens. K. John. Hlawga (Insein), September, 0-0-1 specimens. K. John. Damsite (Insein), September, 0-6-5 specimens. K. John. Padaukchaung (Bassein), October, 0-0-2 specimens. K. John. Bassein October, 0-0-19 specimens. K. John. Myohaung (Myaungmya), October, 0-0-3 specimens. William Law. Pantanaw (Maubin), October, 0-0-5 specimens. Maung Ohn Maung. Danubyu (Maubin), October, 0-0-4 specimens. Maung Ohn Maung. Maubin, October, 0-0-2 specimens. Maung Ohn Maung. Thameintaw (Pyapon), September, 0-8-13 specimens. Maung Ohn Maung. Kyaiklat (Pyapon), September, 0-0-2 specimens. Maung Ohn Maung. Prome, September, 0-0-1 specimens. K. John. Sandoway, "hills", September, 0-0-3 specimens. I. M. Ismailjee. Ramree Island (Kyaukpyu), September, 0-0-1 specimens. I. M. Ismailjee. Kyauktaw (Akyab), September, 0-1-1 specimens. I. M. Ismailjee. Akyab, September, 0-0-1 specimens. I. M. Ismailjee. Myohaung (Akyab), September, 0-0-1 specimens. I. M. Ismailjee. Buthidaung-Maungdaw (Akyab), September, 0-0-3 specimens. I. M. Ismailjee. Paletwa (Arakan Hill Tracts), September, 0-0-11 specimens. I. M. Ismailjee. Pegu, "jungles to the east", August, 0-0-2 specimens. K. John. Toungoo, October, 0-0-2 specimens. K. John. Pathichaung (Toungoo Karen Hills), "nine miles out on Mawchi Road", September, 0-0-1 specimen. H. I. Marshall. Daw Pakko (Toungoo Karen Hills), September, 0-9-0 specimens. H. I. Marshall. Daylo Stream (Toungoo Karen Hills), October, 0-0-1 specimens. H. I. Marshall. Sah Der, (Toungoo Karen Hills), September, 0-0-5 specimens. H. I. Marshall. Myasawni bridge (Toungoo Karen Hills), "on tree 10 feet from ground", October, 0-0-1 specimens. H. I. Marshall. Pa Taw Lo (Toungoo Karen Hills), October, 0-0-2 specimens. H. I. Marshall. Kyaukkyi (Toungoo), October, 0-0-17 specimens. Marshall Shwin. Shwegyin (Toungoo), October, 0-0-16 specimens. Marshall Shwin. Ler-mu-htee (Salween), October, 0-0-1 specimens. Marshall Shwin. Pauk-taw-gwin (Salween), October, 0-0-16 specimens. Marshall Shwin. Mewaing (Salween), October, 0-0-76 specimens. Marshall Shwin. Lashio (Northern Shan States), September. "Richly manured Shan garden", 0-4-1 specimens. "Open, grassy ground, red and rather dry soil" 0-7-0 specimens. "Lantana thicket, soil covered with leaves", 0-0-1 specimens. "Banana garden", 0-24-0 specimens. "Corn field", Nam Khai Shan village, 0-17-1 specimens. "Shaded, muddy ground at edge of paddy field, Ta Pung village", 0-7-0 specimens. "Richly manured soil in Shan garden, E Nai village", 0-12-1 specimens. "Gravelly soil in densely wooded ravine on Hsenwl road 10 miles from town", 0-16-8 specimens. "Rich soil covered with leaf mould at base of cliff ten miles from town", 0-2-1 specimens. "In tall thatch grass at 6th mile on road to Hsenwi", 0-4-0 specimens. "Gravel pit at 5th mile on the Namtu road", 0-17-8 specimens. H. Young. Na Shai village (Pang Long State), October, "short grass, soil dry and hard", 0-0-1 specimens. H. Young. Indaw Lake (Katha), September, 1-0-0 specimens. Saw San Thwe. Hpunchan Hka (Myitkyina), November, 3-0-1 pecimens. F. D. Forbes. Sumprabum (Myitkyina), November, 0-0-6 specimens.

F. D. Forbes. Hkamho (Myitkyina), November, 0-0-9 specimens. F. D. Forbes. Lawange (Myitkyina), November, 0-0-2 specimens. F. D. Forbes. Masum Zup (Myitkyina), November, 0-0-5 specimens. F. D. Forbes. Putao (Myitkyina), November, 0-0-3 specimens. F. D. Forbes. Kankiu (Myitkyina), November, 0-0-19 specimens. F. D. Forbes. Kadranyang (Myitkyina), November, 1-10-0 specimens. F. D. Forbes. Kawapang (Myitkyina), November, 0-0-10 specimens. F. D. Forbes. Tiang Zup (Myitkyina), November, 0-0-3 specimens. F. D. Forbes. Weshi (Myitkyina), November, 0-0-3 specimens. F. D. Forbes. N Sop Zup (Myitkyina), November, 0-0-10 specimens. F. D. Forbes. Chinkram Hka (Myitkyina), November, 0-0-3 specimens. F. D. Forbes. Supkaga (Myitkyina), November, 0-0-6 specimens. F. D. Forbes.

Remarks.—Male porophores are markedly protuberant and abnormal on the Kadranyang and Kawapang worms. Large numbers of coelomic gregarines are present in the coelomic cavities of the postprostatic segments.

In addition to the worms listed above a number of specimens are athecal, or if thecal not normally so—the organs rudimentary, abnormally developed, in part lacking (f. *rugosa*, Gates, 1936, p. 409). These worms are listed below. The first or only set of figures is of completely athecal specimens, the second set which is in parentheses is of the other specimens.

Sittang (Thaton), October, 0-0-2 specimens. K. John. Kyaikto (Thaton), "nearby hills", October, 0-0-4 and (0-0-1) specimens. K. John. Kumingyaung (Thaton), October, 0-0-4 specimens. K. John. Taungzun (Thaton), October, 0-0-3 specimens. K. John. Kyaikto (Thaton). August, 0-0-11 specimens. October 0-0-18 and (0-0-1) specimens. K. John. Bilin (Thaton), October, 0-0-1 specimens. K. John. Thaton, September, 0-0-1 specimens. K. John. Duyinzeik (Thaton), October, 0-0-3 and (0-0-3) specimens. K. John. Aungsaing (Thaton), October, 0-0-1 and (0-1-0) specimens. K. John. Pegu, August, 0-0-5 specimens. K. John. Kungyangon (Hanthawaddy), September, 0-0-1 specimens. K. John. Twante (Hanthawaddy), September, 0-0-1 specimens. K. John. Myaungmya, October, 0-0-2 specimens. Maung Ohn Maung. Bassein, October, 0-0-5 and (0-0-1) specimens. K. John. Taukkyan (Insein), September, 0-0-1 specimens. K. John. Dam-site (Insein), September, 0-0-1 specimens. K. John. Pantanaw (Maubin), October, 0-0-8 specimens. Maung Ohn Maung. Danubyu (Maubin), October, 0-0-1 specimens. Maung Ohn Maung. Ingabu (Henzada), October, 0-0-7 specimens. Maung Ohn Maung. Prome, August, 0-6-7 and (0-2-1) specimens. K. John. Laboo (Prome), August, 0-0-2 and (0-1-9) specimens. K. John. Pauk-taw-gwin (Salween), October, 0-0-3 and (0-0-1) specimens. Marshall Shwin. Mewaing (Salween), October, (0-0-1) specimens. Marshall Shwin. Shwegyin (Toungoo), October, 0-0-4 and (0-0-2) specimens. Marshall Shwin. Kyaukkyi (Toungoo), October, 0-0-13 and (0-0-1) specimens. Marshall Shwin. Toungoo, October, 0-0-2 specimens. K. John. Maw Pah Der (Toungoo Karen Hills), October, 0-0-1 specimens. H. I. Marshall. Daylo Stream (Toungoo Karen Hills), September, 0-0-6 and (0-0-1) specimens, H. I. Marshall. Pa Taw Lo (Toungoo Karen Hills), October, 0-0-16 and (0-0-3) specimens. H. I. Marshall. Pyinmana (Yamethin), October, 0-0-1 and (0-0-1) specimens. K. John. Lashio (Northern Shan States), September, "bullock caravan camp at Man Meh Hang village, 0-0-1 specimens. H. Young. Katha, September, 0-5-0 specimens. Saw San Thwe. Wuntho (Katha), September, (0-0-3) specimens. San San Thwe. Bhamo, October, 0-0-19 specimens. S. C. Paul.

Athecal specimens usually have large masses of gregarine cysts in the coelomic cavities of iii or iv to vii. Often there are further cysts scattered through the coelomic cavities of the postclitellar segments. Cysts were not found in a few of the "thecal" specimens.

Male pores, prostates and prostatic ducts are lacking, as well as the spermathecae in a few specimens : Duyinzeik (2), Myohaung (1), Laboo (2), and Thaton (2, not listed above). *Testes, male funnels, testes sacs and seminal vesicles are also lacking in the* Duyinzeik *worms !* Testes, funnels, sacs and seminal vesicles are present in the Thaton worms as well as the other athecal and "thecal" specimens specially listed above.

Pheretima diffringens (Baird) 1869.

Lawanga (Myitkyina), November, 0-0-2 specimens. F. D. Forbes. Tutuga (Myitkyina), November, 0-0-4 specimens. F. D. Forbes. Hpunchan Hka (Myitkyina), November, 0-0-4 specimens. F. D. Forbes. Hpungin Hka (Myitkyina), November, 0-0-13 specimens. F. D. Forbes. Sumprabum (Myitkyina), November, 0-0-17 specimens. F. D. Forbes. Kankiu (Myitkyina), November, 0-0-1 specimens. F. D. Forbes. Putao (Myitkyina), November, 0-0-1 specimens. F. D. Forbes.

External characteristics.—Genital markings in the preclitellar regions are in two longitudinal series on each side, those of one series just behind spermathecal pores, those of the other series more median. These markings are present on one, two or all of segments vii-ix of 20 specimens. Additional markings are present on one or two of those segments (14 specimens) and are so placed that with the other markings a slightly diagonal row of 3 to 5 is formed extending from the spermathecal pore posteromesially to the setal equator. Postclitellar markings, present on only one specimen, are on xviii, one just in front of and one just behind each male porophore.

Internal anatomy.—Prostates are lacking, though ducts are present and in a u-shaped loop, except as follows : large prostate on left side in xvi-xx (1, Sumprabum), small prostate on right side in xviii-xix (1, Sumprabum).

Seminal chambers of spermathecae are distended by a white material in which no spermatozoal iridescence is visible except in three specimens (Hpungin Hka) in which seminal chambers are lacking (only the stalk portion of the diverticulum developed).

Hearts of x are usually lacking (or unrecognizable ?) but one is present, on the left side of one worm.

Pheretima elongata E. Perrier, **1872.**

Kungyangon (Hanthawaddy), September, 2-9-120 specimens. K. John. Thongwa (Hanthawaddy), September, 0-0-29 specimens. K. John. Kayan (Hanthawaddy), September, 1-0-28 specimens. K. John. Thameintaw (Pyapon), September, 0-0-4 specimens. Maung Ohn Maung. Pyapon, September, 0-2-0 specimens. Maung Ohn Maung. Bogale (Pyapon), September, 5-12-29 specimens. Maung Ohn Maung. Dedaye (Pyapon), September, 0-1-4 specimens. Maung Ohn Maung. Danubyu (Maubin) October, 0-0-2 specimens. Maung Ohn Maung. Maubin, October, 0-0-20 specimens. Maung Ohn Maung. Wakema, (Myaungmya), October, 0-0-17 specimens. Maung Ohn Maung. Henzada, October, 0-0-1 specimens. Maung Ohn Maung. Thinbawgyin (Bassein), October, 0-0-2 specimens. K. John. Pyinmana (Yamethin), October, 0-0-1 specimens. K. John. Ramree Island (Kyaukpyu), September, 0-0-2 specimens. I. M. Ismailjee. Sandoway, "riverside", September, 4-3-3 specimens. I. M. Ismailjee. Mt. Popa (Myingyan), September, 0-33-32 specimens. K. John. Taungtha (Myingyan), September, 0-1-7 specimens. K. John. Lashio, (Northern Shan States), "woods, ground covered with leaves, 8th mile on road to Hsenwi", September, 1-2-1 specimens. H. Young. Indaw Lake (Katha), September, 1-1-0 specimens. Saw San Thwe.

Pheretima exigua Gates, **1930.**

Lashio (Northern Shan States), "Shan garden", August, 0-0-4 specimens. September. "Open grassy ground, red and rather dry soil", 0-0-3 specimens. "Town", 0-0-1 specimen. "In black leaf mould at entrance to Nun's cave west of the town", 0-0-1 specimen. "Shan pepper garden at Myo Wan village, 0-0-45 specimens. "Banana garden at monastery", 0-1-5 specimens. "Woods, ground covered with leaves at 8th mile on the road to Hsenwi", 0-3-34 specimens. "Gravelly soil in densely wooded ravine at 10th mile on road to Hsenwi", 0-0-3 specimens. "Dense woods at 7th mile on road to Namtu", 0-0-21 specimens. "Banyan grove, ground with thin covering of leaves and grass, at 14'th mile on road to Namtu", 0-0-6 specimens. "Bullock caravan camp, Man Meh Hang village, 3-0-2 specimens. H. Young. E Nai village (North Hsenwi State), "at base of bamboo clump", September 0-0-1 specimen. "Richly manured soil in Shan garden, 0-3-7 specimens. H. Young.

Pheretima gemella Gates, 1931.

Nyinmaw (Tavoy), September, 0-0-4 specimens. W. D. Sutton. Nyaungdonle Chaung (Tavoy), "plains", September, 0-0-1 specimens. W. D. Sutton. Nyaungdon (Tavoy), September, 0-0-4 specimens. W. D. Sutton. Pyinthadaw (Tavoy), "plains", September, 0-0-1 specimens. W. D. Sutton. Mayan Chaung (Tavoy), "Lear Tavoy River", October, 0-0-2 specimens. W. D. Sutton. Kamaungthwe River east (Tavoy), October, 0-3-36 specimens. W. D. Sutton.

Pheretima houlleti (E. Perrier), 1872.

Kamaungthwe River east (Tavoy), October, 0-0-4 specimens. W. D. Sutton. Nyinmaw (Tavoy), September, 0-0-1 specimens. W. D. Sutton. Nyaungdonle Chaung (Tavoy), " plains ", September, 0-0-4 specimens. W. D. Sutton. Tanbin Hills (Tavoy), September, 0-0-8 specimens. W. D. Sutton. Kawletchaung (Tavoy), " nearby hills ", September, 0-0-3 specimens. W. D. Sutton. Zinba (Tavoy), September, 0-0-7 specimens. W. D. Sutton. Moulmein (Amherst), October, 0-0-4 specimens. K. John. Mupun (Amherst), October, 0-0-14 specimens. K. John. Sittang (Thaton), October, 0-1-618 specimens. K. John. Boyagyi (Thaton), October, 0-0-20 specimens. K. John. Bilin (Thaton), September, 0-0-4 specimens. October, 0-0-7 specimens. K. John. Mokpalin (Thaton), October, 0-0-16 specimens. K. John. Kyaikto (Thaton), August, 0-0-3 specimens. October, 0-0-75 specimens. K. John. Duyinzeik (Thaton), September, 0-1-0 specimens. October, 0-0-11 specimens. K. John. Kumingyaung (Thaton), October, 0-0-24 specimens. K. John. Taungzun (Thaton), October, 0-0-3 specimens. K. John. Thaton, September, 0-2-22 specimens. K. John. Naung-gala (Thaton), September, 0-0-3 specimens. K. John. Aungsaing (Thaton), September, 0-1-14 specimens. K. John. Thongwa (Hanthawaddy), September, 0-0-17 specimens. K. John. Kungyangon (Hanthawaddy), September, 0-0-1 specimens. K. John. Twante (Hanthawaddy), September, 0-4-21 specimens. K. John. Kyauktan (Hanthawaddy), August, 0-0-2 specimens. Saw San Thwe, September, 0-2-2 specimens. K. John. Thameintaw (Pyapon), September, 0-2-3 specimens. Maung Ohn Maung. Pyapon, September, 0-0-4 specimens. Maung Ohn Maung. Bogale (Pyapon), September, 0-0-6 specimens. Maung Ohn Maung. Kyaiklat (Pyapon), September, 0-1-30 specimens. Maung Ohn Maung. Wakema (Myaungmya), October, 0-0-5 specimens. Maung Ohn Maung. Myohaung (Myaungmya), October, 0-0-3 specimens. William Law. Pantanaw (Maubin), October, 0-0-10 specimens. Maung Ohn Maung. Maubin, October, 0-0-1 specimens. Maung Ohn Maung. Danubyu (Maubin), October, 0-1-4 specimens. Maung Ohn Maung. Yandoon (Maubin), October, 0-0-11 specimens. Maung Ohn Maung. Bassein, October, 0-0-3 specimens. K. John. Thinbawgyin (Bassein), October, 0-0-7 specimens. K. John. Hmawbi (Insein), September, 0-1-5 specimens. K. John. Taikkyi (Insein), September, 1-0-5 specimens. K. John. Wanetchaung (Insein), September, 0-0-9 specimens. K. John. Hlawga (Insein), September, 0-0-3 specimens. K. John. Taukkyan (Insein), September, 0-0-1 specimens. K. John. Ingabu (Henzada), October, 0-0-1 specimens. Maung Ohn Maung. Henzada, October, 0-0-7 specimens. Maung Ohn Maung. Pegu, August, 0-0-1 specimens. K. John. Thanatpin (Pegu), August, 0-0-1 specimens. K. John. Pegu, August, " jungles to the west ", 0-0-3 specimens. " Jungles to the east ", 0-0-7 specimens. K. John. Prome, August, 1-1-10 specimens. K. John. Paukkaung (Prome), September, 0-0-10 specimens. K. John. Laboo (Prome), September, 0-0-5 specimens. K. John. Toungoo, October, 0-0-1 specimens. K. John. Maw Pah Der (Toungoo Karen Hills), October, 0-0-2 specimens. H. I. Marshall. Toungoo Karen Hills, " on epiphytic ferns, 15 feet from ground, on the road to Thandaung ", October, 0-0-1 specimens. H. I. Marshall. Shwenyaungbin (Toungoo Karen Hills), September, 0-0-2 specimens. H. I. Marshall. Pathichaung (Toungoo Karen Hills), " at ninth mile on the road to Mawchi ", September, 0-0-1 specimens. H. I. Marshall. Shwegyin (Toungoo), October, 0-0-13 specimens. Marshall Shwin. Kyaukkyi (Toungoo), October, 0-0-9 specimens. Marshall Shwin. Paut-taw-gwin (Salween), October, 0-0-164 specimens, Marshall Shwin. Thayetmyo, September, 0-5-2 specimens. K. John. Thanbula (Thayetmyo), August, 0-1-8 specimens. K. John. Sandoway, " Doedaung hill ", September, 0-0-4 specimens. " Hills ", September, 0-0-4 specimens. I. M. Ismailjee. Kyaukpyu, September, 0-0-54 specimens. I. M. Ismailjee. Magwe, August, 0-0-1 specimens. K. John. Minbu, August, 0-0-1 specimens. K. John. Pyinama (Yamethin), 0-0-10 specimens. K. John. Akyab, September, 0-1-7 specimens. I. M. Ismailjee. Myohaung (Akyab), September, 0-2-2 specimens. Ismailjee. Buthidaung-Maungdaw (Akyab), September, 0-3-17 specimens. I. M. Ismailjee. Paletwa (Arakan Hill Tracts), September, 0-0-3 specimens. I. M. Ismailjee. Mt. Popa (Myingyan), September, 0-15-20 specimens. K. John. Kin-U (Shwebo), September, 0-3-5 specimens. Saw San Thwe. Indaw Lake (Katha), September, 0-0-4

specimens. Saw San Thwe. Naba (Katha), "nearby hills", September, 0-0-6 specimens. Saw San Thwe. Wuntho (Katha), "nearby hills", September, 0-2-9 specimens. Saw San Thwe. Katha, September, 0-12-5 specimens. Saw San Thwe. Lashio (Northern Shan States), September. "Open grassy ground, red and rather dry soil", 0-0-3 specimens. "Woods, ground covered with leaves, at 8th mile on road to Hsenwi", 0-1-2 specimens. "Gravelly soil in densely wooded ravine, at 10th mile on road to Hsenwi", 0-0-2 specimens. "Open ground, bullock caravan camp, at 11th mile on the Namtu road", 0-0-1 specimens. H. Young. Man Meh Hang village (Hsipaw State), "bullock caravan camp, September, 0-0-17 specimens. H. Young. Nam Hung (Pang Long State), "rocky soil covered with leaves in woods", October, 0-0-2 specimens. H. Young. Ta Pung village (Hsenwi State), "shaded muddy ground at edge of paddy field", September, 0-6-22 specimens. H. Young. Meung Nawng, Salween Ferry (Pang Long State), October, "manured ground in low and damp Shan garden", 0-1-2 specimens. "In sand along bank of Salween River", 0-0-4 specimens. H. Young. Bhamo, "banks of lake", October, 0-0-2 specimens "Around wells", 0-0-1 specimens. S. C. Paul. Mogaung (Myitkyina), October, 0-0-7 specimens. R. C. Sharma. Hopin (Myitkyina), October, 0-0-2 specimens. R. C. Sharma. Putao (Myitkyina), November, 0-0-3 specimens. F. D. Forbes. N Sop Zup (Myitkyina), November, 0-0-2 specimens. F. D. Forbes. Chinkram Hka (Myitkyina), November, 0-0-8 specimens. F. D. Forbes.

Remarks.—Some of the spermathecae are lacking in several specimens: on the right side of vii only (1, Mogaung), on both sides of vii (2, Prome and Mogaung), all except that on the right side of viii (1, Prome).

Pheretima mamillana Gates, 1931.

Nyinmaw (Tavoy), September, 0-0-5 specimens. W. D. Sutton. Nyaungdonle Chaung (Tavoy), "plains", September, 0-0-3 specimens. W. D. Sutton. Tanbin Hills (Tavoy), September, 0-1-13 specimens. W. D. Sutton. Myigyaunglaung (Tavoy), "nearby plains", September, 0-0-4 specimens. W. D. Sutton. Nyaungdon (Tavoy), September, 0-0-2 specimens. W. D. Sutton. Pyinthadaw (Tavoy), "hills", September, 0-15-21 specimens. "Plains", 0-0-21 specimens. W. D. Sutton. Posoe Chaung (Tavoy), "near Tavoy River", September, 0-0-46 specimens. W. D. Sutton. Mayan Chaung (Tavoy), "near Tavoy River", September, 0-0-23 specimens. W. D. Sutton. Zinba (Tavoy), September, 0-0-17 specimens. W. D. Sutton. Kamaungthwe River east (Tavoy), October, 0-0-31 specimens. W. D. Sutton. Siyigyan (Tavoy), "plains", September, 0-0-2 specimens. W. D. Sutton. Kinmunsakhan (Thaton), October, 0-0-2 specimens. K. John.

Remarks.—Spermathecae are lacking in two specimens (Nyaungdonle chaung) in which masses of protozoan parasites surround the gut in segments vii-viii.

Pheretima meridiana Gates, 1932.

Kamaungthwe River east (Tavoy), October, 0-0-15 specimens. W. D. Sutton. Zinba (Tavoy), September, 0-0-2 specimens. W. D. Sutton. Siyigyan (Tavoy), "plains" September, 0-0-1 specimens. W. D. Sutton. Tanbin Hills (Tavoy), September, 0-0-1 specimens. W. D. Sutton. Pyinthadaw (Tavoy), "hills", September, 0-0-2 specimens. "Plains", 0-0-1 specimens. W. D. Sutton. Posoe Chaung (Tavoy), "near Tavoy River", September, 0-0-2 specimens. W. D. Sutton. Mayan Chaung (Tavoy), "near Tavoy River", September, 0-0-1 specimens. W. D. Sutton. Kawlet Chaung (Tavoy), "nearby hills", September, 0-0-2 specimens. W. D. Sutton. Duyinzeik (Thaton), October, 0-0-1 specimens. K. John. Naung-gala (Thaton), October, 0-0-1 specimens. K. John. Shwegyin (Toungoo), October, 0-0-1 specimens. Marshall Shwin. Sah Der (Toungoo Karen Hills), September, 0-0-3 specimens. H. I. Marshall. Maw Pah Der (Toungoo Karen Hills), October, 0-0-1 specimens. H. I. Marshall. Kyaukkyi (Toungoo), October, 0-0-7 specimens. Marshall Shwin. Ler-mu-htee (Salween) October, 0-0-4 specimens. Marshall Shwin. Pauk-taw-gwin (Salween), October, 0-0-3 specimens. Marshall Shwin. Mewaing (Salween), October, 0-0-4 specimens. Marshall Shwin. Myohaung (Akyab), September, 0-0-1 specimens. I. M. Ismailjee. Paletwa, (Arakan Hill Tracts), September, 0-0-1 specimens. I. M. Ismailjee. Lashio, (Northern Shan States), September. "Bamboo jungle toward top of high hill north of town", 0-0-6 specimens. "Rocky soil covered with leaves in woods, Man Hung", October, 0-0-1 specimens. "Thatch grass, soil dry and red, Na Kho Sheh village", October, 0-0-1 specimens. H. Young. Maymyo (Shan Plateau), September, 0-0-4 specimens. Miss. Laura Johnson. Kadranyang (Myitkyina) November, 0-0-1 specimens. F. D. Forbes. Supkaga (Myitkyina), November, 0-0-2 specimens. F. D. Forbes.

Remarks.—The Man Hung specimen is unusually small, only 85×3 mm. and looks superficially much like *houlleti.*

Genital markings, usually lacking in this species, are present on three Maymyo worms : one on the left side of 7/8 ; one on the right side of 8/9 and one on the left side, each just median to a spermathecal, aperture ; one on the posterior margin of viii, each side, just median to the spermathecal apertures ; one on the anterior margin of viii just median to the left spermathecal aperture.

The right spermathecal invagination of ix is everted in one specimen a condition that has never been noted before.

Spermathecae are totally lacking in one specimen from Na Kho She.

Pheretima morrisi (Beddard), 1892.

Lashio, September. " Leaf-covered soil in dense woods, Nawng Pa Shi Tin ", 0-0-11 specimens. " Very damp soil in deep woods 3 miles west of town ", 0-0-1 specimens. H. Young. Meung Nawng village, Salween Ferry (Pang Long State) October, " manured ground in low and damp Shan garden ", 0-0-1 specimens. H. Young.

Remarks.—Two genital markings are just median to each male porophore on each of these worms.

Pheretima peguana (Rosa), 1890.

Kamaungthwe River east (Tavoy), September, 0-0-5 specimens. W. D. Sutton. Tanbin Hills (Tavoy), September, 0-0-1 specimens. W. D. Sutton. Migyaunglaung (Tavoy), " nearby plains ", September 0-0-1 specimens. W. D. Sutton. Nyaungdon (Tavoy), September, 0-0-4 specimens. W. D. Sutton. Pyinthadaw (Tavoy), " nearby hills ", September, 0-0-8 specimens. Kawlet Chaung (Tavoy), " nearby hills ", September, 0-0-10 specimens. W. D. Sutton. Siyigyan (Tavoy), " plains ", September, 0-0-19 specimens. W. D. Sutton. Zinba (Tavoy), September, 0-0-9 specimens. W. D. Sutton. Moulmein (Amherst), October, 0-0-7 specimens. K. John. Mupun (Amherst), October, 0-0-36 specimens. K. John. Boyagyi (Thaton), October, 0-0-1 specimen. K. John. Bilin (Thaton), September, 0-0-23 specimens. October, 0-0-2 specimens. K. John. Sittang (Thaton), October, 0-0-28 specimens. K. John. Kyaikto (Thaton), August, 0-0-1 specimens. October, 0-0-33 specimens. " Nearby hills ", October, 0-0-10 specimens. K. John. Taungzun (Thaton), August, 0-0-1 specimens. October, 0-0-6 specimens. K. John. Naunggala (Thaton), September, 0-0-4 specimens. K. John. Duyinzeik (Thaton), September, 0-0-6 specimens. K. John. Aungsaing (Thaton), September, 0-0-11 specimens. K. John. Thaton, September, 0-3-24 specimens. K. John. Kyauktan (Hanthawaddy), August, 0-0-1 specimens. Saw San Thwe. September, 0-1-7 specimens. K. John. Syriam (Hanthawaddy), August, 0-0-10 specimens. Saw San Thwe. Twante (Hanthawaddy), September, 0-0-10 specimens. K. John. Kungyangon (Hanthawaddy), September, 0-0-4 specimens. K. John. Thongwa (Hanthawaddy), September, 0-0-3 specimens. K. John. Kayan (Hanthawaddy), September, 0-0-3 specimens. K. John. Thameintaw (Pyapon), September, 1-0-10 specimens. Maung Ohn Maung. Pyapon, September, 0-1-0 specimens. Maung Ohn Maung. Bogale (Pyapon), September, 0-0-1 specimens. Maung Ohn Maung. Dedaye (Pyapon), September, 0-0-10 specimens. Maung Ohn Maung. Myaungmya, October, 0-0-2 specimens. Maung Ohn Maung. Bassein, October, 0-0-15 specimens. K. John. Thinbawgyin (Bassein), October, 0-0-18 specimens. K. John. Padaukchaung (Bassein), October, 0-0-1 specimens K. John. Pantanaw (Maubin), October, 0-0-15 specimens. Maung Ohn Maung. Danubyu (Maubin), October, 0-0-1 specimens. Maung Ohn Maung. Maubin. October, 0-0-10 specimens. Maung Ohn Maung. Yandoon (Maubin), October, 0-0-21 specimens, Maung Ohn Maung. Hmawbi (Insein), September, 0-0-4 specimens. K. John. Taikkyi, (Insein), September, 0-0-13 specimens. K. John. Wanetchaung (Insein), September, 0-0-7 specimens. K. John. Taukkyan (Insein), September, 0-0-2 specimens. K. John. Hlegu (Insein), September, 0-0-2 specimens. K. John. Hlawga (Insein), September. 0-0-1 specimens. K. John. Pegu, August, 0-0-9 specimens. " Jungles to the east ", 0-0-1 specimens. " Jungles to the west ", 0-0-5 specimens. K. John. Ler-mu-hteo (Salween), October, 0-0-1 specimen. Marshall Shwin. Ingabu (Henzada), October, 0-0-7 specimens. Maung Ohn Maung. Zalun (Henzada), October, 0-0-2 specimens

Maung Ohn Maung. Henzada, October, 0-0-13 specimens. Maung Ohn Maung. Sandoway, September, "Doedaung hill", 0-37-12 specimens. "Hills", 0-2-5 specimens. I. M. Ismailjee. Toungoo, October, 0-0-7 specimens. K. John. Kyaukkyi (Toungoo), October, 0-0-5 specimens. Marshall Shwin. Shwegyin (Toungoo), October, 0-0-64 specimens. Marshall Shwin. Maw Pah Der (Toungoo Karen Hills), October, 0-0-7 specimens. H. I. Marshall. Paukkaung (Prome), September, 0-0-10 specimens. K. John. Prome, September, 0-0-11 specimens. K. John. Laboo (Prome), September, 0-0-4 specimens. K. John. Thayetmyo, September, 1-0-5 specimens. K. John. Thanbula (Thayetmyo), August, 0-0-7 specimens. K. John. Allanmyo (Thayetmyo), August, 0-0-3 specimens. K. John. Kyaukpyu, September, 0-4-6 specimens. I. M. Ismailjee. Ramree Island (Kyaukpyu), September, 0-0-17 specimens. "Hill", 0-0-46 specimens. I. M. Ismailjee. Myebon (Kyaukpyu), September, 0-0-4 specimens. I. M. Ismailjee. Akyab, September, 0-0-33 specimens. I. M. Ismailjee. Myohaung (Akyab), September, 0-0-26 specimens. I. M. Ismailjee. Pyinmana (Yamethin), October, 0-0-17 specimens. K. John. Taungdwingyi (Magwe), "jungle to the east", 0-0-5 specimens. K. John. Mt. Popa (Myingyan), September, 0-0-9 specimens. K. John. Tada-U (Sagaing), September, 1-0-6 specimens. K. John. Myohaung (Mandalay), October, 0-0-107 specimens. K. John. Kin-U (Shwebo), September, 0-25-10 specimens. Saw San Thwe. Kyaukmyaung (Shwebo), September, 0-3-7 specimens. Saw San Thwe. Naba (Katha), "nearby hills", September, 0-4-61 specimens. Saw San Thwe. Bhamo, October, 0-0-1 specimens. "Banks of lake", 0-0-6 specimens. "Around wells", 0-0-1 specimens. S. C. Paul. Alam (Myitkyina), November, 0-0-4 specimens. F. D. Forbes.

Variation and *abnormality*.—No. 1. Only one genital marking present, on the right side, reaching posteriorly only to 17/18 which is visible clear across the ventrum (Naba). No. 2. Genital markings lacking on 17/18. Left spermatheca of vii lacking (Prome). No. 3. Median (unpaired) female pores on xiii and xiv, clitellum on xiv-xv on right side, on xiv-xvi on left side. Genital markings of right side on 16/17 and 17/18. Right seminal vesicle of xii rudimentary, right ovary and oviducal funnel in xii, left in xiii, right spermatheca of ix lacking (Kayan). No. 4. Median (unpaired) female pores on xiii and xiv. Genital markings of left side on 16/17 and 17/18, left male pore on xvii, left heart of xiii lacking and left seminal vesicle of xii absent. Left anterior seminal vesicle reaches into contact with septum 7/8. Paired oviducal funnels present in xiii but only the right ovary. An oviducal funnel in xiii on the left side but no ovary. The left spermatheca of ix lacking (Akyab).

Pheretima planata Gates, 1926.

Moulmein (Amherst), October, 12-0-42 specimens. K. John. Mupun (Amherst), October, 3-0-2 specimens. K. John. Sittang (Thaton), October, 8-0-33 specimens. K. John. Kyaikto (Thaton), September, 0-0-1 specimens. October, 3-1-7 specimens. K. John. Sittang (Thaton), October, 0-0-3 specimens. K. John. Bilin (Thaton), October, 0-0-2 specimens. K. John. Thaton (September), 0-2-3 specimens. K. John. Kayan (Hanthawaddy), September, 0-1-0 specimens. K. John. Thongwa (Hanthawaddy), September, 0-1-2 specimens. K. John. Kungyangon (Hanthawaddy), September, 0-5-1 specimens. K. John. Twante (Hanthawaddy), September, 0-4-1 specimens. K. John. Kyauktan (Hanthawaddy), August, 0-3-0 specimens. Saw San Thwe., Syriam (Hanthawaddy), August, 10-1-0 specimens. Saw San Thwe. Bogale (Pyapon), September, 0-7-0 specimens. Maung Ohn Maung. Dedaye (Pyapon), September, 1-3-0 specimens. Maung Ohn Maung. Kyaiklat (Pyapon), September, 0-3-0 specimens. Maung Ohn Maung. Thameintaw (Pyapon), September, 0-56-2 specimens. Maung Ohn Maung. Pyapon, September, 0-5-1 specimens. Maung Ohn Maung. Wakema (Myaungmya), October, 2-0-0 specimens. Maung Ohn Maung. Myohaung (Myaungmya), October, 0-3-0 specimens. William Law. Bassein, October, 0-2-0 specimens. K. John. Thinbawgyin (Bassein), October, 0-8-5 specimens. K. John. Padaukchaung (Bassein), October, 0-1-3 specimens. K. John. Danubyu (Maubin), October, 0-1-0 specimens. Maung Ohn Maung. Maubin, October, 0-3-2 specimens. Maung Ohn Maung. Yandoon (Maubin), October, 0-1-0 specimens. Maung Ohn Maung. Hmawbi (Insein). September, 1-0-0 specimens. K. John. Taikkyi (Insein), September, 1-0-0 specimens,

K. John. Wanetchaung (Insein), September, 4-4-0 specimens. K. John. Hlegu (Insein), September, 0-1-0 specimens. K. John. Hlawga (Insein), September, 0-0-1 specimens. K. John. Pegu, August, 0-0-1 specimens. K. John. Thanatpin (Pegu), August, 2-1-0 specimens. K. John. Zalun (Henzada), October, 0-5-4 specimens. Maung Ohn Maung. Henzada, October, 10-0-0 specimens. Maung Ohn Maung. Ingabu (Henzada), October, 1-0-0 specimens. Maung Ohn Maung. Paukkaung (Prome), September, 0-1-2 specimens. K. John. Sandoway, September, "hills", 0-3-1 specimens. I. M. Ismailjee. Toungoo (October), 4-0-5 specimens. K. John. Shwegyin (Toungoo), October, 0-0-15 specimens. Marshall Shwin. Kyaukkyi (Toungoo), October, 0-0-1 specimens. Marshall Shwin. Pathichaung (Toungoo Karen Hills), September, 0-1-0 specimens. H. I. Marshall. Pa Taw Lo, (Toungoo Karen Hills), October, 0-0-1 specimens. H. I. Marshall. Thanbula, (Thayetmyo), September, 0-3-0 specimens. K. John. Akyab, September, 4-1-0 specimens. I. M. Ismailjee. Buthidaung-Maungdaw (Akyab), September, 26-3-1 specimens. I. M. Ismailjee. Paletwa (Arakan Hill Tracts), September, 0-1-1 specimens. I. M. Ismailjee. Indaw Lake (Katha), September, 41-0-6 specimens. Saw San Thwe. Wuntho (Katha), "hills to the west", September, 17-0-3 specimens. Saw San Thwe. Bhamo, October, 0-0-1 specimens. "Banks of lake", 0-25-0 specimens. "River bank", 0-4-0 specimens. "Waste land beyond town", 0-23-0 specimens. "Around wells", 0-1-0 specimens. S. C. Paul. Alam Myitkyina), November, 1-0-0 specimens. F. D. Forbes. Weshi (Myitkyina), November, 0-0-2 specimens. F. D. Forbes. N Sop Zup (Myitkyina), November, 0-1-8 specimens. F. D. Forbes. Mogaung (Myitkyina), October, 0-0-3 specimens. R. C. Sharma. Mohnyin (Myitkyina), October, 0-0-4 specimens. R. C. Sharma.

Remarks.—Copulatory chambers (one or both) are everted in a number of these specimens and on the protuberance thus formed there are visible ten to thirteen genital markings.

Pheretima posthuma (L. Vaillant), 1868.

Moulmein (Amherst), October, 0-0-8 specimens. K. John. Mupun (Amherst), October, 0-3-26 specimens. K. John. Sittang (Thaton), October, 0-0-4 specimens. K. John. Thongwa (Hanthawaddy), September, 0-0-2 specimens. K. John. Kyauktan (Hanthawaddy), September, 0-1-0 specimens. K. John. Twante (Hanthawaddy), September, 0-0-2 specimens. K. John. Thameintaw (Pyapon), September, 5-12-21 specimens. Maung Ohn Maung. Pyapon, September, 0-2-3 specimens. Maung Ohn Maung. Bogale (Pyapon), September, 0-1-1 specimens. Maung Ohn Maung. Dedaye (Pyapon), September, 0-2-2 specimens. Maung Ohn Maung. Myaungmya, October, 0-0-1 specimens. Maung Ohn Maung. Danubyu (Maubin), October, 0-0-1 specimens. Maung Ohn Maung. Maubin, October, 0-0-2 specimens. Maung Ohn Maung. Yandoon (Maubin), October, 0-6-6 specimens. Maung Ohn Maung. Bassein, October, 0-1-14 specimens. K. John. Hlegu (Insein), September, 0-0-2 specimens. K. John. Taikkyi (Insein), September, 0-2-1 specimens. K. John. Wanetchaung (Insein), September, 0-2-1 specimens. K. John. Pegu, August, 0-5-0 specimens. K. John. Henzada, October, 0-0-2 specimens. Maung Ohn Maung. Paukkaung (Prome), August, 0-0-4 specimens. K. John. Prome, August, 0-0-9 specimens. K. John. Laboo (Prome), August, 1-0-2 specimens. K. John. Sandosay, "hills". September, 0-3-0 specimens. I. M. Ismailjee. Kyaungnagwa (Toungoo), October, 12-9-27 specimens. H. I. Marshall. Toungoo (October), 0-0-5 specimens. K. John. Allanmyo (Thayetmyo), August, 0-3-3 specimens. K. John. Thanbula (Thayetmyo), August, 0-1-1 specimens. K. John. Thayetmyo, August, 0-0-5 specimens. K. John. Kyaukpyu, September, 0-0-3 specimens. I. M. Ismailjee. Magwe, August, 0-2-13 specimens. K. John. Taungdwingyi (Magwe), August, 0-0-8 specimens. K. John. Pyinmana (Yamethin), October, 1-6-14 specimens. K. John. Minbu, August, 0-1-4 specimens. K. John. Myingyan, September, 0-0-4 specimens. K. John. Akyab, September, 0-0-5 specimens. I. M. Ismailjee. Kyaukse, "two miles to the west", September 0-0-10 specimens. K. John. Monywa (Lower Chindwin), September, 0-2-15 Saw San Thwe. Ye-U (Shwebo), September, 0-0-4 specimens, Saw San Thwe. Kin-U (Shwebo), September, 0-5-11 specimens. Saw San Thwe. Kyaukmyaung (Shwebo), September, 0-0-1 specimens. Saw San Thwe. "Nearby bank of the Irrawaddy River". 0-16-38 specimens. Saw San Thwe. Katha, September, 0-0-6 specimens. Saw San Thwe. Nava (Katha), October, 0-0-4 specimens. Saw San Thwe. Indaw Lake (Katha), September, 3-6-28 specimens. Saw San Thwe. Bhamo, October. "Banks of lake". 0-0-2 specimens. "Banks of Irrawaddy River", 0-0-58 specimens. S. C. Paul.

Remarks.—Worms of this species are "innumerable" on the banks of the Irrawaddy River, the surface covered for miles with their castings,

according to Saw San Thwe. Similar reports, for other sections of the Irrawaddy, as well as for the Sittang and Salween Rivers have been made by other collectors.

Pheretima robusta (E. Perrier), 1872.

Lashio (Northern Shan States), September, "Damp ground in woods at 11th mile on the road to Hsipaw", 0-0-24 specimens. "Bullock caravan camp, Man Meh Hang village, on the road to Hsipaw", 0-0-1 specimens. H. Young. Pang Noi village (Pang Long State), October, "rich dark soil under clump of trees", 0-0-3 specimens. H. Young. Hpa Cha village (Pang Long State), October, "rocky soil in woods", October, 0-0-1 specimens. H. Young. Meung Nawng village, Salween Ferry (Pang Long State), "manured ground in low and damp Shan garden", October, 0-0-3 specimens. H. Young.

Remarks.—Two genital markings are median to the male porophores on 23 specimens, one postsetal, the other presetal, the latter slightly more lateral than the postsetal. The right postsetal is lacking (1 specimen), or the left postsetal (2), both postsetals (1), all except the right presetal (1), all lacking (2). The right presetal is doubled on two specimens.

One genital marking is present on each spermathecal porophore, immediately behind the spermathecal pore. Further preclitellar markings, occasionally present, are 2-4 inter-setal intervals median to the spermathecal pore lines, on viii.

The nerve cord is attached to the ventral faces of the test is sacs of both x and xi (6 specimens).

The ampulla is bound down around an ental portion of the spermathecal duct so as to camouflage a slightly bulbous thickening within which the duct lumen is widened into a small chamber into which the diverticulum opens. The wall of this chamber has annular ridges and the floor is convex. On the center of the convexity is a minute opening into the narrow lumen of the ectal portion of the duct.

No spermatozoal iridescence was noted in any of the seminal chambers of any of these specimens.

Family Glossoscolecidae.

Genus **Pontoscolex** Schmarda, 1861.

Pontoscolex corethrurus (Fr. Müller), 1857.

Sitpye (Tavoy), September, 2-0-9 specimens. W. D. Sutton. Nyinmaw (Tavoy), September, 2-0-6 specimens. W. D. Sutton. Nyaungdonle Chaung (Tavoy), "plains" September, 14-0-48 specimens. W. D. Sutton. Mayan Chaung (Tavoy), "near Tavory River", September, 0-0-6 specimens. W. D. Sutton. Posoe Chaung (Tavoy), "neat Tavoy River", September, 0-0-4 specimens. W. D. Sutton. Kamaungthwe River eas (Tavoy), October, 1-0-26 specimens. W. D. Sutton. Kyaikmaraw (Amherst), August, 0-3-3 specimens. K. John. Moulmein (Amherst), August, 0-0-2 specimens. October, 0-0-3 specimens. K. John. Mupun (Amherst), October, 0-0-4 specimens K. John. Sittang (Thaton), October, 0-0-19 specimens. K. John. Thaton, September, 9-0-3 specimens. K. John. Boyagyi (Thaton), October, 0-0-46 specimens. K. John. Duyinzeik (Thaton), September, 0-0-26 specimens. K. John. Bilin (Thaton), September, 2-0-2 specimens. October, 2-0-30 specimens. K. John. Kyaikto (Thaton), September, 0-0-2 specimens. October, 11-0-7 specimens. K. John. Kyaiktiyo (Thaton), October, 0-0-1 specimens. K. John. Kumingyaung (Thaton), October, 0-0-22 specimens. K. John. Taungzun (Thaton), October, 0-0-4 specimens. K. John. Thaton, "Hills to the west", September, 0-0-3 specimens. K. John.

Aungsaing (Thaton), September, 5-0-2 specimens. K. John. Kyauktan (Hanthawaddy), September, 0-1-2 specimens. K. John. Thongwa (Hanthawaddy), September, 0-0-2 specimens. K. John. Kungyangon (Hanthawaddy), August, 0-0-3 specimens. K. John. Pyapon, September, 0-0-6 specimens. Maung Ohn Maung. Thameintaw (Pyapon), September, 8-0-7 specimens. Maung Ohn Maung. Dedaye (Pyapon), September, 0-0-9 specimens. Maung Ohn Maung. Kyaiklat (Pyapon), September, 0-0-5 specimens. Maung Ohn Maung. Taikkyi (Insein), September, 0-0-1 specimens. K. John. Myaungmya, October, 9-0-109 specimens. Maung Ohn Maung. Myohaung (Myaungmya), October, 0-0-3 specimens. William Law. Henzada, October, 3-0-0 specimens. Maung Ohn Maung. Bassein, October, 0-0-7 specimens. K. John. Thinbawgyin (Bassein), October, 0-3-0 specimens. K. John. Sandoway, September, "Hills", 0-1-0 specimens. "Riverside", 0-1-1 specimens. I. M. Ismailjee. Kyaukpyu, September, 0-1-4 specimens. I. M. Ismailjee. Akyab, September, 0-0-2 specimens. I. M. Ismailjee. Buthidaung-Maungdaw (Akyab), 0-5-2 specimens. I. M. Ismailjee. Kyauktaw (Akyab), September, 7-0-1 specimens. I. M. Ismailjee. Pyinmana (Yamethin), October, 0-0-3 specimens. K. John. Toungoo, October, 0-0-3 specimens. K. John. Indaw Lake (Katha), September, 0-0-1 specimens. Saw San Thwe. Mogok (Katha), September, 0-33-113 specimens. Mrs. A. C. Hanna. Thandaung, "under rocks to the north", September, 0-13-0 specimens. G. E. Blackwell. Bhamo, "banks of lake", October, 0-0-1 specimens S. C. Paul. Mt. Harriet (S. Andaman), "in clay of termites wste heap", ca. 500 feet, 30. XI. 23, 0-2-0 specimens. Port Blair (Andaman Islands), "Sta. B. 15", 0-19-0 specimens. Andaman Island, 2-0-0 specimens. Mt. Harriet (S. Andaman), 0-2-0 specimens. (All Andaman Islands specimens from the Indian Museum.)

Genus **Glyphidrilus** Horst, 1889.

Glyphidrilus sp.

Sittang (Thaton), October, 5-0-0 specimens. K. John. Kayan (Hanthawaddy), September, 18-0-0 specimens. K. John. Kyauktan (Hanthawaddy), September, 1-0-0 specimens. K. John. August, 0-34-0 specimens. Saw San Thwe. Thanatpin (Pegu), August, 12-0-0 specimens. K. John. Pyapon, September, 0-1-0 specimens. Maung Ohn Maung. Kyaiklat (Pyapon), September, 1-0-0 specimens. Maung Ohn Maung. Thinbawgyin (Bassein), October, 2-0-0 specimens. K. John. Ingabu (Henzada), October, 1-0-0 specimens. Maung Ohn Maung. Zalun (Henzada), October, 25-0-0 specimens. Maung Ohn Maung. Henzada, October, 5-0-0 specimens. Maung Ohn Maung. Prome, August, 0-3-0 specimens. K. John. Taungdwingyi (Magwe), "jungle to the east", several specimens. K. John. Minbu, "edge of water in small pit". August, 0-4-0 specimens. K. John. Lashio (Northern Shan States), "in mud of paddy flats to the northeast", September, 28-0-0 specimens. H. Young. A Kin De village (Northern Shan States), "wet boggy ground covered by thick growth of water plants", October, 2-0-0 specimens. H. Young. Tiangzup (Myitkyina), November, 1-0-0 specimens. F. D. Forbes.

Remarks.—Records of clitellate specimens, of three species, were lost in the war.

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