

Some Annelids of the Thames Valley.

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(With Text-figures.)

[Read 21st December, 1911.]

I AM anxious at the outset to guard against the idea that the Thames Valley, any more than other parts of England, has been exhaustively worked. We are familiar with a goodly number of worms, particularly those belonging to the two families known as the Lumbricidæ and the Tubificidæ. We know something also of the Naïdidæ, but of the large and important family of the Enchytræidæ we are still in almost absolute ignorance, in spite of the fact that some 30 species of the genus *Fridericia* alone are already recorded as British.

I have chosen the Valley of the Thames, rather than the river itself, as my field, because I am thereby enabled to draw attention to the excellent work done by those able pioneers who have prepared the way for my own more recent researches. The greasy, fœtid ooze of our great river does not present a very attractive hunting-ground for the naturalist: yet the treasures it contains will amply reward the worker who has the courage to ignore its evil odours, or to risk the covering of his boots with a most disagreeable slime.

Although the Thames Valley has as yet been but partially worked, there is perhaps no section of the country which has received so much attention in relation to the Oligochaets. It is a pleasure, therefore, in the first place to give

A BRIEF HISTORICAL SURVEY.

I do not pretend to have looked up every detail, but have endeavoured to do justice to all who have done anything to further our knowledge of the subject since the days when the study of terrestrial and freshwater annelids became a scientific pursuit. The honour of being first in the field in this connexion undoubtedly belongs to Sir E. Ray Lankester. Not less than forty years ago (1) he recorded the discovery of *Psammoreyetes barbatus*, Vejdovsky, in brackish water at Barking. The worm still exists in the same locality, and will be considered again at a later point. In June 1898 Dr. Benham wrote (2) that, so far as he was aware, the species had not been recorded again till he found it in the mud amongst the roots of reeds in the Cherwell.

In the eighties at least three workers were adding to our knowledge of the subject. Oerley (3), a most careful and advanced Hungarian student, was working in England at this time, and among other discoveries found *Octolasion platyurum*, Fitz., at Cambridge, and *O. rubidum*, Oerley, at Woolwich. These records have not since been confirmed, but Oerley has so

thoroughly impressed me with his accuracy and conscientiousness that I am still hoping to rediscover the species named. While he was working with the larger earthworms, Bourne (4) and Bousfield (5) were rendering splendid service by their researches among the Naididæ. It is enough at this point to refer to the Journal of this Society (Zoology, vols. xix.–xx.) for evidence of the careful and valuable work of Dr. Bousfield. The next important contribution to our subject came from the pen of Dr. Benham (2), and it may perhaps be said that he did for the Tubificidæ what Bousfield and Bourne had done for the Naididæ. His "Notes on some Aquatic Oligochæta" for the first time opened up the great and important field of research presented by the large and interesting group of worms of which *Tubificæ* is the type. While some of his material came from the mouth of the Thames, being supplied by Mr. W. H. Shrubsole of Sheerness, other species were found in the neighbourhood of Oxford, which forms the limit of our field inland.

Of Beddard (6) it must suffice to say that his splendid 'Monograph of the Order Oligochæta' was an epoch-making book, and gave so great a stimulus to research that if it were brought up to date it would have to record many hundreds of new species. He is undoubtedly the highest authority this country has ever produced on the subject of Oligochæts.

My own researches into this order began in 1890. During that year I found some annelids in London which had not previously been recorded, and by the aid of some indefatigable collectors was able to do a good deal of work among the Lumbricidæ and Enchytræidæ (7). I must specially mention Mr. George Day, F.R.M.S., and Mr. William Allen of Plaistow. During the past twenty years I have worked at Oxford, Marlow, Kew, the suburbs of London, and Sheerness, and have had the kind assistance of Mr. Chas. S. Todd, of Tottenham, and others, to whom my thanks are due for help. Aided by a Government Grant for these researches I have, during the past year (1911), paid a special visit to the Thames Valley, and am able as a result to add a number of species to our former lists, some of which are new to science. We may now pass to a systematic study of the species which are found in the district under review, and for convenience of reference it may be desirable to follow the order adopted by Beddard, and still more recently by Michaelsen (8).

SYSTEMATIC SURVEY.

Family ÆOLOMATIDÆ.

Michaelsen places in this family one certain and one doubtful genus. To the genus *Æolosoma* he allots seven species, and no new species has been added to the six which are on record for Great Britain. These annelids are

all of small size, and are found in fresh-water in almost every part of the globe. There are usually no internal septa to mark the segments, which can, however, easily be numbered by aid of the setæ. These are in four bundles of one to six, chiefly capilliform. The girdle appears in the adult on the under surface of segments 5-7, and the spermatheca, which number 1-3 pairs in segments 3-5, are simple, being destitute of diverticula. The prostomium is large in proportion to the size of the worm, and is ciliated on the ventral surface. The worm can be propagated asexually, by a process of division without the formation of a budding zone such as one sees continually in the Naididæ.

1. *ÆOLOSONA HEADLEYI*, *Beddard*. (Monograph, p. 186.)

Setæ entirely capilliform. Integumental globules bright green, occasionally verging towards blue. Found in a tank at the Zoological Gardens, London.

2. *ÆOLOSONA HEMPRICHII*, *Ehrenberg*. (Symb. Phys. 1831.) For synonymy see *Beddard*, 'Monograph,' p. 183, and 'Das Tierreich,' x. p. 14; *Lankester* in *Trans. Linn. Soc.* vol. xxvi. 1867, p. 641.

Family NAIDIDÆ.

This is a very large family, to which many additions have been made since the publication of *Beddard's* 'Monograph' and of 'Das Tierreich.' Unfortunately the British species have received little attention since the days of *Bousfield* and *Bourne*, but I have been able during the past year to add somewhat to our knowledge of the indigenous species. The setæ are sometimes wanting in the anterior segments either entirely or from the dorsum, and are of various kinds. Some of the species have rudimentary eyes, and asexual as well as sexual reproduction occurs. The sexual organs are situated as far forward as the fifth segment. Occasionally the nephridia fail, but usually they are large for the size of the worm. These annelids form beautiful objects for the microscope. Following *Michaelsen* our first genus is *Paranais*.

1. *PARANAIS NAIDINA*, *Bretscher*. (*Revue Suisse de Zool.* 1896, vol. ii. p. 508; 1899, vol. vi. p. 393; *Das Tierreich*, x. p. 18.)

Unknown in England till August last, when I found it in the Thames at *Kew*. Eyes may be present or absent. The first segment is very narrow, and the dorsal setæ commence on the second. There are five or six setæ in each set from segments 2 to 5. The brain is deeply notched behind. The worm is about 8 mm. in length, and in August was undergoing asexual reproduction, some 20 segments going to the perfect worm. Found by *Bretscher* (10) in Switzerland (*Zürich*).

2. *PARANAIS LITORALIS* (*O. F. Müll.*) *Czern.* (Zool. Dan. 1788 ; syn. *Uncinaiis*, Beddard, Monograph, p. 295.)

Has a blunt prostomium. Setæ vary in length and thickness. The subject of some interesting notes by Benham and Bourne. The worm was received by the former, along with other aquatic annelids, from Sheerness : Benham (2), p. 187.

3. *CHÆTOGASTER DIASTROPHUS*, *Gruith.*, Benham (2), p. 212 ; near Oxford.

4. *CHÆTOGASTER DIAPHANUS*, *Gruith.* (The synonymy is given by Beddard and Michaelsen.)

Southern (9) marks its occurrence in England and Scotland with a query, but I have recently been able to demonstrate its indigenous character beyond doubt, since it occurs plentifully in the neighbourhood of my home.

5. *CHÆTOGASTER CRYSTALLINUS*, *Vejd.* (*Cf.* Lankester, Trans. Linn. Soc. xxvi. (1869) p. 641.)

For the various species of *Nais* and *Dero* it suffices to refer to Bousfield and Bourne. I have, however, to add one species to the list, and as I can find nothing exactly corresponding with it in the various authorities, it must for the present be held to be new to science.

6. *DERO OLEARIA*, sp. n.

Forked setæ beginning in 2nd segment ventrally ; 4-5 per bundle, slender, as long as half the diameter of the body ; the upper tooth larger than the lower, and the node in the middle, or approaching the first (inner) third. The dorsal setæ begin in segment 6 ; each bundle consisting of one capilliform and one forked seta. There are three forked setæ of equal length in the ventral bundles posteriorly, but the setæ in the anterior ventral bundles vary slightly and progressively in length, the dorsad being longer than the ventrad. The forked setæ of the dorsal bundles are more slender and straight than those found in the ventral sets, and the teeth are small. Length of entire worm 8-10 mm.

The chloragogen cells, which are black, begin in segment 6 along with the capilliform setæ. At rest the prostomium equals the individual setigerous segments in length, and is 3-4 times as long as the peristomium, or first segment, which carries no setæ and is exceedingly small. No taste-hairs or papillæ are present. The segments number 40 ; there was no sprouting zone or bud, nor was a girdle developed. Eyes are wanting.

The living worm is exceedingly active, swimming freely in water, but breaking up almost as soon as it is placed on the microscopic slip, even if not subjected to pressure. This makes it difficult to work out the details. I believe it has the gills which distinguish *Dero* from *Nais* ; and a special character is

the large number of clear oil globules, which after 15 hours in glycerine remained unaffected. Hence the specific name. The first six segments remained intact when all the rest of the worm broke up at the septa into five and thirty pieces. Septa are wanting in this cephalized portion.

One specimen collected at Kew in August, and kept with other annelids till December 8th, 1911, when it was examined. It closely resembles *D. stuhlmanni*, Stieren, reported from the Victoria Nyanza; but the African worm is only 2 mm. in length and has but 18 segments (Michaelsen, 'Das Tierreich,' x. p. 29).

7. *STYLARIA LACUSTRIS* (Linn.) Johnst. is one of our commonest worms.

8. *PRISTINA EQUISETA*, Bourne. Botanical Gardens, Regent's Park, London.

Family LUMBRICULIDÆ.

Aquatic worms of much larger size than the *Æolosomatidæ* and *Naïdidæ*. The type (*Lumbriculus variegatus*, O. F. Müll.) often attains a length of 80 mm. and may have 200 or more segments. The sigmoid setæ are in pairs, and the free extremity is sometimes forked. With the exception of *Stylodrilus* (and *Bichæta*?) there are, in this family, blind contractile appendages to the blood-vessels. These are well seen in *Lumbriculus variegatus*, and give to the animal a very beautiful appearance. There are no penial setæ. Only two of the genera are at present known in the Thames Valley.

1. *LUMBRICULUS VARIEGATUS*, O. F. Müll., Verm. terr. 1774.

Body usually dark green in front. Posteriorly there are 6-8 caecal appendages to the dorsal vessel in each segment. Very rarely found in the adult condition. The worm often divides into two or more portions when handled or under examination. One of the commonest species of freshwater annelids in England, it occurs in almost every pond, ditch, and stream in the district among water-weeds. Yet I sought it in vain at Sutton Broad in August.

(*Rhynchelmis*. Beddard says, 'Monograph,' pp. 215-16:—"I have seen a specimen from some part of England, but cannot give any details. There is every probability that it is a native of the country. I believe this specimen to be in the Oxford Museum." So far as I can recall, Benham, who worked at Oxford, makes no allusion thereto, nor have I been able on the occasion of my visits to obtain specimens or information.)

The genus *Stylodrilus* consists of worms which are marked by the possession of a pair of penes on the tenth segment which are not retractile but remain as external appendages, perforated by the sperm-ducts. The setæ are bifid,

but in some cases the forks can be seen only with fairly high powers of the microscope. A pair of spermathecae is found in segment 9, and the girdle usually extends over 9, 10, and 11.

2. *STYLODRILUS VEJDOVSKYI*, Benham. (Quart. Journ. Micr. Sc. vol. xxxiii. 1891, p. 209.)

Twenty-five mm., more or less, in length, with penes a little more than half the diameter of the body. First discovered in the River Cherwell, it has since been found by me in many parts of England, but more frequently in the North and Midlands than in the South. It is interesting to see the locality "Goring-on-Thames" in 'Das Tierreich,' x. p. 63. For details we must refer to the original paper by Benham as above.

Family TUBIFICIDÆ.

This large and interesting, but perplexing family has been the subject of very special and painstaking investigation during the past year: and though I have not yet by any means worked out all the problems connected therewith, I have at least reduced some of the chaos to order. I had the honour, on December 20th, 1911, of presenting to the Royal Microscopical Society some of the results of this enquiry, and may be permitted to refer those who are interested in our fresh-water Annelids to that Memoir for such details as may not be given herewith (11). An old record informs us that specimens of *Saenuris tubifex*, or some other "Small red Water-worms (are) found plentifully in the mud of the river Thames" (Johnston, 'Catalogue of British Worms,' p. 64). Such worms abound everywhere in the Thames, and it is impossible as yet to say to how many species or genera they belong. Perhaps the first reliable record is the following:—

1. *PSAMMORYCTES BARBATUS* (Grube) Vejd. (= *Tubifex umbellifer*, Lankester, Quart. Journ. Micr. Sc. xi. 1871, p. 181; Ann. & Mag. N. Hist. ser. IV. vii. 1871, p. 92.)

Found at Barking, then, as now, in brackish water. See Benham (2) p. 208, where will be found a useful note, especially in relation to the setæ.

As I do not follow Michaelsen in placing *Heterochæta* and other genera under *Psammoryctes*, this is the only species of the genus to be recorded for the Thames Valley at present. The species, however, is not limited to brackish water, as Benham found it in our district among the roots of reeds in the Cherwell, and I have taken it at Stratford-on-Avon and elsewhere.

2. *HETEROCHÆTA COSTATA*, Clap.

The anatomy and histology of this species (Benham (2), p. 188 *seq.*) form what one may call the first classical study of British Tubificidæ. Specimens

were received by Dr. Benham from Mr. W. H. Shrubsole, of Sheerness, in the spring of 1891. Since then I have repeatedly studied it from different localities between the Nore and the Tower Bridge. I take this opportunity of expressing my great indebtedness to Mr. Chas. S. Todd, of Tottenham, for valuable consignments from many localities, containing a large proportion of the species recorded in this connection.

3. HEMITUBIFEX BENEDENI (*Udek*). (Recorded by Benham with the foregoing as *H. ater*.)

Found in dark, evil-smelling, decaying organic detritus at Sheerness, and thence to the City. Received from Mr. Topps-King, of Chatham, quite recently.

4. SPIROSPERMA FEROX, *Eisen*.

Benham says (2, p. 207): "I have found specimens in the Thames and in the Cherwell."

5. CLITELLIO ARENARIUS (*O. F. Müll.*) *Sav.*

Benham (2, p. 187), from Sheerness.

6. BRANCHIURA SOWERBYI, *Beddard*.

Regent's Park and Kew Gardens: still abundant, with other interesting aquatic annelids, some of which will be named below. For a recent study of this worm reference may be made to the paper of Dr. J. Stephenson, presented to the Royal Society of Edinburgh, December 4, 1911.

We come now to more recent studies, which not only confirm the foregoing records, but greatly extend our knowledge of the Thames Valley Tubificidæ.

7. MONOPYLEPHORUS PARVUS, *Ditlerson* (1904: *Zeit. wissen. Zool.* Bd. 77, pp. 426-8, figs. 25 & 26).

As there can be no doubt about the identity, I transcribe my own notes. "Thames at Kew. Lily pond in Kew Gardens: collected August 26, 1911. Tower Bridge: collected by Mr. C. Todd, Sept. and Dec., 1911. A tiny worm 6-10 mm. in length; very slender: segments 65. Straw-coloured or yellow-brown. Head somewhat pointed when in motion, front segments with narrower and wider annulus. Chloragogen cells begin in segment 5. Setæ usually three in front, four in a few instances, declining to two and one posteriorly. Nephridia with small anteseptal without covering cells; post-septal very large. Dorsal vessel with heart-like enlargements, ranging in some instances from the fifth to the ninth segment. Brain with a lobe at each of the posterior corners and strong anterior processes. Sperm-funnel about twice as long as broad; ducts with peritoneal cells. Two sets of three setæ only on segment 11, with an unpaired male pore between. This refers it to *Monopylephorus*. The setæ here do not differ from those of the other

segments. No penial setæ present; no penis present." A further note is added, "Posterior setæ with upper tooth smaller than the lower: the node at the outer third." I have material still under observation in the hope of finding specimens in the adult condition. In my judgment *Vermiculus* (Goodrich) and *Bothrioneuron* (Stolč = *Bothrioneurum* as corrected by Michaelson) are synonyms of *Monopylephorus*.

The genus *Limnodrilus* has, perhaps more than any other, grown under my investigations. I have not only to record the occurrence of the species which have long been known to science, but venture to submit some new descriptions.

8. *LIMNODRILUS HOFFMEISTERI*, Clap.

The most widely distributed species in the genus. Found almost everywhere in the Thames Valley where mud can be obtained perennially.

[Since I began the preparation of this paper I have had further opportunities of studying this ubiquitous species. I find that the Thames specimens taken at the Tower Bridge and elsewhere show one or two strongly marked varieties as well as what might be called the typical form. I am now engaged in studying the earlier authorities with a view to determining which is the type and which the variety. Meanwhile, to avoid confusion, and to aid in the clearing up of difficulties, I have defined one variety in my account of the British Tubificidæ, and named it *L. hoffmeisteri*, var. *tenellulus*.]

9. *LIMNODRILUS UDEKEMIANUS*, Clap.

Almost as ubiquitous as the last (Mém. de la Soc. de Phys. de Genève, xvi (1862) p. 243).

10. *LIMNODRILUS CLAPAREDIANUS*, Ratzel, Zeit. wiss. Zool. 1868, p. 590.

Seems not to have been found till the present year. Taken at Kew, August 1911. I think it may have been confused at times with one of the other species of *Limnodrilus*.

In view of the conflicting statements of the authorities respecting the length of the penis-sheath in the above three species I am subjecting them to careful measurement. Differences certainly appear to occur; but when we have eliminated the errors which are due to inaccurate observation and confusion of species, these differences will either disappear or be reducible to a trustworthy term.

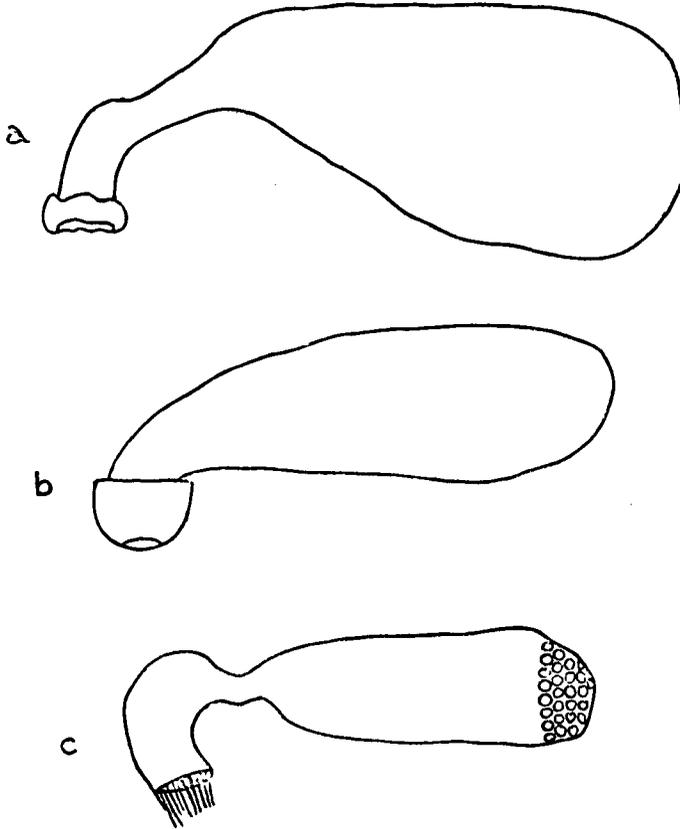
11. *LIMNODRILUS LONGUS*, Bretscher. (Revue Suisse de Zool. vol. ix. (1909) pp. 204-5, figs. 2 & 3.)

The original description is very brief: "Intestine begins in segment 5. Setæ in front bundles 5. Penis-sheath straight or slightly bent, over twenty times longer than broad; reaching through segments 10-12." The note which follows adds nothing to these facts. Southern (9, p. 136) says that "in the Irish specimens the length of the penis-sheath was 21 times the breadth.

Bretscher gives 20 to 1 as the proportion." (This is not exactly true, for Bretscher says "Penisscheide . . . über 20-mal länger als breit"). "The sheath has a broad and shallow funnel-like expansion at the distal end. The anterior nephridia are enveloped in bladder-like cells. The length is 20-25 mm., and there are 4-7 setæ in the anterior bundles."

My own notes are as follows:—" *L. longus*, Bret. In mud from Tottenham: collected by Mr. C. Todd, September 1911. Length 1 inch (=20-25 mm.).

FIG. 1.



Spermatheca of (a) *Limnodrilus longus*, (b) *L. galeritus*, and (c) *L. awantiacus*.

Segments about 90. Head small. Setæ 4-6, 7 in the front segments, the teeth about equal, slender, not coarse like those of *L. udekemianus* and *L. papillosus*; dwindling behind to 3 and 2, with teeth rather wider apart. Chloragogen cells (= intestine) beginning in segment 5. Penis-sheath very long; duct the longest I have yet observed, with large pyriform prostate and atrium. Spermathecae somewhat pear-shaped, narrowing gradually (fig. 1 a) into a short duct. Brain somewhat concave in front with convex sides. Not deeply lobed."

The next four species, new to science, are based on specimens collected by myself or Mr. Todd in and around London in August and September of the present year (1911). It may be thought by some that the absence of a penis-sheath would justify the creation of a new genus, but I do not myself regard such action as necessary, especially as that organ may yet be discovered*. I have at present two species which are not known to possess that organ. The first is—

12. *LIMNODRILUS PAPILLOSUS*, sp. n.

First collected at Kew, August 26th, 1911; since obtained from the Thames near London, and various localities in Sussex, Nottinghamshire, and Derbyshire. The specimens from Sussex differ from the type, but being out of our present district are unnoticed. The Kew notes are as follows:—“Length from 1–2 inches, nearly 1 mm. in diameter in front, with 180 segments. Setæ, 5–7 in front, 3–4 in middle and 2 in posterior segments. Brownish red, with fleshy head and yellowish tail, gradually tapering from the thickest part. Head short, rounded. Large hearts in 8–9. Spermathecæ present, but no penis-sheath. Chloragogen cells begin in 5 or 6, large, dark, circular, when set free.” The Kew specimens are the largest I have seen, and differ somewhat from the others in colour, and some minor details. I attribute this to the fact that the Kew specimens have been introduced, and life is higher: the specimens found in Derbyshire being located in stiff loamy soil, and showing a tough, papillose integument of a yellowish hue, often approaching a dirty orange. Again, my notes respecting a typical specimen found in the Midlands are as follows:—“Length 25–30 mm., 90–120 segments. Setæ usually five in front bundles, upper tooth much larger than lower. Pharynx in 2–3; ventral setæ wanting on segment 11. Spermathecæ in 10, a simple sac; no spermatophores seen; striate, not cellular or glandular. Nephridia large; two pairs in front of girdle in 6/7, 7/8, then in 13 and the following. The vascular system in front segments not complex.”

Thus it will be seen that this species differs in many ways from the earlier forms. The absence of penis-sheath, the presence all over the body of papillæ, the shape of the nephridia, and the vascular system all differentiate it from *L. udekemianus*, which it resembles chiefly in the shape and size of the setæ.

13. *LIMNODRILUS GALERITUS*, sp. n.

Chloragogen cells begin in fifth segment. Setæ 4–5 in segments 2–7, and usually three in middle of body, with upper tooth rather larger than lower, in anterior bundles, and teeth equal behind. Efferent duct very long. Spermathecæ without a distinct duct, but with a cap at the external opening

* Pointner (12) has created the genus *Isochaeta* for these species.—H. F., May 25, 1912.

(fig. 1 *b*). Penis-sheath long, intermediate between *L. hoffmeisteri* and *L. longus*; nearly straight, slender, with trumpet-shaped extremity. Setæ one-sixth the length of the penis-sheath.

From the River Lea, Tottenham. Collected by Mr. C. Todd, September 1911, in company with the next.

14. *LIMNODRILUS TRISSETOSUS*, sp. n.

A small, tender worm, of 40 segments or more. Length about 10 mm. Front segments biannulate. Setæ three throughout. This is a very unusual arrangement in this genus, seeing that the rule is for the number to decrease behind the girdle. No ventral setæ near the male pores, dorsal setæ present on girdle-segments. Lower tooth somewhat larger than the upper. Pharynx reaches to end of segment 3; chloragogen cells begin in 5, and from the girdle backwards orange and black cells are intermixed, as in *L. aurantiacus*, Fr. Nephridia very large in middle segments. Brain slightly concave behind. Spermathecae pear-shaped, without distinct duct. No spermatophores at present seen. No penis-sheath, but a widening of the duct near the male aperture. Nerve ganglia in front segments with extensions as in *L. nervosus*, Friend.

River Lea, Tottenham, September 1911.

15. *LIMNODRILUS AURANTIACUS*, Friend. ('The Naturalist,' 1911, p. 414.)

Length 6-8 mm. and upwards; 60 segments; brilliant orange-coloured cells in segments 8-20 or thereabouts. Setæ usually five in segments 2-8, and three behind; varying in size. Penis-sheath slightly bent, about thirteen times longer than broad. Brain roundish with slight concavity behind. Pharynx reaches to posterior end of segment 4. Spermathecae (fig. 1 *c*) with narrow neck nearly midway between ampulla and duct. Nephridia of tail with very tiny anteseptal.

Kew Gardens, August 28, 1911. Since found in many other localities around London and in the country.

The genus *Ilyodrilus* as defined by Eisen and Stolč needs revision in the light of my recent discoveries around London and elsewhere. Hitherto, no one has been able definitely to prove the presence of this genus in England, although Benham long ago suggested that Lankester probably had some species of *Ilyodrilus* under examination when he referred to the membrane found stretched across the teeth of some of the setæ. This suspicion is abundantly confirmed by my discovery of species of *Ilyodrilus* in the Thames, at points not far removed from, if not identical with, those from which Lankester's specimens were drawn. In my study of the British Tubificidae [Journ. R. Micr. Soc., 19th June, 1912, p. 268] I have named five species

of *Ilyodrilus*, all new to Britain, and two new to science. Of these, three species are at present known to occur in the Thames Valley, and there is every reason to believe that the number will shortly be considerably increased.

[*Note added May 25th, 1912, in place of further descriptions.*

The recent researches of Bretscher, Pignet, Ditlevsen, Pointner, and others have resulted in so great an extension of our knowledge of the Tubificidæ, and at the same time have revealed so confused a condition, that it is deemed advisable to withhold the descriptions of these species of *Ilyodrilus* and *Tubifex* till greater certainty prevails respecting their definition.

The Enchytræidæ and Lumbricidæ also remain to be described.]

BIBLIOGRAPHY.

- (1) LANKESTER, E. RAY.—Trans. Linn. Soc. vol. xxvi. 1867, p. 461; Quart. Journ. Micr. Sc. vol. xi. 1871, p. 181; Ann. & Mag. N. Hist. ser. IV. vol. vii. 1871, p. 92.
- (2) BENHAM, W. B.—Aquatic Oligochæta. Quart. Journ. Micr. Sc. vol. xxxiii. 1891, pp. 187 *seq.*
- (3) OERLEY, L. A.—A palæarktikus övben élő' terrikolákknak revisiója és elterjedése. Budapest, 1885.
- (4) BOURNE, A. G.—Notes on the Naidiform Oligochæta. Quart. Journ. Micr. Sc. vol. xxxii. 1891, pp. 335–356.
- (5) BOUSFIELD, E. C.—Journ. Linn. Soc., Zool. vol. xix. 1886, pp. 264–268; vol. xx. pp. 91–106; cf. Report Brit. Association, 1885.
- (6) BEDDARD, F. E.—A Monograph of the Order Oligochæta, 1895.
- (7) FRIEND, Rev. HILDERIC.—Journ. Linn. Soc., Zool. vol. xxiv. 1892, p. 292 *seq.*, and numerous articles in 'The Naturalist,' 'Zoologist,' 'Irish Naturalist,' 'Gardener's Chronicle,' 'Kew Bulletin,' and elsewhere.
- (8) MICHAELSEN, W.—Das Tierreich, vol. x. Oligochæta, 1900.
- (9) SOUTHERN, R.—Contributions towards a Monograph of the British and Irish Oligochæta. Proc. Roy. Irish Acad. vol. xxvii. 1909, p. 119 *seq.*
- (10) BRETSCHER, K.—Revue Suisse de Zoologie, 1896 and following years.
- (11) FRIEND, Rev. H.—Journ. Roy. Micr. Soc., June 1912, pp. 265–293.
- (12) POINTNER, H.—Zeit. wissen. Zool., Bd. 98, pp. 626 *seq.*