

Mr. Matschie, in his excellent book on the 'Mammals of German East Africa,' calls the Central-African form *Adenota kob* (p. 126), but in the appendix he calls it *Adenota koba*, Erxl. (p. 147).

I cannot believe that Buffon's "Koba ou la grande vache du Sénégal" was an *Adenota* at all, and if it was one, it rather seems to me that Buffon had had two skulls of the same species, and that he figured the adult specimen as "*koba*" and the young one as "*kob*." For he affirms that both came from the Senegal.

Adenota thomasi is known from the northern Central-African Lake region:—Kavirondo, Ussoga, Uganda (*Speke, Jackson, Gedge, Lugard, Stuhlmann, Neumann*); Unyoro, Albert Lake (*Lugard*); Simiu River—south-east corner of the Victoria Nyanza (*Langheld*). Unyoro is the most northern known point. It does not occur east of the watershed to the Victoria Nyanza (Mau Sotik mountains). North of Unyoro is the region of *Adenota maria*, Gray, and *A. leucotis*, Licht. (Bahr el Gazal, Sobat, Kir). To the west the true *A. kob* occurs—Senegal and Gambia (B.M. Type Paris Mus.), Togo (*Baumann*), Cameroons (*Zenker*), extending eastward to the Ubangi river, whence Dybowsky brought specimens to Paris.

Southward occur *A. leché* and *A. vardoni*, which are both known from British Central Africa (Lakes Mweru, Bangweolo, Nyassa, south Tanganyika). It seems that the two species of *Adenota* met with by Böhm and Reichard west of Tanganyika must have belonged to these last two species.

A. thomasi lives in herds of 30–50, about five times as many females as males; its habits are those of *Æpyceros melampus*, but it prefers rather damp meadows near the water. Kiganda name: *Nssunu*.

I shall on a future occasion give a more exact comparison of the six species forming the genus *Adenota*.

6. On some Earthworms from the Sandwich Islands collected by Mr. R. L. Perkins; with an Appendix on some new Species of *Perichæta*, &c. By FRANK E. BEDDARD, F.R.S., &c.

[Received December 16, 1895.]

So little has been done in exploring the Earthworm-fauna of oceanic islands that I am particularly pleased at being able to offer to the Society an account of a rather extensive collection of Earthworms made in the Sandwich Islands by Mr. R. L. Perkins under the auspices of the British Association Committee for the exploration of those islands. Two collections made at different times and kindly forwarded to me by Dr. D. Sharp, F.R.S., include examples of a number of species principally belonging

to the genus *Perichæta*. I am much indebted to Dr. Sharp, and also to Mr. Perkins for his careful preservation of the specimens.

Our knowledge of the Earthworms of the Hawaiian Archipelago is at the present time exceedingly limited: four species form the entire list; and of these *Perichæta corticis* of Kinberg¹, though undoubtedly a *Perichæta*, or at least a *Perichætid*, is quite unrecognizable as a species, while *Hypogæon havaicum* of the same naturalist is believed by Rosa² to be merely *Allolobophora putris*, a widely spread species which has been "introduced" into many extra-European countries. Two species, however, which have been sufficiently described for identification, appear to be peculiar to the Sandwich Islands. The first of these was made known by Dr. Rosa³, and fully described from material existing in the Vienna Museum, as *Perichæta hawayana*. The second, which is not perhaps so certainly a distinct species, I have myself described under the name of *Pontoscolex hawaiiensis* in my recently published 'Monograph of the Order Oligochæta' (p. 660).

In the present communication I have three new Hawaiian species to add to this list; and I have also to record the occurrence in those islands of a few widely distributed forms. The entire list of Earthworms now known from the Hawaiian Archipelago, excluding only the unintelligible *Perichæta corticis*, is as follows—the species peculiar to the islands being printed in Clarendon type:—

Fam. LUMBRICIDÆ.

- (1) *Allolobophora fœtida*.
- (2) *Allolobophora putris*.
- (3) *Allolobophora caliginosa*.

Fam. PERICHÆTIDÆ.

- (4) *Perichæta indica*.
- (5) *Perichæta hawayana*.
- (6) *Perichæta perkinsi*.
- (7) *Perichæta molokaiensis*.
- (8) *Perichæta sandvicensis*.

Fam. GEOSCOLICIDÆ.

- (9) *Pontoscolex hawaiiensis*.

This will appear to many to be a meagre enough list, especially when contrasted with the rich and peculiar insect, molluscan, and avian fauna of the same islands. But it is a long list when compared with those of the Earthworms of other oceanic islands, from very few of which have undoubtedly indigenous forms been secured.

¹ "Annulata nova," Öfr. K. Svensk. Vet.-Akad. 1866.

² "Revisione dei Lumbrici," Mem. Acc. Torino, 1893.

³ Ann. d. k. k. Hofmus. Wien, Bd. vi.

It is early, of course, to lay down any general statements; and were it not that Mr. Perkins has collected so many species and in most cases so many individuals of each species, I should have contented myself with a plain description of fact and should not have ventured upon comment. It may be permissible, however, to indicate the "Oriental" facies of the fauna and the absence of very peculiar types. The latter statement, in fact, appears to hold good generally for oceanic islands, so far as our imperfect data enable us to speak. It argues their really oceanic origin and their short existence. Even in Kerguelen and Marion Is., which are remote from traffic and can hardly have been stocked by human means, the one known species, *Acanthodrilus kerguelarum*, is only specifically different from the Earthworms most nearly allied upon the adjoining mainlands. And these islands are possibly among the most ancient of oceanic islands.

Allolobophora fætida, Sav.

Numerous examples of this widely distributed species from Halemanu, Kausi.

Allolobophora caliginosa, Sav.

Hab. Waialua, Oahu.

Allolobophora putris, Sav.

There are a large number of examples of the variety "*arborea*" (smaller, and with tubercula pubertalis only upon xxix. & xxx.), which Rosa believes to be identical with Kinberg's "*Hypogæon havaicus*." Its occurrence, therefore, is not a new fact.

Hab. Molokai, and Kawaihoa River, Oahu.

***Pontoscolex hawaiiensis*, n. sp.**

Of this apparently new species some 8 or 10 examples were collected.

The length of a fair sized specimen is 142 mm; the breadth at the clitellum 4 mm., elsewhere rather less. The number of segments is rather more than 210; after the 128th segment is an oval swelling upon the body 3 mm. long and commencing about 90 mm. from the anterior end; this is the structure which has been described in other species, and regarded as a growing point. This modified region of the body appears to be constant in position; this is shown by the following measurements of two individuals:—

| | A. | B. |
|---|----|----|
| Length of body in front of "growing region" | 90 | 80 |
| Length of body behind "growing region" | 47 | 40 |

The intestine proper appears to begin at the end of the clitellum; there is here a distinct circular valve, and the intestine has a distinct typhlosole projecting into its lumen. The calibre, however, is not greater.

The setæ of this species are, as in *Rhinodrilus*, ornamented

throughout. On the very first seta-bearing segment of the body the setæ have precisely the same ridged free extremities that the setæ upon the clitellum show. At first the setæ of each pair are fairly close together. Later they get farther apart and become irregular in arrangement, as in *Pontoscolex corethrurus*. On the clitellum the ventral pairs are quite regular, although each individual seta of the pair is farther away from its fellow than anteriorly. This continues for a short distance behind the clitellum. On the other hand, the lateral pairs of setæ are irregular in the clitellar region. The ventral of the two setæ, however, which is on a line with the nephridiopore, is fixed in position: it is the other which varies.

The clitellum occupies segments xiv.-xxi. with a portion of xiii. and xxii.

The dorsal vessel is in certain respects peculiar¹. Where it emerges from the last thick mesentery it is moderately thin; it gradually becomes thicker and at the same time moniliform; the increased thickness is due to the fact that the dorsal vessel becomes double; its character is that of the dorsal vessel in *Acanthodrilus novæ-zelandiæ*, i. e. the tube is single where it traverses the septa, but separates into two halves between the septa. In segments xiv. and xv. the dorsal vessel attains to its greatest bulk; after this its calibre becomes suddenly diminished. It retains, however, its double character.

In segments xi., xii. are hearts which seem to have no connection with the dorsal vessel but only with the supra-intestinal.

The gizzard is in segment v.; it is followed by four very thick septa. In the segments following the gizzard are 3 pairs of calciferous glands. Behind the first three strong septa are very small spermathecae, simple elongate oval pouches without diverticula.

Hab. Mauna Loa, Hawaii, and Waiahia, Oahu.

Perichaeta indica, Horst.

Dr. Michaelsen has called attention² to the fact that this species, which is very widely distributed, is frequently without a "prostate" gland. In five specimens which he received from Georgia and Florida there was no trace of the gland, only the muscular duct being present. In the 6th specimen the gland was present on one side. Dr. Michaelsen further makes the suggestion that the original home of the species may be Japan, where as a general rule³ the *Perichaeta* show the same character.

Among the worms collected by Mr. Perkins were 8 examples of this species from Molokai, all fully mature; I dissected seven of them, in none of which was there the least trace of the gland in question; the curved duct alone was present.

¹ In one specimen of three which I examined, the dorsal vessel seemed to be single.

² "Die Regenwurm-Fauna von Florida u. Georgia," Zool. JB., Bd. viii. p. 177.

³ F. E. Beddard "On some Perichætidae from Japan," *ibid.* Bd. vi. p. 755.

Dr. Michaelsen has also called attention to the variability of the genital papillæ.

Of my specimens four are normal (*i. e.* there are 3 pairs on vii., viii., ix.); in two the papillæ are on vii., viii. on one side of the body, on viii. only on the other; in the seventh specimen these conditions are exactly reversed; in the eighth, one side of the body is normal, on the other the papillæ lie on viii., ix., x.

In six specimens from Maui¹ the genital papillæ and prostates were as follows:—

| | | |
|-------|----------------------------|---------------------------------|
| 1.... | On vii., viii. | 0. |
| 2.... | 0. | Small. |
| 3.... | viii., ix. | 0. |
| 4.... | On viii. (left side only). | Small (on one side only, left). |
| 5.... | 0. | 0. |
| 6.... | vii., viii. | Small (on one side only, left). |

It is interesting to contrast this list with the last, on the hypothesis, of course, that the islands upon which the two series were collected are different.

There were also two individuals from Mauna Loa, Hawaii, upon which I do not comment, as there were only two.

Perichæta perkinsi, n. sp.

The length of this species (of which I have examined two examples) is 192 mm.; the diameter is 6 mm. The number of segments is 110.

The colour is of a light brown, darker on the back.

The *prostomium* is broad (2.5 mm.) but not long; it is cut off from the first segment by a transverse groove.

The buccal cavity is eversible, as in many *Perichæta*.

The first dorsal pore that I could detect lies between segments xii./xiii.

The *clitellum* occupies the whole of segments xiv.–xvi., and is without setæ.

The *oviducal pore*, distinctly a single pore, is situated in the middle of a white area upon the brown clitellum on segment xiv.

The *male pores* are rather wide apart, and upon segment xviii. I counted eleven setæ between them. Each pore itself is upon a whitish papilla, and to the outside is another smaller papilla which is not perforated; the two are surrounded by several concentric circular wrinkles of the integument.

There are no *genital papillæ* except the one just referred to and upon which open glands.

The *setæ* of *P. perkinsi* are not so numerous as in many other species. The segments in the anterior part of the body have fewer setæ than those which follow. There is a gradual increase up to the xviii segment, whence the number appears to remain fairly

¹ Mr. Perkins has queried the locality.

constant up to the end of the body. The formula¹ will read thus:—

| | | | | |
|---------------------|----|----|------|------|
| Segment | I. | V. | XII. | XVI. |
| No. of setæ | 23 | 31 | 43 | 46 |

but on some segments quite close to the tail I counted as many as 49 setæ. The size of the setæ varies on different segments and on different parts of the same segment. The setæ on either side of the nerve-cord, as is the case with other species (e. g. *Perichæta houlleti*), are larger than those more laterally placed. This difference commences to be well marked in the third setigerous segment, anterior to which, it may be observed, is no ventral nerve-cord, but the circumœsophageal commissures. From the third setigerous segment to the sixth (inclusive) there is this marked difference between a few ventral setæ—particularly the ventralmost seta—on either side of the nerve-cord and the rest of the setæ of the segment. On the tenth segment all the setæ are very much smaller than on the preceding segments², and those on either side of the ventral nerve-cord are not larger. On the eleventh segment the setæ again are larger, and there is a slight difference in size between the ventralmost two or three setæ and the rest, but not nearly so marked as on segments iv.–vii.

The clitellum is, as has been already mentioned, entirely without setæ; but no doubt in the immature worm they are present. In any case the special longitudinal muscles of the setæ were quite obvious in the mature worm. At the hinder end of the body the setæ are larger than those of some of the anterior segments—a difference which may have to do with the habit (so general among earthworms, at least of this country) of lying outside the burrow with the tail only concealed within.

The first septum lies between segments v./vi. The septum between viii./ix. is missing, as is nearly universally the case with *Perichæta*. The septum between ix./x. is largely defective, though not absent; it consists chiefly of a strong muscular band on each side, which is attached to the insertion of the next following septum. Septa v./viii., x./xiii. are moderately thickened.

In the hinder part of the body were paired masses of cœlomic cells, attached on either side of the dorsal blood-vessel, such as I have described in *Perichæta*. They were full of Gregarines.

The pharynx is beset with numerous salivary glands, which extend back as far as the sixth segment. The gizzard is globular, not in any way elongated.

The last heart is in segment xiii.

The sperm-sacs are in segments xi., xii.; there are, as usual, two pairs of sperm-duct funnels.

¹ This is a little different from the segments originally selected ("On some Species of the Genus *Perichæta*," P. Z. S. 1892, p. 157); but as the number culminates at xvi. I have thought it well to emphasize the fact by the formula.

² In relation to this fact, it is interesting to observe that in *Perichæta caducichæta* (Benham, Ann. & Mag. Nat. Hist. ser. 6, xvi. p. 47, 1895) the setæ upon this segment are absent.

The *spermiducal glands* extend through three segments; they are coarsely lobate, and the muscular duct is curved like a horse-shoe; there is no terminal sac.

The *ovaries* are in segment xiii., and in the same segment are a pair of rather large kidney-shaped egg-sacs.

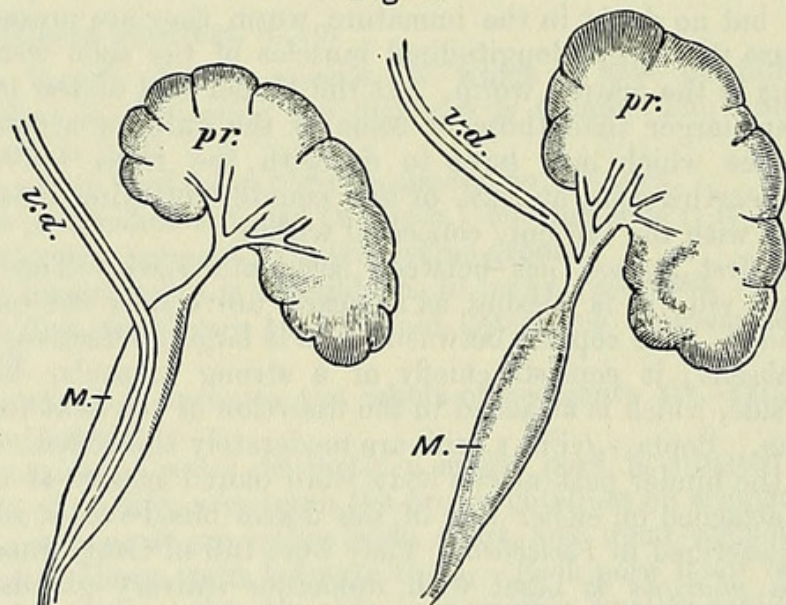
The *spermathecae* are four pairs in segments vi.-ix. The pouch, which is pear-shaped, is sharply marked off from the narrow duct. The diverticulum is rather longer than the latter, and ends in an oval dilatation.

Locality. Halemanu, Kauai.

Remarks.—This species does not possess any very marked distinctive characters, excepting, perhaps, one which will be described immediately. On the other hand, I cannot identify it with certainty with any of the species already known that have four pairs of spermathecae.

I may take this opportunity of recording a peculiarity in the sperm-ducts of *Perichæta perkinsi*, which is new to the genus, and does not therefore help in the identification of this species; indeed, so few species of *Perichæta* have been examined microscopically, that the absence of the peculiar relations of the sperm-duct to the spermiducal gland, which I am about to describe, in the species

Fig. 1.



Perichæta perkinsi.

Spermiducal gland (*pr.*), vasa deferentia (*v.d.*), and muscular duct (*M.*) of gland of *Perichæta perkinsi* (left-hand figure) and of a normal *Perichæta* (right-hand figure).

already investigated, does not go for much. The two sperm-ducts retain their separateness, and perforate the duct of the spermiducal gland at some little distance from its external opening, but at a point where it is already wrapped up in a moderately thick coating of muscular fibres, not so thick, however, as they will ultimately become. The two sperm-ducts, however, do not at

once open into the lumen of the duct; they become narrower and somewhat triangular in section, losing at the same time their ciliated lining. In cross-sections the two tubes are seen to lie in close contact with each other and with the lumen of the spermiducal-gland duct. Ultimately, just where the gland-duct perforates the body-wall on its way to the exterior, the sperm-ducts open into it.

Perichæta molokaiensis, n. sp.

This is a moderately small species, 81 mm. in length, and consisting of 93 segments.

The *prostomium* is small, and is continued by grooves on to first half of first segment.

The *dorsal pores* commence on x./xi., and are visible upon the clitellum.

The *clitellum* has a few setæ on its last segment, and extends over segments xiv.—xvi.

There are no *genital papillæ*.

The *male pores* are separated by 15 setæ.

The first *septum* separates segments iv./v.; none are specially thickened.

The *intestine* begins in xv.; the *cæca* are in xxvi., and are not large.

The *sperm-sacs* are large, and are in xi., xii.; the sperm-reservoirs (containing the funnels) in x., xi.

The *spermiducal glands* extend from xvii.—xxi., and are much lobed. Their duct is long and curved, but has no terminal sac.

The *spermathecæ* are four pairs in vi.—ix. The pouch is sharply marked off from the long duct. The diverticulum, ending in an oval dilatation, is about as long as the latter.

Hab. Molokai.

Remarks.—As I have only had a single specimen of this species at my disposal, I have been careful to injure it as little as possible. Hence my description is in places somewhat defective. I believe, however, that this description is sufficient to avoid a confusion with allied forms. It is certainly not far from *Perichæta peregrina* of Fletcher¹, chiefly in the large size of its spermiducal glands. Mr. Fletcher does not say how many of the clitellar segments of *P. peregrina* have setæ, a matter which is apparently of some importance in the discrimination of species.

Perichæta hawayana, Rosa.

The length of the largest example of this species is 150 mm.; the number of segments of that individual was 97.

The *colour* is brown, with a pure flesh-tinge in parts.

The *seta-formula* is as follows:—

| I. | V. | XII. | XVI. | XXI. |
|----|----|------|------|------|
| 16 | 26 | 43 | 45 | 50 |

¹ Proc. Linn. Soc. N. S. W. 1886, p. 969.

There are nine setæ on the xvth segment of the body, 4 on one side and 5¹ on the other side of the median ventral line. On the third, fourth, and fifth setigerous segments the setæ are very stout, particularly on either side of the median ventral line. Those of the first two segments are delicate, as are those which follow the fifth. Fourteen setæ lie between the male pores.

The *clitellum* (xiv.-xvi.), as has been already remarked, has setæ upon its last segment.

The *dorsal pores* commence x./xi.

The *male pores* lie in the line of setæ; close to each, but below the line of setæ, are two or three *papillæ* in a straight line with their fellows on each side of the body, but obliquely as regards its transverse axis.

The first *septum* divides segments v. and vi.; this and the next two are thickened; so are the first four following the gizzard, the last of which divides segments xiii./xiv.

The *intestine* begins in xv.; the *cæca*, which lie in segment xxvi., are short.

The last *heart* is in segment xiii.

The *sperm-sacs* lie in xi. and xii.; in x. and xi. are the sperm-reservoirs, containing funnels of sperm-ducts.

The *spermiducal gland* occupies segments xvii.-xxi.; it is flattened and lobulated; the duct is long and curved, narrowing towards the external orifice, which is not provided with a terminal sac.

The *ovaries* occupy the usual position. There are a pair of elongated egg-sacs in both xiii. and xiv.

The *spermathecae* are in vi., vii., viii. The oval pouch communicates with the exterior by a long duct longer than itself. The diverticulum, ending in an oval dilatation, has a corkscrew-like duct. This diverticulum, when straightened, is not far short of the pouch in length.

Hab. Waimea, Molokai, and Mauna Loa, Hawaii.

Remarks.—I have given a description of this species because the individuals examined by myself depart slightly and in a few particulars from the description given of *Perichaeta hawayana* by Dr. Rosa. The most noteworthy difference is apparently the existence of setæ upon the last segment of the clitellum. Dr. Rosa does not assert their absence, but would, I am disposed to think, have mentioned their presence were they existent. On the other hand, his description of the intestinal cæca—"eine gefiederte, durch zwei Lappenreihen vermittelte Gestalt erkennen lassen"—agrees entirely with my observations. Differences also in the number of the setæ in certain segments, and in the number of the thickened intersegmental septa, will appear on a comparison of Dr. Rosa's account with mine.

I have marked this species as one of those indigenous to Hawaii.

¹ 14 or 15 altogether in another specimen, and more still apparently in others.

But I possess specimens from Hong Kong which cannot be distinguished. One of these has four papillæ near the male pore of one side of the body. It therefore approaches *Perichæta bermudensis*, which has a considerable number of such papillæ. These two species are now hardly to be separated.

Perichæta sandvicensis, n. sp.

The largest example of this species measures 100 mm. in length, and has 105 segments.

The *dorsal pores* commence xi./xii., and are visible on the clitellum.

The *seta*-formula is the following:—

| I. | V. | XII. | XVI. |
|----|----|------|------|
| 21 | 33 | 52 | 53 |

The setæ of the first two segments are small; those of the next four are stronger, after which they again diminish. The setæ on either side of the median ventral line are not longer than those elsewhere.

The *clitellum* occupies segments xiv.–xvi., and has no setæ.

The *male pores* are separated by 18 setæ. They were in most of the specimens very prominent.

There are *no genital papillæ*.

The first *septum* divides segments v./vi.; this and the one which follows are very stout, and bound to each other by numerous muscular threads. The septum vii./viii. is not so thick. The next two, as in other *Perichætæ*, are absent. After the gizzard are two strongest septæ; to the first of these the hinder part of the gizzard is attached by at least five muscular straps.

The *alimentary canal* presents no character of any particular interest.

The last *heart* is in segment xiii.

The *sperm-sacs* are in segments xi. and xii. The sperm-reservoirs of segment xi. are much larger than those of segment x.

The *spermiducal glands* are much incised, and occupy about three segments. The duct is long and curved, and is without a terminal sac.

The *spermathecæ* are two pairs in vii. and viii. The pouch has not a very long duct. The diverticulum is not very long; it is bent often in a zigzag fashion, and does not terminate in a suddenly dilated extremity.

Hab. Lanai, 2000 ft.; Mauna Loa, Hawai, Molokai.

Remarks.—The only species with which it would be possible to confuse the present are *Perichæta annulata* and *Perichæta japonica*. In the latter, however, the male pores are described by Horst¹ as lying upon a J-shaped groove, which extends on to segment xvii. In the former, according to the same author, the

¹ "New Species of the Genus *Megascolex*, &c," Notes Leyd. Mus vol. v. p. 182.

"prostate" glands, although trilobed, are limited to the xviiiith segment.

The shape of this gland is frequently used as a specific character in *Perichæta*, and as a rule apparently with some reason. The present species, however, shows that it is necessary to be discreet in the use of the character. In nearly all the examples which I dissected, the gland in question occupies three or four segments and has an ear-like shape, the lower margin curving forwards and upwards like the lobe of the ear. In one specimen, which I do not feel able to distinguish specifically, the gland has a quadrangular form, occupies four segments, and is deeply incised in correspondence therewith.

From Hong Kong I have received specimens of a *Perichæta* which I do not like to separate specifically from the above, although they show certain differences from it amongst themselves. In one specimen, a long and slender worm, the spermathecæ have a long duct, and the spermiducal glands have the ear-like shape characteristic of the species. The male apertures are prominent. Other specimens, though smaller, are rather stouter worms than the one just referred to; the duct of the spermatheca is not very long, and the spermiducal glands are much lobulated and not ear-shaped. Nor is there here a marked difference between the septum immediately preceding the gizzard and those just in front of it: there is this difference in the first mentioned specimen from Hong Kong. In both the cæca are long and slender, occupying two full segments.

APPENDIX.

I take the present opportunity of describing three new species of *Perichæta*, and two new *Acanthodrilids*, which I have recently received.

PERICHÆTA INSULÆ, n. sp.

Of this new species I have a single example—a slender worm measuring 103 mm.

It consists of 95 segments.

The *clitellum* occupies the three usual segments, but is deficient at both ends. The last segment of the *clitellum* has setæ.

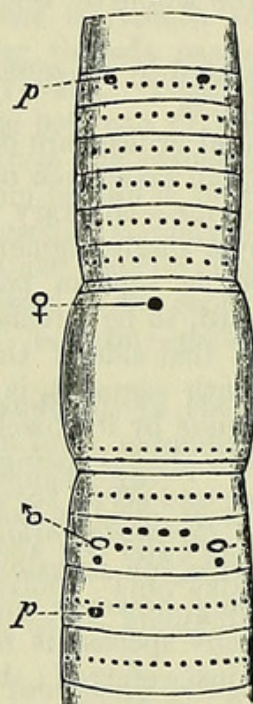
The *male pores* are separated by a moderate distance.

Genital papillæ are present in two regions of the body. On the xviiiith segment are 8 largish papillæ, each surrounded by a series of circular ridges upon the skin. Two of these papillæ form on each side with the male pore of their side a triangle; the remaining four form a line across the segment above the line of the setæ. On segment xix., on the left side of the body, is a single similar papilla. In addition to these papillæ developed in the neighbourhood of the male pores, there are a pair near the anterior margin of the viith segment like those of *Perichæta indica*.

The first *septum* separates segments iv./v. This and the three following are not very much thickened, but they are tied to each

other and to the parietes by a considerable number of ligamentous threads. The three septa which come immediately after the gizzard are stouter than those which follow; but here, again, the increase in thickness is not very marked.

Fig. 2.

*Perichæta insulæ.*

♀, oviducal pore. ♂, male pore.
p, papillæ.

The *pharynx*, as is so usual in *Perichæta*, is beset with numerous racemose glands; these extend back as far as the sixth segment. The *gizzard* is rather bell-shaped, diminishing in transverse diameter anteriorly, but truncated posteriorly, where it has a thickened rim. The intestine begins abruptly in the xvth segment at about the middle of that segment. The *cæca* extend through two segments. The last heart is in segment xiii.

The *sperm-sacs*, compact in form, are in segments xi., xii. as usual. The *spermiducal glands*, also rather compact, commence in xvii. and extend as far back as xx. The duct is stout and S-shaped.

The *spermathecae* are in vi., vii. Each has a diverticulum about half its own length, of an elongated oval form.

Hab. Hong Kong.

PERICHÆTA TRITYPHLA, n. sp.

The *length* of this species (after preservation in Perenyi's fluid) is 63 mm.; that individual consisted of about 75 segments.

The *seta-formula* is as follows:—

| I. | VI. | XII. | XVII. |
|----|-----|------|-------|
| 25 | 38 | 49 | 49 |

I give segment vi. instead of v. since I did not count the setæ with accuracy upon the latter. The setæ towards the ventral side are slightly more crowded than laterally, but there is no very marked difference in size; neither is there any very great variation in size from segment to segment.

The *clitellum* occupies the whole of segments xiv.-xvi.; it has no setæ.

The *male pores* are separated by 12 setæ.

There are no *genital papillæ*.

Between the spermathecal orifices are 30 setæ.

There are no *septa* that can be spoken of as specially thickened.

The *gizzard* seemed to me—contrary to what is the rule with the genus—to only occupy a single segment. At any rate, on the right-hand side of the body a septum passes forwards from the hinder margin of the gizzard, to be attached close to the orifice of the second spermatheca of that side of the body. The intestine, commencing in the fifteenth segment, is very sharply marked off from the preceding œsophagus by its black colour (due of course to contained earth), the œsophagus being yellowish white. The intestinal cæca are peculiar and serve to differentiate the species. It is well known that *Perichæta hilgendorfi*, *P. sieboldi*, and *P. musica* possess as a rule, or occasionally, 6 of these cæca on each side of the body, arising, however, one above the other in the same segment. The present species is not so amply provided as are those to which I have just referred; but it has three cæca on each side, of which the upper is the larger.

The last *heart* is in segment xiii.

The *sperm-sacs* are large and occupy the available space of segments xi., xii.; they also extend into x. The sperm-reservoirs (in x., xi.) are small.

The *spermiducal glands* extend through segments xvii.-xxi. They are much incised and quadrangular in form. The duct communicates with the exterior through a large *bursa copulatrix*.

The globular *spermathecae* are in vii. and viii.; they open, however, between vii./viii. and viii./ix.; their duct is short; there is a long coiled diverticulum rather longer than the pouch, ending in a dilated extremity.

Hab. Barbados.

PERICHÆTA TRINITATIS, n. sp.

This is a stout *Perichæta* measuring 150 mm. in length and consisting of 100 segments.

The *setæ* upon segments vi.-ix. appeared to be larger than those on the segments following. On the seventeenth segment (from the stripped-off cuticle) I counted 45 setæ. There are 20 between the male pores.

The *dorsal pores* appeared to commence on xi./xii.

The *clitellum* occupies segments xiv.-xvi.

The *male pores* are very conspicuous and surrounded by circular wrinkles of the integument.

There are no *genital papillæ*.

The first distinct *septum* separates segment iv. from v. This and the three following—in fact all the septa which lie in front of the gizzard—are strengthened not only by an increased thickness, but by muscular strands which bind septum to septum and to the body-wall. Following the gizzard are four thickened septa, of which the last bounds the thirteenth segment posteriorly; here also are a few muscular threads passing between the septa and from them to the body-walls. These threads are found as far back as the septum lying between xv. and xvi. As is so often the case, these bands arise from one segment and traverse another to be attached to the septum behind it or to the body-wall between. The direction of the muscular strands is outwards. Two particularly strong muscular bands—one on either side and latero-dorsal in position—attach the gizzard to the septum next following.

The *gizzard* is round in form—neither particularly elongated nor bell-shaped.

The *intestine* begins suddenly in the xvth segment; the *cæca* are simple and conical in form, extending through three segments.

The last *heart* is in segment xiii.

The large *sperm-sacs* are as usual in the xith and xiith segments.

The *spermiducal glands* are large and loosish in texture, owing to their extensive lobulation. They extend through segments xvii. to xxi. inclusive. The duct is moderately long and bent into a curved horseshoe.

The *spermathecae* are four pairs lying in segments vi.–ix.; the point itself is oval, with a tendency to be pointed at the tip; the duct is short. The diverticulum is longer than the pouch and moniliform distally.

There are egg-sacs in segments xiii.–xiv.

Hab. Trinidad.

§ The Distribution of *Perichæta*.

Except for accidental transference to this country and to other temperate climates, the genus *Perichæta* is purely tropical in its range, and is practically confined to the Oriental region and to the Neotropical; from the former it reaches the Australian part of the Eastern Archipelago and the continent of Australia itself. Africa has no true *Perichæta*, except *P. capensis*, which is also Oriental. In all parts of the Oriental region *Perichæta* is a dominant form, and always constitutes a large proportion of the gatherings of worms from such localities. It is also exceedingly abundant in some of the West Indian Islands, such as Trinidad, Bahamas, Grenada, Jamaica, Bermudas, and Barbados. It occurs more rarely upon the South American Continent. The following species are already known to occur in both the Old and the New Worlds:—*P. indica*, *P. sumatrana*, *P. houlleti*, *P. dyeri*, and *P. posthuma*. Peculiar to the New World, so far as published records go, are *P. sancti jacobii*, *P. ringeana*, *P. elongata*, *P. pallida*, *P. bermudensis*, *P. barbadensis*,

and *P. hesperidum*. I am able now to alter this list, by removing *P. bermudensis*, which I have received from Hong Kong¹, and also adding to the first list *P. violacea* and *P. sinensis*, which I have received from Trinidad and Grenada, and to the second the two new species described in this paper. The first list will then contain eight species, and the second eight. Seeing the large number of species which have been in all probability introduced into the West from the East, it is in my opinion by no means to be taken for granted that the genus *Perichæta* is indigenous in the West Indies and South America. I am disposed to look upon it as a distinctly Oriental genus.

ACANTHODRILUS MACQUARIENSIS, n. sp.

Of several specimens of this apparently new species only two were sexually mature.

It is a small species, measuring about an inch in length, and consisting of some 100 segments.

The *prostomium* is incomplete, not dividing the peristomial segment.

The *setæ* are distant from each other, but not equally so. The two ventral of each side are more closely related than the two dorsal. The actual distances are much as indicated in the following scheme :

$$S_1 \quad 1 \quad S_2 \quad 1 \quad S_3 \quad 1\frac{3}{4} \quad S_4$$

for the anterior segments of the body. Behind the clitellum the distance separating the two ventral *setæ* is about half that which separates the two dorsal. Towards the xviiiith segment and on both sides of it the two *setæ* of each ventral couple get closer together, and on the xviiiith segment these *setæ* are closer together than anywhere else. A similar convergence of the *setæ* towards the segment bearing the male pores has been noticed in various species of the genus *Microscolex*. On the xviiith and xixth segments the ventral *setæ* are altogether absent, being replaced by the penial *setæ*.

The *nephridiopores* open in front of seta 3.

One of the two sexually mature individuals had no *papillæ*; upon the other there were a pair of these structures corresponding in position to the ventral *setæ*. One of them was evidently abnormally situated, for they were upon different segments, the right-hand one upon the tenth, the left-hand upon the eleventh segment. The clitellum occupies segments xiii.-xvi., commencing at about the middle of the former segment. It is continuous across the ventral surface except perhaps for the last of the segments over which it extends.

The *oviducal pores* are paired, and upon segment xiv. each lies in front of seta 1.

The *male pores* (on xviiiith) are to the outside of seta 2. The *spermiducal gland-pores* correspond in position to the outer seta

¹ Typical specimens, not doubtful *P. hawayana*; see pp. 202-203.

of the ventral couple. The spermathecal pores have a position corresponding to that of the glands. As to internal anatomy, I could find no well-developed gizzard; this, if present, is certainly rudimentary. The intestine appears to begin in the xvth segment.

The last heart is in segment xii.

The sperm-sacs, very racemose in character, are in segments xi., xii.

The spermathecae are in segments viii., ix. Each is an oval pouch with two diverticula of the same form, but smaller, one on each side.

The spermiducal glands are not very long and but slightly coiled.

There were two fully developed penial setae in the bundle which I extracted for examination, and four immature ones. The fully mature setae are ornamented upon the distal one-fourth by sparsely scattered triangular, often rather blunt and not very large tubercles. These were also apparent upon all the immature setae.

Hab. Macquarie I., S. of New Zealand¹.

Remarks.—It will be obvious from the above description that the present species cannot be possibly confounded with any New Zealand species, with which it would be natural to compare it in the first place. There are in New Zealand no members of the genus *Acanthodrilus* (s.s.) which present the following combination of characters:—Setae distant, gizzard rudimentary, clitellum short (xiii.–xvi.), nephridia not alternating, spermathecae with two diverticula. *Acanthodrilus* with these characters are restricted in range to Patagonia, S. Georgia, and the Falkland Islands. The Patagonian group thus characterized contains four species, viz., *A. bovei*, Rosa, *A. georgianus*, Mich., *A. falclandicus*, F. E. B., and *A. aquarum dulcium*, F. E. B., which furthermore agree in being all of small size. The only difference which distinguishes *A. macquariensis* from these is the form of the penial setae and the position of the genital papillae. It is a most interesting fact, and one which has an obvious bearing upon the theory of a former northward extension of the Antarctic continent, that from Macquarie Isl., 600 or 700 miles south of New Zealand, and therefore so much nearer the existing southern continent, a decidedly Patagonian and South Georgian form of *Acanthodrilus* should have been met with.

BENHAMIA INDICA, n. sp. (Fig. 3, p. 210.)

I have received from Mr. Wroughton, through the kind suggestion of Mr. E. H. Aitken, a number of worms which may belong to a new genus. They are stoutish worms, the largest reaching a length of three or four inches.

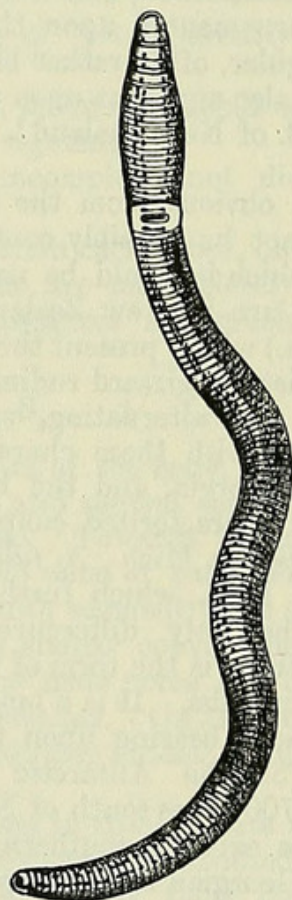
The prostomium is large, but does not encroach upon the buccal segment.

The setae of the ventral couple are fairly closely approximated to each other, those of the dorsal couple are distant. The space

¹ I am indebted to Prof. T. J. Parker, F.R.S., for the specimens.

separating the two setæ of the dorsal couple is about two and a half times that separating the two setæ of the ventral couple. The setæ are all grouped on the ventral surface of the body, not extending far laterally. On the xviith, xviiiith, and xixth segments the ventral setæ appear to drop out in the sexually mature worms. In an immature specimen the xviiiith segment had a pair of ventral setæ in the usual position, but small in size; on the xviith and xixth segments were a pair of very small and quite immature setæ. I did not detect any of these on the opposite side of the body.

Fig. 3.

*Benhamia indica.* Nat. size.

Dorsal pores were visible at the posterior end of the body, where the worm was less contracted.

There are a series of *genital papillæ* in the region of the spermathecæ. A pair of large papillæ lie upon segment ix.; through it protrude the setæ of the segment, which differ from those of other segments of the body in being modified in structure. They are like those of many Geoscoleids in being rather longer than the ordinary setæ, less curved in form, and in having the distal extremity ornamented with elegantly disposed semicircular ridges. Between this segment and the next, and again on the

boundary segments x./xi., is a single median papilla, upon the middle of each of which is a row, concave forwards, of large pores, which appear to correspond to glands like the capsulogenous glands of *Perichætæ*. Such glands have already been met with in Acanthodrilids (in *Acanthodrilus rosæ*), another fact among many which show the intimate relationship between the two families.

The *clitellum* occupies segments xiii.-xvi.

The *nephridia* are of the diffuse type.

The first *septum* separates segments iv./v. The next three are moderately thickened, and after the last of these come four, which, though not quite so thick, are to some extent strengthened. All these septa, beginning with the first mentioned, are attached to each other and to the parietes by numerous tendon-like muscular fasciculi. These latter extend for a segment or two farther back than that which is bounded by the last thickened septum. The last heart lies in the xiith segment. The *dorsal blood-vessel* is single. Two stout *gizzards* immediately following each other lie in segments v. and vi. In segments xi. and xii. are a pair of *calciferous glands*. The *intestine* seems to begin in segment xvi. and has a well-developed *typhlosole*, which, however, is not apparent for the first ten segments or so, though it may be possibly present earlier as a rudiment.

The *sperm-sacs* are a single pair in xii. This, however, may be a question of immaturity. On the other hand, although I detected two pairs of funnels belonging to the sperm-ducts, I could only see the testes of segment xi., and the funnels of segment x. were distinctly smaller than the posterior pair.

The *spermiducal glands* are very long and coiled. There appear to be no penial setæ associated with them.

The *spermathecae* are as usual in viii. and ix. The diverticula near to the external aperture are inconspicuous, but apparently tri- or quadrifid.

Hab. Thana, Bombay (1500 ft. and 2500 ft. altitude).

Remarks.—Though I do not propose, for the present at least, to create a new genus for this species, it differs in several points from any known member of the genus *Benhamia*. It comes nearest perhaps to *Benhamia inermis*, with which it agrees in absence of penial setæ and in the position of calciferous glands



Beddard, Frank E. 1896. "On some earthworms from the Sandwich Islands collected by Mr. R. L. Perkins; with an appendix on some new species of Pericheta etc." *Proceedings of the Zoological Society of London* 1896, 194–211.

View This Item Online: <https://www.biodiversitylibrary.org/item/97658>

Permalink: <https://www.biodiversitylibrary.org/partpdf/69844>

Holding Institution

Smithsonian Libraries and Archives

Sponsored by

Biodiversity Heritage Library

Copyright & Reuse

Copyright Status: Public domain. The BHL considers that this work is no longer under copyright protection.

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.