

# Danish freeliving Nematodes.

By

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The present paper is a contribution to the knowledge of the freeliving Nematodes of Denmark, a part of our fauna to which almost no attention has been paid till now. It treats 59 species, distributed on 21 genera. The great majority are land- and fresh-water species. I have included a few marine littoral forms which I met with accidentally, e. g. *Rhabditis marina* which Bastian described in 1866 from Falmouth. 8 species have not been described before.

Though the work is mainly faunistic there are included some observations of biological and morphological facts. Such facts will be found under the respective species.

All the animals dealt with were collected by the author. Consequently the majority originate from the surroundings of Copenhagen. A smaller part was taken near the mouth of the Isefjord, near Lynæs. The Jutland-forms I collected on a journey last summer (1910) at the expense of the Japetus Steenstrup fund, for which beg to offer my best thanks.

I am much indebted to the Carlsberg fund for the support it has given my work by enabling me to procure suitable instruments, and also for having paid the phototypic reproduction of the plates.

I wish to thank Dr. de Man in Yerseke for the kindness with which he has placed at my disposal his great knowledge whenever I have addressed myself to him.

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With our present knowledge of the Nematodes it is not possible to draw a sharp line between the freeliving and parasitic forms. Thus we have the heterogene species with a parasitic and a freeliving generation, forms as *Angiostomum nigrovenosum*, common in the lungs of frogs and *Strongyloides intestinalis* whose parasitic generation lives in the intestine of man and mammals. Then we have a number of species living in putrefying substances and plant decay, many of which are transitional forms to parasitic life. It is proved that several of these forms can occasionally become parasitic; such cases are recorded from time to time in the special medical literature. As to other species it is proved of late that they can be found both as real entoparasites in plants and free in the earth. That the number of these will increase considerably in future is beyond doubt. Besides these partly or facultative parasites and besides the Nematodes of putrefaction we have for the rest the great number of species living free in earth and water, which far exceed the other groups in number. As far as our present knowledge extends, they are not parasitic though we must say that the life of a great number of forms depends on plants or particularly roots of plants. The supposition, generally found in the literature that the majority of Anguillulines live in putrefying substances is scarcely correct. Bütschli has already objected to it; he writes: „Ich suchte diese freilebende Nematoden mit ganz geringen Ausnahmen vergeblich in Wasser, Schlamm oder Erde, die schon durch den Geruch sich als deutlich faulend erwiesen. Gewöhnlich fand ich den Schlamm stark riechender Gewässer ganz frei von unseren Thierchen, ebenso die schon angefaul- ten Confervenmassen auf der Oberfläche derartiger Gewässer. Eine reiche Fauna unserer Thiere entwickelt sich hingegen in reinem und vorzugsweise fliessendem Wasser.“ The species found in putrefying substances are ordinarily quite distinct forms which are representatives of a few genera, the most common of which are

*Rhabditis*, *Diplogaster* and *Cephalobus*. De Man, who in his large Monograph exclusively deals with the „in der reinen Erde und im süßen Wasser lebenden Nematoden“ divides these in the strictest sense of the word free-living forms, after the different soil in which they live. He establishes five groups, namely:

- Omnivage-Arten,
- Wiesennematoden,
- Sandnematoden,
- Brachwassernematoden,
- Süßwassernematoden.

With the word „Brachwassernematoden“ de Man indicates the forms living in earth, saturated with brackish water; he tells himself that the word is an abbreviation of „Brachwassererdenematoden“. This sort of soil which is, of course, found to a great extent in Holland has its own fauna containing forms which are neither to be found in the sea nor in freshwater. The Sand-Nematodes are especially found in dunes; the omnivaging forms occur in all sorts of earth besides fresh-water and the sea. A fact which would be of great interest to get explored, is the extension downwards in the soil of the different species of Nematodes. It is connected with the question of their dependence on the plants and could possibly also throw light upon their relation to organic substances in the earth as well as to other in the earth living organisms.

As to collecting and preparation I shall notice the following: I immediately put the gathered material which has to be examined for Nematodes in tin-boxes or in glasses with tight-fitting covers or corks; then it will not dry up and the animals will keep living for a long time. This summer I have re-examined some of the material which I gathered last summer on a journey in Jutland and which has been standing during the winter in such boxes or glasses and it proved that it still contained lots of Nematodes besides Oligochetes, Tardigrades, Podura and larvæ of Insects, in short the whole fauna which is commonly found in such material, ap-

parently well and comfortable. — For the purpose of finding the animals I employ quite flat glass-cups of c. 20 ctm. in diameter. Here I pour water over the material and spread it over the cup. It is not convenient to have too much of earth as it renders the searching for the animals difficult; it is not easy especially to search in fatty mould and clayey material. The glass-cup is placed on a black underlayer, raised a little over it, on the turned cover of a Petri-cup and then I begin the search by means of a good lens. The animals are taken with a very fine needle — for the smallest forms a pipette is employed, drawn out in a long fine tip — and placed in a watch-glass with some water. From here they are picked up and placed one by one on a slide for examination. Many of them being very agile — in that respect the various species behave most differently — it is necessary to make them immobile, and this is generally done by holding the slide for a moment cautiously over a small spirit-flame; thereafter the coverslip is applied, which must be supported by wax or the like.

If these animals are to be prepared for study or for Museum use it is preferable to mount them on slides on account of their diminutiveness. Several fluids are recommended for fixation. De Man employs a mixture of Glycerine 3 and acetic acid  $1\frac{1}{3}$ . I have not succeeded in employing this and others have had the same misfortune; Örley thus says in his paper: „Die Rhabditiden und ihre medicinische Bedeutung“, that „solche Präparate sehr aufhellen und schrumpfen“. Jägerskjöld recommends in his paper of 1901: „Weitere Beiträge zur Kenntniss der Nematoden“ a mixture of Alcohol 50 0/o, 70—90, Glycerine, c. 30—70 and glacial acetic acid, c. one drop. Loos recommends mixtures of a similar composition (Zool. Anz. 1901) and Örley employs picro-sulphuric, solution of corrosive sublimate and  $\frac{1}{4}$  per cent solution of osmic acid. —

I have tried for my preparations most of these reagents with unequal results and moreover I have tried a number of other mixtures which I thought might be employed with success. These

animals being, as known, provided with a very thick cuticula it is of importance to find well penetrating fluids; this is not the case with osmic acid. This fluid, in my opinion, can only be employed upon diminutive species and in this case, in accordance with the well known method employed on Protozoans, namely on the slide with osmic vapour by holding the slide inverted over the mouth of a bottle containing a 1 per cent solution of osmic acid, for five minutes. As far as my experience goes, the same fluid that can be used for some forms cannot be employed with success on all. One of the mixtures which has most satisfied me and which I used for a long while is a mixture of a saturated solution of Picric acid 3 and glacial acetic acid 1. It has the advantage that it kills the Nematodes instantly and that the animals always assume their natural shape, viz. either stretched out or more or less curved, as the stiff cuticula will permit, without incalculable torsions caused by contractions of the muscles, which can be of the most disturbing effect when the animals are to be mounted on the slides. The mixture will also bring about a profitable differentiation so that the organs, often even the nuclei of the cells will appear distinctly. The weak point is that some shrinking is inevitable. I shall here add, that I never — as is generally recommended — apply the mixture from the edge of the cover-slip. I take the animal with a needle and put it direct into a watch-glass, filled with the fixation-fluid.

On account of the above mentioned shrinking I have of late employed the following mixture: Formaline, 6, Alcohol 90<sup>o</sup>/<sub>o</sub>, 20, glacial acetic acid, 1 and aqua destill., 40. This I find gives very beautiful results. — Boiling with Alcohol after the method of Loos, that has proved so excellent for the greater parasitic forms is not applicable to the case under consideration. After fixation I remove the animals into a mixture of Glycerine, 1, Alcohol 90<sup>o</sup>/<sub>o</sub>, 1, Aqua destill. 2 for evaporation, and thereafter they are mounted on the slide in pure Glycerine or Glycerine-Gelatine.

In spite of all pains taken I have not succeeded in getting

good preparations of all the species I have met with. Among forms difficult to prepare I may name: *Tylenchus*, *Plectus*, *Cephalobus* and the smaller species of *Diplogaster* and *Rhabditis*. On the whole the larger forms seem to give the best results on preparation, especially the *Dorylaimi*.

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**Monohystera dispar** Bastian.

1865. Bastian, l. c. p. 97. Pl. IX. fig. 1 and 2.

1873. Bütschli, — p. 63. Tf. IV. fig. 24 a and b. (*M. crassa*).

1884. de Man, — p. 41. Tf. III. fig. 12.

I have this species, whose male is not known, only from the lake of Furesø, where it was taken quite near the bank and in the very edge of the water on roots of plants. I have only seen a few specimens; it seems not to be so common in this country as it is in Holland according to de Man. The individuals also appear to be a little smaller. The length of the specimens, I have measured, is 0,4—0,7 mm. I note here the dimensions of a mature female that had one egg in the uterus; it was taken in August 1900.

Zeiss Okularmikrom., Obj. C. Oc. 2.

Length 87 = 0,57 mm.

Oesophag. 19.

Vulva 55.

Tail 15.

Breadth 4.

The formula of de Man gives:  $\alpha = 22$ ,  $\beta = 4^{1/2}$ ,  $\gamma = 6$ .

**Monohystera socialis** Bütschli.

1874. Bütschli, p. 28. Tf. II. figg. 8 a—d.

Bütschli found this species very abundant in a brackish-water basin named „kleinen Kiel“ in the town of Kiel. Here the animal lives essentially in the masses of *Oscillaria*. Bütschli tells how, taking clumps of *Oscillaria* with water in a glass, he saw a great number of the named species „wie Spinnweben zwischen

den einzelnen Klumpen und an den Wänden des Gefäßes hinziehen; andere ballen sich zu Klumpen zusammen, in welchen sich viele Hunderte der Thierchen umeinander herumwinden“. The description Bütschli gives of the behaviour of this species reminds one of other Nematodes of putrefaction, for instance *Rhabditis* and *Diplogaster*, which forms it resembles as to the great number of eggs which it produces. It is ovoviviparous, a fact that is often observed among the Rhabditides, and the body of the female is frequently swarming with large young.

I have found this species both in the Kalkbrænderihavn near Copenhagen and at Charlottenlund. And even if I have not seen it in such lots as Bütschli describes, my opinion is that it is a rather common littoral-form which will appear in putrefying seaweed and which probably can be found all round our coasts.

***Monohystera crassissima* n. sp.**

Pl. III. Figs. 14, 15, 22.

I found the species for the first time in July 1909 among Conferves from a pool on the meadow near Øresund by Hellerup. As the material had been standing for a few days in a Petri-cup and began to putrefy I remarked that the individuals of the Nematodes increased conspicuously in number and after some days more I had a regular culture. This only kept for a while; when the putrefaction augmented the animals died rather speedily. Later I have taken the species several times at the same locality but always only single individuals and I have not succeeded in my attempts at getting a culture anew. I suppose that we here have to do with a typical Nematode of putrefaction like *M. socialis* Bütschli, the single specimens I have met with later on being young, immature individuals roaming about.

The shape of this species is extraordinarily clumsy but it is very agile and has some resemblance to diminutive fly-maggots, which is particularly striking where it is found in abundance. It has its average width about the middle of body and is tapering at

the extremities. The cuticula is smooth, beset with long fine setæ. The lateral organ is large, circular and, when seen in profile, rather deep with a slight elevation in the centre; it is placed rather near the anterior end (fig. 22). The tail is rather short and contains three excretory glands debouching on its blunt rounded tip. The mouth is slightly cup-shaped and rather flat. Oesophagus increasing towards its proximal end, is here only a little thicker than near the mouth. The glands on the limit between the intestine and the oesophagus are not very conspicuous. The intestine consisting of two rows of cells is rather dark-coloured and frequently contains Diatoms. The ovary stretches far forwards in the body-cavity; on the preparations it can be followed beyond the proximal end of the oesophagus but then it tapers and is lost, so that it is impossible exactly to indicate the limit. Unfortunately I have no observations in that respect from living specimens. The anus is situated about half-way between the vulva and the end of the tail, a little nearer the latter. The vulva is forming a broad transverse fissure and the vagina is placed vertically to the longitudinal axis of the animal, not parallel to the rectum as often is the case in this genus. The spicules of the male are very characteristic; they are bent in an obtuse angle and being thickest in the angle they have a dilatation proximal to this on the ventral side. The tip is curved slightly upwards and ends bluntly. The distal half is surrounded by a sheath-like apparatus, consisting of a very thin membrane provided with two pointed tips stretching backwards in the animal.

Zeiss Ocularmikrom. Obj. A. Oc. 2.

♀ Length 110 = 1,7 mm.

Oesoph. 20.

Vulva 75.

Anus 95.

Tail 15.

Width 8.

♂ Length 90 = 1,4 mm.

Oesoph. 19.

Tail 13.

Width 6.

The formula of de Man gives  $\left\{ \begin{array}{l} \text{♀, } \alpha = 14, \beta = 5^{1/2}, \gamma = 7. \\ \text{♂, } \alpha = 15, \beta = 5, \gamma = 7. \end{array} \right.$

**Monohystera similis** Bütschli.

1873. Bütschli, p. 62. T. V. fig. 30 a—b.

1884. de Man, p. 40. T. III. fig. 11.

Referring to the descriptions which Bütschli and de Man have given of the species, I shall point out, that it is frequently found in the Ordrup Mose in the pools near the gate which leads to Dyrehaven at the house of the „Posemand“. It lives here especially among *Lemna trisulca* and on the roots of *Hydrocharis morsus ranæ*. It is very agile with characteristic movements; it swims by putting the body in a quickly swinging or oscillating motion like the larvæ of certain gnats. When it has advanced a little in this manner it stops short with the body stretched out and lies as dead, till it after a moment resumes its movements in the described manner.

**Tripyla papillata** Bütschli.

1873. Bütschli, p. 52. T. VI. fig. 35 a—b.

1884. de Man, p. 47. T. V. fig. 19.

This species has been taken in the Furesø and in the Lyngby Sø where it seems to be very common. In the Furesø it occurs on the roots of the plants in the edge of the water, in the Lyngby Sø it was taken on the roots of *Stratiotes aloides*. Besides this a single specimen was found in damp moss near the bank of a little pond in Dyrehaven, near Springforbi.

**Tripyla affinis** de Man.

1884. de Man, p. 48. T. V. fig. 20.

De Man writes, that this species occurs in „die feuchte Erde der Wiesen und Marschgründe“; the Danish localities are all near the sea or brackish water. It was taken on the meadow near Øresund by Hellerup together with *Oncholaimus thalassophygas* de Man and other typical „Brackwassernematoden“; other localities are Hundested and Lynæs, near the Isefjord, on roots of plants.

**Tripyla setifera** Bütschli.

1873. Bütschli, p. 51. T. VI. fig. 36 a—f.

1884. de Man, p. 46. T. IV. fig. 17.

Bütschli found this species on the roots of fungi in a wood, de Man indicates both roots of plants in the moist meadows of Holland and in mould. The only locality where it has been found in Denmark is in swampy tracts of boggy land between Hulsig and Kandestederne, near the Scaw.

**Cyatholaimus intermedius** de Man.

1884. de Man, p. 53. T. VI. fi. 25.

In Lynæs were taken two females and one male. The females have been collected near the harbour on roots of grass in a little pond used as watering-place for cattle. The male originates from roots of plants near the Isefjord. The male differs from the species of de Man in having 6 præanal papillæ.

I note the measurements for a male and a female.

Zeiss Okularmikrom. A., Oc. 2.

♂ Length 74 = 1,1 mm.

♀ Length 64 = 1 mm.

Oesoph. 9.

Oesoph. 9.

Tail 7.

Vulva 28.

Width 2.

Tail 7.

Width 2.

The formula of de Man gives  $\left\{ \begin{array}{l} \text{♂, } \alpha = 37, \beta = 8, \gamma = 10. \\ \text{♀, } \alpha = 32, \beta = 7, \gamma = 9. \end{array} \right.$

**Spilophora glophila** de Man.

Pl. IV. figs. 32 and 34.

1876. de Man, p. 85. T. X. fig. 40 a—b.

1884. de Man, p. 58. T. VII. fig. 29.

This species has been collected on the meadow by Hellerup near Öresund in a few specimens. It appears to differ inconspicuously from the illustrations of de Man in respect to the chitinous thickenings of the mouth-cavity; the oral bristles also are relatively

a little thicker on the specimens from Hellerup (see the figs. 32 and 34).

**Chromadora Leuckarti** de Man.

1884. de Man, p. 58. T. VIII. fig. 30.

A young specimen, female, taken at the Furesø 5. VI. 11. There is certainly no doubt that it is the species named; it agrees perfectly with the description of de Man. The animal is 0,8 mm in length.

Zeiss Okularmikrom. Obj. C. Oc. 2.

Length 134 = 0,8 mm.

Oesoph. 19.

Vulva 62.

Tail 17.

Width 4.

The formula of de Man gives:  $\alpha = 32$ ,  $\beta = 7$ ,  $\gamma = 8$ .

**Chromadora Orleyi** de Man.

Pl. IV. figs. 35 and 37.

1884. de Man, p. 59. T. VIII. fig. 31.

This species was also taken at the Furesø among plants in the edge of the water, only once, but in many specimens. In a male I have counted 16 præanal papillæ of the typical form. The male spicules differ a little in form from the illustration given by de Man in having a dilatation in its proximal end (see fig. 35).

**Hypodontolaimus inæqualis** (Bast.).

1865. Bastian, p. 166. T. XIII. fig. 223—225.

1874. Bütschli, p. 44.

1886. de Man, p. 66.

1888. de Man, p. 39.

1904. Jägerskjöld, p. 417.

This species seems to be common at the coasts of Öresund. It has been collected in the „Kalkbrænderihavn“ near Copenhagen,

at Charlottenlund and Klampenborg among *Ulva* and *Enteromorpha*. It is evident that it requires only a small degree of saltness as it has been taken together with *Oncholaimus thalassophygas* d. M. on the meadow by Hellerup near Öresund.

***Mononchus papillatus* Bastian.**

1865. Bastian, p. 101. Pl. IX. fig. 27—28.

1873. Bütschli, p. 76. T. III. fig. 19 a—b.

1884. de Man, p. 64. T. IX. fig. 35.

Evidently this species is very common in Denmark; it has been taken at Lynæs, at the Furesø by Frederiksdal, Lyngby Mose, Charlottenlund and Kildeskoven. In Jutland it was collected at Kandestederne, in a pond among the dunes by Lønne and at Nymindegab opposite to the mouth of Ringkøbing Fjord. It can by no means be called „ziemlich selten“ here such as de Man indicates it to be in Holland. De Man notes that it occurs „in der feuchten Erde auf Wiesen und Marschgrüden sowohl in Süßwasser- als in Brackwassergegenden“; this also agrees with its occurrence in Denmark. A curious fact is, that it can be found both in sandy marshland, among dunes and in fat mould.

The Danish form agrees almost perfectly with the description of de Man, differing only in the fact that the chitinous list situated in the cavity of the mouth opposite to the dorsal tooth is slightly serrated, a fact which has not hitherto been observed.

***Mononchus spectabilis* n. sp.**

Pl. III. figs. 17, 19, 27, 28, Pl. IV. fig. 36.

In March 1910 the author found in some material from the meadow by Hellerup near Öresund several *Mononchs* resembling highly the *Mononchus papillatus*, only conspicuously larger and, what is the most remarkable, the males being about as numerous as the females.

All the species of the genus *Mononchus* show the peculiarity that they will float on the surface of the water as if their cuticula

were greasy. If some material is spread in a flat glass-cup and water is poured over it, the Mononchs will mount rapidly and be lying on the surface dry and shining. This peculiarity I have only observed in one genus besides the Mononchs, namely in the genus *Ironus*. It seems to be a peculiarity of these genera; I have seen it as well in *Ironus ignavus* as in *Ironus longicaudatus* and it is the case with all the species of *Mononchus* I have examined. It is very remarkable and it has surprised me that it is mentioned nowhere in the literature. In the case referred to, the Nematodes suddenly swarmed to the surface of the water which was poured out over the material in a glass cup: they resembled perfectly diminutive steel-needles which had suddenly become alive, and it was now an easy matter — on account on the largeness of the species — to pick them up and place them into a watch-glass.

The examination of the animals gave the following result: the females reached the length of 4 mm, the males the length of 3,6 mm. As to form and aspect the animals agree in some measure with the *Mononchus papillatus*. Behind the head the body is inconspicuously constricted. The cavity of the mouth is about twice as long as wide, the distal half being a little wider than the proximal half in that this is tapering towards the oesophagus, in the distal end of which it is ending pointed. In this way the oesophagus is encompassing about the proximal third of the mouth-cavity. The dorsal tooth is placed in the upper half of the mouth and its apex is running obliquely inwards and forwards. The decurrent edge of the tooth is visible to the commencement of the oesophagus. Opposite to the tooth is found a thickened chitinous ridge the middle of which is serrated. Between this and the tooth another chitinous list is seen without serration and relatively inconspicuous. The shape of the cavity of the mouth is on account of these lists prismatic, triangular in transverse section. The oesophagus is very muscular and has a conspicuous chitinous intima, which reaches a little way downwards into the lumen of the intestine, a case not uncommon in the Mononchs. The vulva is placed

a little behind the middle of the body; the ovaries do not reach far; the postvaginal part does not reach the middle between the vulva and the anus; the antevaginal part about a third of the distance to the proximal end of the oesophagus. Usually are found two eggs in the uterus, sometimes I have observed more, up to four. The cells of the intestine are filled with oil-globules. The tail is conical and pointed and always highly bent inwards, towards the vent, getting the shape of a hook.

The male is inconspicuously more slender than the female and increases from the point where the masculine papillæ commence, in the way that the animal assumes its greatest circumference at the anus. The bursal musculature is highly developed and the numerous papillæ which are very prominent appear to have a lateral position, forming two longitudinal rows between which the body of the animal appears to be groove-shaped. The spicules are angular and provided with a longitudinal list in their distal half; an accessory piece of a characteristic shape much resembling that of *M. tridentatus* figured by de Man in 1876, T. XIII, fig. 50.

There is no doubt, that the form here described is closely related to the *M. papillatus*, especially as a more thorough examination has proved, that the *M. papillatus* is also provided with a serrated list opposite to the dorsal tooth. The principal deviations between the two forms are the following: 1) the difference of dimensions, 2) the position of the vulva which in *M. spectabilis* is situated a little behind the middle of the body, in *M. papillatus* at the beginning of the last third part of the animal; 3) the length of the tail, which is more considerable in *M. papillatus* and finally the fact, that the male of the *M. papillatus* is unknown, while the male of the *M. spectabilis* is about as numerous as the female.

If the two forms should prove to be identical it must be supposed that an alternation of generations takes place such as de Man supposes with *Trilobus*, but for the present I find it most correct to consider the *M. spectabilis* as specifically different from *M. papillatus*.

Zeiss Okularmikrom. A. Oc. 2.

Female.	Male.
Length 250 = 4 mm.	Length 228 = 3,6 mm.
Oesoph. 50.	Oesoph. 46.
Vulva 135.	Tail 5.
Tail c. 8.	Width 5.
Width 8.	

For the female the formula of de Man gives:  $\alpha = 31$ ,  
 $\beta = 5$ ,  $\gamma = 5$ .

### **Mononchus brachyuris** Bütschli.

1873. Bütschli, p. 77. T. III & IV. fig. 20 a—e.

1884. de Man, p. 66. T. IX. fig. 37.

This species has in Denmark about the same distribution as *M. papillatus* but it is decidedly more uncommon. Hitherto I have not seen the male, which for the rest is known. The species is apparently fond of dampness like the other Mononchs. It was collected on the roots of *Menyanthes trifoliata* in a bog at Lynæs. Further it has been taken in the bog by „Vintapper-gaarden“, near Lyngby. In Jutland it was collected in the boggy regions between „Hulsig“ and „Kandestederne“, in a bog near the „Kandestederne“ and on roots of plants at the bank of a pond between Nymindegab and Nørre-Nebel.

### **Mononchus macrostoma** Bastian.

1865. Bastian, p. 101. Pl. IX. fig. 29—30.

1884. de Man, p. 63. T. IX. fig. 34.

Among all the Danish Mononchs this species has the widest distribution; it has been collected at nearly all the places where I have met with other species of the genus. It is one of the most common of all our freeliving Nematodes. On Sjælland it has been collected at the „Furesø“, in the Ermelund, on roots of plants, in Lyngby Mose, Hellerup Strandeng, Ordrup Mose, at Lynæs in a bog near the plantation. Further it has been taken on the little

island Egholm in Storebelt where it was found in abundance in a little pool. In Jutland it was taken on the northern shore of the Scaw where it occurs in a ditch among the dunes near the sea; at „Kandestederne“ in a bog, and finally in the little pond at Lønne near Nørre-Nebel. The male was observed only once, namely in Ordrup Mose, Aug. 1909.

**Mononchus dolichurus** n. sp.

Pl. II. figs. 6, 10, 11.

This exceedingly nice and characteristic form was found in the wide boggy regions between Hulsig and Kandestederne in Jutland. In spite of an eager search in the material it has been impossible for me to find more than one specimen, a female. Though not still mature — the female organs are just laid down and form a little sausage-shaped body which indicates the place of the vulva not yet developed — the animal has a length of ca. 4 mm. Thus it will probably prove to be larger than most of the other species of this genus.

The front part which tapers very little is beset with two circles of rather conspicuous papillæ; behind these the body is inconspicuously constricted as in *M. spectabilis*. The cavity of the mouth, which in optical section appears to be regularly barrel-shaped, is probably prismatic and in transverse section triangular. The dorsal tooth, which is relatively small and has its apex turned downwards, is placed in the proximal half of the mouth-cavity; its distance from the bottom is about the third of the length of the former. Besides this tooth some inconspicuous conical prominences are found partly opposite to the tooth, partly in the bottom of the mouth-cavity. I count all in all seven. Oesophagus has the form usually found in the Mononchs but has three or four inconspicuously developed lobes at its proximal end, a case not found in other species of this genus (Fig. 11). The tail, after which I have named the animal, is longer than in any species of this genus hitherto known; it measures but  $4\frac{1}{2}$  in the length of the animal.

It is kept bent inwards towards the vent forming a regular circular arch. (fig. 10). The movements of the animal are very slow.

After having written the above, the material in which the specimen dealt with was found has been re-examined and I succeeded in finding one specimen more, unfortunately also an immature female being a little smaller than the individual which was found at first. It gives no further information.

Zeiss' Okularmikrom. Obj. A. Oc. 2.

Length 247 = 4 mm.

Oes. 62.

Vulva 148.

Tail 55.

Width 6.

The formula of de Man gives:  $\alpha = 41$ ,  $\beta = 4$ ,  $\gamma = 4^{1/2}$ .

#### ***Oncholaimus thalassophygas* de Man.**

1884. de Man, l. c. p. 68. T. X. fig. 39.

1889. de Man, p. 1. T. VI. fig. 1 a—c.

There is not much to be said of the distribution of this species in this country; it is very common on Hellerup Strandeng. It occurs in pools that are by turns filled with water and dry. It was collected on the roots of *Scirpus* and *Aster tripolium* and among *Conferves*. Besides the named locality it has only been taken at Dragør near the „Badehotel“, a place resembling that at Hellerup. The Danish specimens agree essentially with the specimens described by de Man from the isle of Walcheren.

#### ***Oncholaimus viridis* Bastian.**

1865. Bastian, l. c. p. 137. Pl. XI. fig. 137 and 138.

A form resembling the *Oncholaimus viridis* occurs abundantly at our coasts. The different proportions do not agree perfectly with what is known of this species. On the other side this is the only one of the species with a single ovary of this genus described by Bastian, to which it can be ranged with some reasonableness. I

have not found it reasonable to establish for the present a new species on it. It has been collected at Charlottenlund, in the „Kalkbrænderihavn“ and at Lynæs among putrefying seaweed.

Zeiss' Okularmikrom. A. Oc. 2.

♀ Length 292 = 4,7 mm.

Oes. 26.

Vulva 222.

Tail 3.

Width 4.

***Oncholaimus oxyuris* n. sp.**

Pl. II. figs. 8, 9, 12, 13.

This form, so far as I can see new to science, has been collected on Hellerup Strandeng and later in Dragør, near the „Badehotel“. It appears to be closely related to *Oncholaimus viridis* Bast. which it resembles in several respects, but it differs from this species in having the tail rather different in form. — The head is truncate, with a circlet of 10 short, stout setæ. The length of the pharyngeal cavity is about twice its width and provided with the usual 3 teeth among which the ventral tooth is the larger. The porus excretorius is placed at a distance behind the bottom of the pharyngeal cavity equal to the length of the latter. The female organ is unsymmetrical like that in *O. viridis* and stretches forwards in the body; the uterus is rather spacious and is able to contain a considerable number of eggs, up to eleven. The vulva is not prominent as is the case in *O. viridis*. The tail is tapering considerably behind the anus and the tip of the former is constricted to a little finger-shaped appendage, curved towards the vent. The tail of the male differs somewhat from that of the female and is on the ventral side slightly spoon-shaped. The edge of this excavation is on both sides beset with a row of very strong and stout setæ. Between the spoonshaped excavation and the tip of the tail is placed a postanal, domical papilla which is possibly double. The

spicules are rather short, slender and slightly curved; no accessory piece.

As for the female the following measurements have been taken on a specimen which de Man has had the kindness to examine; the results of my measurements differ a little from those of de Man; this difference is probably caused by the considerable bending of the animal prepared rendering exact measuring difficult. I have found it correct to give my own results here. The above mentioned deviations are insignificant.

Zeiss Okularmikrom. A. Oc. 2.

♀ Length 250 = 4 mm.

♂ Length 238 = 3,8 mm.

Oes. 35.

Oes. 33.

Vulva 172.

Tail c. 4.

Tail 5.

Width 5.

Width 5.

De Man's formula  $\left\{ \begin{array}{l} \text{♀, } \alpha = 50, \beta = 7, \gamma = 50. \\ \text{♂, } \alpha = 47, \beta = 7, \gamma = 60. \end{array} \right.$

### ***Eurystoma terricola* de Man.**

1907. de Man, l. c. p. 84. T. IV. fig. 17.

This nice form has been collected in several specimens at Lynæs, near the bank of the Isefjord, partly on the roots of *Salicornia* and *Atriplex* partly among horse-manure, lying on the beach. After de Man it occurs in „la terre humide aux bords des fossés d'eau saumâtre à l'île de Walcheren“.

### ***Enoplus communis* Bastian.**

1865. Bastian, p. 148. Pl. XII. fig. 164—166.

1866. Schneider, p. 57. T. IV. fig. 9—13 (*E. cochleatus*).

1874. Bütschli, p. 40, fig. 55 a—b.

Lynæs, on roots of plants in the edge of the water by Isefjord; Dragør, near the Badehotel.

**Ironus ignavus** Bastian.

Pl. IV. fig. 33.

1865. Bastian, p. 104. Pl. IX. fig. 34 a—b.

1876. Bütschli, p. 384. T. XXV. fig. 15 a—e.

1884. de Man, p. 70. T. X. fig. 40.

This species occurs rather abundantly in the Dyrehaven near the Fuglesangsø. It lives here in black mud and damp mould where it would be almost impossible to find it, if it had not the same peculiarity as the Mononchs, namely to swim on the surface of the water. If some mud is spread in a flat glasscup and water is poured over it the animals will mount to the surface where they can be easily collected by help of a needle. Later the species has been taken at the Furesø together with *Dorylaimus stagnalis* and *Trilobus gracilis*, just the same species among which Bütschli has collected it in the river of Main. The female organ, the characteristic ring-musculature of which is discussed both by Bütschli and de Man, I have taken the opportunity to figure. The dimensions of the Danish specimens agree principally with those from the river of Main.

I note the measurements of a female of middle size:

Zeiss Okularmikrom. A. Oc. 2.

Length  $213 = 3,4$  mm.

Oes. 39.

Vulva 111.

Tail 13.

Width 4.

Phar. cavity  $7\frac{1}{2}$ .

The formula of de Man gives:  $\alpha = 53$ ,  $\beta = 5\frac{1}{2}$ ,  $\gamma = 16$ .

**Ironus longicaudatus** de Man.

1884. de Man, p. 71. T. XXXIV. fig. 140.

The *I. longicaudatus* occurs at localities much resembling those in which *I. ignavus* lives; it has f. i. been taken in mud from the Fuglesangssø in Dyrehaven. Further it has been collected

in a pool in Dyrehaven near Springforbi. In Jutland it was taken in a trench between Nørre Nebel and Nymindegab with very ferruginous water.

While the male of *I. ignavus* occurs about as abundantly as the female this is not the case with *I. longicaudatus*; though I have collected a lot of specimens I have not met with a single male.

I give the measurements for a female with two eggs in the uterus.

Zeiss Okularmikrom. A. Oc. 2.

Length 166 = 1,2 mm.

Oes. 26.

Tail 40.

Vulva 66.

Phar. cavity 7.

Width 4.

The formula of de Man gives:  $\alpha = 41$ ,  $\beta = 6\frac{1}{2}$ ,  $\gamma = 4$ .

### **Trilobus gracilis** Bastian.

Pl. III. figs. 16 and 20.

1865. Bastian, p. 99. Pl. IX. fig. 20—22.

1873. Bütschli, p. 53. T. IV. fig. 21 a—e, 23 a—b.

1884. De Man, p. 75. T. XI. fig. 43.

This exceedingly nice Nematode occurs in this country abundantly in Furesø and Lyngby Sø. A single specimen has been taken in the Bøllemose near Skodsborg. It appears as if the specimens from the Furesø generally are a little larger than those from other localities; they have been taken in the edge of the water on roots of plants and often attain a length of 3 mm.

In one female specimen I have found a peculiar monstrosity: The animal had two eggs in the uterus, one antevaginal and one postvaginal. But between the vulva and the anus occur four well developed masculine papillæ of the shape characteristic for the males of this species and in no respect to be distinguished from these. No spicules are found and, as far as can be seen, no testes; apart

from these papillæ the animal appears to be a female normally developed.

As I have not seen any case of that sort in freeliving Nematodes mentioned in literature I have figured the organs dealt with.

**Trilobus pellucidus** Bastian.

1865. Bastian, p. 100. Pl. IX. figs. 23, 24.

1884. De Man, p. 76. T. XI. fig. 44.

This species is not rare in Denmark, but its distribution is probably different from that of the above named species as they have not been found together. I found the *T. pellucidus* in a bog by Lynæs from which locality several specimens were collected. Moreover it has been taken at the Kandesteder in Jutland, in sandy mould, and finally one specimen has been taken in Ordrup Mose in water.

According to my experience it must be supposed that of the two species of the genus *Trilobus*, *Tr. gracilis* is particularly a freshwater-form while *Tr. pellucidus* is attached to brackish water. I may note therefore, that Bastian indicates *gracilis* to be found „about the roots of *Ruppia maritima* from brackish water“ while *pellucidus* is found in „mud from bottom of ponds“. De Man notes that *gracilis* „bewohnt nicht nur die feuchte Erde, welche von süßem oder brackischem Wasser durchtränkt ist, sondern auch das süße Wasser selbst, in Gräben und Teichen“.

**Prismatolaimus dolichurus** de Man.

Pl. III. fig. 18.

1884. De Man, p. 80. T. XII. fig. 47.

I have seen this species only once among material from Lynæs and only one specimen. It was found together with *Mononchus papillatus* and *Plectus granulatus* on roots of plants originating from the little bog behind the church. In this species there is a peculiarity at the oesophagus which de Man does not mention in his text but which is visible in his figure; this peculiarity consists in a rather conspicuous constriction by which the proximal

part of the oesophagus is separated from the other. In the specimen from Lynæs this peculiarity was rather more conspicuous than in that figured by de Man.

***Cylindrolaimus tristis* n. sp.**

Pl. III. figs. 21, 23, 26.

The only species of this genus which was collected here agrees with none of the species described by de Man. I have taken it in the Furesø for two years successively in the same locality, namely between Hjortholm and the biological laboratory. It occurs on roots of plants in the edge of the water. Its movements are exceedingly characteristic: It does not swim but it moves very slowly with the most awful writhings, bending its body extraordinarily abruptly at a single or more spots as if intending to break it to pieces; at the same time the animal is trembling as if very miserable and piteous. I suppose these movements are peculiar for the genus partly because de Man has named one of his two species *C. melancholicus*; it would be just as suitable for the species from the Furesø; I consequently named this species *C. tristis*.

The species from the Furesø is considerably larger than the two known from Holland; while the larger of these is a little more than one millimeter long the Danish species measures almost two. But it is relatively much more slender. The body is tapering slightly forwards with a rounded head devoid of lips. I have not been able to state if setæ are present, at any rate they are exceedingly small and inconspicuous. The lateral organ placed near the head is of a shape diverging from that known in the species from Holland; in profile it has the shape of a narrow funnel running obliquely inwards in the body, forming an angle of nearly  $45^{\circ}$  with the long axis of the former. It is not to be seen in my figure which was drawn after a specimen prepared where it was not visible. I have only seen it on living animals and always rather indistinctly. The oesophagus is long and increases towards its proximal end. Its Chitin-intima, as also observed by

de Man in the Dutch species, reaches a little way into the lumen of the intestine. The vulva is forming a broad transverse fissure; the female organ is single and extends forward in the animal. Uterus contains never more than one egg, which is very large and cylindrical; in a female of the length of nearly 2 mm it measures  $165 \mu$  in length. The tail relatively a little longer than in the former described species tapers evenly, ending with its apex rounded and a little dilated with a distinct duct for the caudal glands.

All the specimens collected are females.

Zeiss Okularmikrom. Obj. C. Oc. 2.

Length  $270 = 1,8$  mm.

Pharyngeal cavity: 8.

Oesophagus 70.

Vulva 160.

Tail 20.

Width 4.

The formula of de Man gives:  $\alpha = 67$ ,  $\beta = 3$ ,  $\gamma = 13^{1/2}$ .

### **Diplogaster rivalis** Leydig.

1873. Bütschli, p. 120. T. XI. fig. 68.

1876. — p. 371. T. XXIII. fig. 5 a—b, and XXIV. fig. 5 c.

1884. De Man, p. 86. T. XII. fig. 50.

1886. Örley, p. 42.

It was taken at Ordrup Mose, behind Christiansholm, in a little pool filled with Conferves. I got both male and female, the latter with large and lively young. The species appears to have no wide distribution in this country.

### **Diplogaster fctor** Bastian.

1865. Bastian, p. 116. Pl. X. fig. 171—173.

1884. De Man, p. 88. T. XIII. fig. 51.

A male was taken at Lynæs, the length of which measures 1,2 mm.

Zeiss Okularmikrom. A. Oc. 2.

Length 76.

Oes. 13.

Tail 9.

Width  $1\frac{1}{2}$ .

**Diplogaster longicauda** Claus.

Claus, l. c. p. 354.

This species I have found in putrefying fungi in the Kildeskov together with a short-tailed form of the same genus which I did not succeed in determining to species.

**Diplogaster gracilis** Bütschli.

1876. Bütschli, p. 373. T. XXIII. fig. a—c.

Also this species were collected in the Kildeskov in putrefying fungi. It agrees with the *D. longicauda* in having the tail tapering very much posteriorly and terminating in a long pointed extremity. It is easily known by its female organ being unsymmetrical, with the vulva placed a little before the anus. The male has an inconspicuously developed bursa and two long slender spicules, with a scarcely visible accessory piece.

**Cephalobus elongatus** de Man.

1884. De Man, p. 96. T. XIV. fig. 57.

1906. Kati Marcinowski, p. 215.

Only two species were found of the genus *Cephalobus*. *C. elongatus* was collected in the Kildeskov in a putrefying stub. It appears to me beyond doubt that it occurs here as a veritable Nematode of putrefaction; I kept it for weeks in a little glass filled with the putrefying wood-mass in which the animals propagated lively. De Man indicates that the species „bewohnt nicht nur die feuchte, oder von süßem oder brackischem Wasser getränkte Erde der Wiesen und Marschgründe, sondern auch den sandigen Dünenboden an den Wurzeln der dort wachsenden Pflanzen“. After later

examination by Kati Marcinowski it appears that this species can also occur entoparasitic in plants. M. writes: „Nach den im folgenden niedergelegten Beobachtungen lebt das Thier auch im Korn keimender Getreidepflanzen, vermag auch in oberirdische Pflanzenteile einzudringen und so zeitweise als Parasit zu leben. Auch in Wasser, dem eine geringe Menge lebender und gestorbener Pflanzenteile zugesetzt waren, sowie auf einer in Wasser auf Mohrrübenscheiben gezüchteten Pilzkultur konnte *C. elongatus* nicht nur wochenlang am Leben erhalten werden sondern pflanzte sich auch fort“.

We have here one instance more of the peculiar ability of certain nematodes to accomodate themselves to the most different circumstances.

***Cephalobus persegnis* Bastian.**

1865. Bastian, p. 124. Pl. X. fig. 104—106.

1884. De Man, p. 92. T. XIII. fig. 52.

This species has been collected in the Kildeskov partly in old stubs together with the above named species and partly among putrefying leaves on the earth. Both species contained ripe eggs in the month of February.

***Plectus cirratus* Bastian.**

1865. Bastian, p. 119. Pl. X. fig. 81 and 82.

1884. De Man, p. 110. T. XVII. fig. 68.

A female has been taken at Lynæs, near Isefjord on roots of plants. The uterus contained three eggs. I note the measurements taken.

Zeiss Okularmikrom. A. Oc. 2.

Length 71 = 1,1 mm.

Oesoph. 15.

Vulva 33.

Tail 10.

Width 3.

After de Man's formula this gives:  $\alpha = 24$ ,  $\beta = 5$ ,  $\gamma = 7$ .

**Plectus granulosis** Bastian.

1865. Bastian, p. 120. Pl. X. fig. 93 and 94.

1873. Bütschli, p. 92. T. VII. fig. 47 b and T. VIII. fig. 47 a and c.

1884. De Man, pag. 107. T. XVI. fig. 65.

This species is very common in this country. De Man indicates it to be „omnivag“ and it is evident, that it is able to accomodate itself to the most different localities. It has been taken at Lynæs, on roots of plants near the Isefjord, in the Kildeskov among putrefying leaves on the earth, in Frederiksdal, near the Furesø and at Hellerup Strandeng on roots of plants.

**Plectus parietinus** Bastian.

1865. Bastian, p. 118. Pl. X. fig. 79, 80.

1873. Bütschli, p. 89. T. III. fig. 17, T. VII. fig. 46 a—c. fig. 39, T. VIII. fig. 52.

1884. De Man, p. 109. T. XVI. fig. 67.

Also this species appears to be widely distributed here. It occurs in the Kildeskov where it has been taken among putrefying leaves on the earth and at Hellerup Strandeng, among conferves on damp sandy soil. On the little island Egholm in Storebelt it was collected together with *Mononchus macrostoma*.

**Plectus rhizophilus** de Man.

1884. De Man, p. 113. T. XVII. fig. 72.

A single specimen from the boggy land between Hulsig and Kandestederne.

**Rhabditis brevispina** Claus.

1884. De Man, p. 122. T. XVIII. fig. 79.

A Rhabditis taken in damp earth between Lynæs and Hundested I suppose to be identical with *R. brevispina* Claus. Several mature specimens were found together, all females. One of the largest specimens attains a length of 1 mm.

Zeiss Okularmikrom. A. Oc. 2.

Length  $72 = 1,1$  mm.

Oes. 10.

Vulva 26.

Tail 10.

Width 4.

Formula of de Man:  $\alpha = 18$ ,  $\beta = 6\frac{1}{2}$ ,  $\gamma = 7$ .

### **Rhabditis terricola** Dujardin.

1845. Dujardin, p. 240.

1873. Bütschli, p. 107. T. XI. fig. 64 a—h. T. X. fig. 64 a.

1886. Örley, p. 35. T. II. fig. 10—17.

This species was taken in the Kildeskov in putrefying fungi and on a field between Hellerup and Charlottenlund in horse-manure.

### **Rhabditis pellio** Schneider.

1866. Schneider, p. 154.

1873. Bütschli, p. 112. T. IX. fig. 59 a—d. T. X. fig. 59 e.

1886. Örley, p. 33. T. I.

In culture, established on dead lumbrici in earth I have got this form several times. I have never taken it free in the earth.

### **Rhabditis marina** Bastian.

Pl. II. figs. 1, 2, 3, 4, 5, 7.

1865. Bastian, p. 129, Pl. X. fig. 60—62.

Last year in the month of April this species was taken at the beech of Charlottenlund among putrefying sea-weed, Enteromorpha and Ulva. Under the microscope it proved to be highly pellucid, of a very nice form and of a size unusual in the group of the Rhabditidæ.

The shape is rather slender, tapering at both ends. The cuticula shows transverse striæ and under high magnifying powers also longitudinal striæ. The mouth is surrounded with six inconspi-

cuously prominent lips, devoid of papillæ; no setæ. The cavity of the mouth has the same width throughout its whole length and is prismatic; it measures about  $\frac{1}{12}$  of the length of the oesophagus; this contains an enlargement distinctly limited in the middle and has the proximal globular bulbus provided with the usual valvular apparatus. The intestine, the cells of which are filled with oil-drops of various dimensions, is much larger than the oesophagus. The porus excretorius is very indistinct and hardly observable; it is placed a little behind the middle of the proximal half of the oesophagus. Vulva which is placed slightly posterior to the middle of the body is rather prominent and forms a broad transverse fissure. The female organ is double; the uterus is very large and the ovaries extend far forward and backward in the body. In this respect individual differences occur; in many cases the distance of the bending of the antevaginal ovary from the proximal end of the oesophagus is equal to the half of the length of the latter, often, especially in older females, this distance is much shorter. The terminal ends of the ovaries nearly reach each other opposite to the vulva; in younger specimens there can be a conspicuous distance between them (fig. 4). The species is ovoviviparous, having in older specimens the large uterus abundantly filled with lively moving young and ova in all stages of development. In the figure 4, of a young female, is seen a lot of shell-eggs two of which are showing stages of cleavage. — The conical shaped tail is not narrowing to a point as Bastian indicates but shows under high magnifying powers a little globular dilatation (fig. 7). No duct for caudal glands is seen.

In the male the bending of the single testis reaches forward in the body to a distance from the proximal end of the oesophagus about equal to the length of the latter. The terminal end of the testis is placed nearly at the middle of the body. The bursa encompassing the tip of the tail has on each side 2, 2, 3, 2 supporting-rays. (figs. 1, 2). The spicules, each of which are showing two longitudinal lists, are slightly curved and have a dilatation in

their proximal half. The proximal end is obliquely cut off; an accessory piece, triangular isosceles, is found (fig. 3).

It is beyond doubt that this form, just as the other members of the genus *Rhabditis*, is a nematode of putrefaction. They congregate where seaweed, probably also sea-animals lie rotting. Immediately after the material was collected it contained apparently no Rhabditides; it is impossible that I should not have observed this large form if it had been present in a tolerable number; probably some larvæ must have been present, but at any rate their number was so little prominent that they were not observed under the examination. First when the material had been standing for some time in my room in a glass-cup and I examined it anew, it proved to be swarming with *Rhabditis marina* in all stages of development, in short, that I had got a culture of this species. However a culture is not always so easily to be got. I have attempted it several times with a negative result; and a culture so beautifully developed as the first time I have not later succeeded in getting.

Zeiss Okularmikrometer A. Oc. 2.

Old female:

Length 195 = 3,1 mm.

Oes. 24.

Vulva 100.

Tail 10.

Width 8.

Young female:

Length 100 = 1,6 mm.

Oes. 18.

Vulva 55.

Tail 6.

Width 5.

Male:

Length 100 = 1,6 mm.

Oes. 16.

Width 4.

For the old female de Man's formula gives:  $\alpha = 24$ ,  $\beta = 8$ ,  $\gamma = 19\frac{1}{2}$ .

#### **Aphelenchus** sp.

All that I know about the genus *Aphelenchus* is that one species occurs in Denmark. A female was taken in the Kildeskov

the 20. 2. 10. After thawing weather for some days the lying snow had partly melted and the earth under the trees was covered with putrefying leaves; among these it was taken, only one specimen, together with *Plectus parietinus*, *Plectus granulatus* and *Cephalobus persegnis*. It did not appear to agree with any of the species of de Man. Accidentally I lost the specimen under the preparation and I have only these few notes and the measurements taken on the living animal.

Length 871  $\mu$ .

Oes. 79 -

Vulva 587 -

Tail 52 -

Width 19 -

Spear 13 -

#### **Tylenchus Davainei** Bastian.

1865. Bastian, p. 126. Pl. X. fig. 109—11.

1873. Bütschli, p. 37. T. I. and II. fig. 7 a—c.

1884. De Man, p. 151. T. XXIV. fig. 100.

I have only seen a few freeliving species of the genus *Tylenchus* and of these species only a single or a few specimens. *T. Davainei* was taken in Ordrup Mose behind Christiansholm. It was a mature female with one egg in the uterus and was found on roots of grass in sandy clay, July 1910.

#### **Tylenchus robustus** de Man.

1884. De Man, p. 144. T. XXII. fig. 92.

This species was taken in the „Vintappergaarden“s Mose on roots of grass, only a few specimens.

#### **Tylenchus dubius** Bütschli.

1873. Bütschli, p. 39. Tf. II. fig. 9 a—e.

1884. De Man, p. 145. T. XXII. fig. 93.

Hellerup Strandeng, a few specimens.

**Dorylaimus obtusicaudatus** Bastian.

1865. Bastian, p. 106. Pl. IX. fig. 41, 42.

1884. De Man, p. 167. T. XXVI. fig. 109.

1906. — p. 163, fig. 8, 9.

This specimen is exceedingly common and widely distributed. De Man writes: „Ich beobachtete es überall, in allen Gründen dieses Landes“; as to Denmark the same can be written. It was taken in the following localities:

Lynæs N. of the plantation; Dyrehaven at the Fuglesangssø; in the Kildeskov among putrefying leaves; Ordrup Mose, on roots of plants; Hellerup Strandeng, on roots of plants; Vintappergaardens Mose; Lyngby Mose, in moss; Eremitagesletten at Springforbi. On Langeland it was taken at Hjortholm, on roots of moss; in Jutland it was collected at Varde Aa; in a trench between Nørre Nebel and Nymindegab; in a pond at Lønne; in boggy land near Kandestederne; at Skagens Nordstrand in a ditch near the sea. Only once I met with a male specimen which was taken at Springforbi.

**Dorylaimus intermedius** de Man.

1884. De Man, p. 170. T. XXVII. fig. 113.

De Man writes about this species that the male is taken more frequently than the female, a rather isolated fact in this group. I have taken the species only twice, a male specimen at Lynæs, in the bog near the plantation and a female in the Kildeskov among putrefying leaves, in the month of February. The female was mature with 3 shell-eggs in the uterus.

**Dorylaimus eurydorys** n. sp.

Pl. III. fig. 25, IV. fig. 30.

At Varde Aa I have taken a short-tailed *Dorylaimus* that, as far as I can see, not has been described before. Unfortunately I have not got a mature female and consequently the description can only be deficient. The only two specimens which have been taken

is a male of a length of 7 mm. and a young female measuring 4,6 mm.

The front end tapers considerably and the head-like part is distinctly marked by a sharp constriction. The mouth is surrounded by 6, nearly globular lips each of which is provided with two rather prominent papillæ one superior and one inferior. Very characteristic is the spear which has a considerable width in its proximal end; it is rather short, narrowing quickly towards the apex. The oesophagus is slender in its distal third and increases evenly in width. The tail which has the same shape in both sexes is very short, conical with rounded end. In the young female the ovary is just laid down; from its position the future place of the vulva can be nearly judged to a little behind the middle of the body. — There are 17 preanal papillæ in the male arranged in five sets of 7, 3, 3, 3, and one quite near the anus. The spicules are rather large, slightly curved, thickest in the middle and provided with two longitudinal lists; accessory pieces small and pointed in their proximal end.

The two specimens were collected near the bank of Varde Aa; they were very sluggish in their movements.

#### ***Dorylaimus rhopalocercus* de Man.**

1884. De Man, p. 169. T. XXVII. fig. 111.

This form has been collected on a meadow near Hellerup on roots of *Bellis*. De Man indicates that the species lives in „die feuchte Erde unserer Wiesen und Marschgründe“.

#### ***Dorylaimus Carteri* Bastian.**

1865. Bastian, p. 106, Pl. IX. fig. 38—40.

1884. De Man, p. 177. T. XXIX. fig. 122.

It belongs to de Man's „omnivage Arten“. It was collected in Lyngby Mose, in moss; in Dyrehaven, near the Fuglesangssø where it was taken in mud on roots of plants; in Dyrehaven near Springforbi and in Ordrup Mose. In Jutland it was taken in

a pond near Lønne at Nørre Nebel and in the extensive bogs between Hulsig and Kandestederne.

**Dorylaimus acuticauda** de Man.

1884. De Man, p. 179. T. XXX. fig. 124.

Several specimens were collected, both sexes, in Nymindegab opposite to the mouth of the Ringkøbing Fjord. A little strand-meadow is found here at the foot of the dunes covered with grass and Armeria. On the roots of these plants it was found. The Danish specimens appear to be a little larger than those described by de Man.

Zeiss Okularmikrom. A. Oc. 2.

Length 145 = 2,3 mm.

Oes. 33.

Vulva 71.

Tail 5.

Width 4.

De Man's formula gives:  $\alpha = 36$ ,  $\beta = 4^{1/2}$ ,  $\gamma = 29$ .

De Man indicates:  $\alpha = 23-25$ ,  $\beta = 4$ ,  $\gamma = 30-35$ .

**Dorylaimus tenuis** n. sp.

Pl. V. figs. 39, 40, 42, 43, 46.

A very singular form belonging to this genus has been collected in Lyngby Sø. It occurs in mud on the roots of *Stratiotes aloides*. Several specimens were taken in the month of August both mature males and females, but none of the females contained shell-eggs in the uterus. Evidently the eggs had been newly laid as proved by the distension of the uterus (fig. 43). The shape of the animal is exceedingly thin, having almost the same width from head to tail. Only the front-end tapers rather quickly. The head is rounded, devoid of lips. Just behind the mouth occurs a ring-shaped thickening of the chitin-intima in which the spear moves. This is of the well-known usual shape and rather strong. The chitin-intima of the oesophagus is rather conspicuous. The distal

three quarters of the oesophagus are thin, from the beginning of the last fourth part it increases quickly. The vulva is placed a little before the middle of the body; the ante- and postvaginal part stand in the relation as 36 to 57. The tail is conical, pointed and its distal third is ventrally bent, forming a right angle with the proximal part. The female organ is bifid, the ovaries are relatively small; the uterus being rather spacious appears to be able to contain a considerable number of eggs. The hind part of the body of the male is ventrally bent. The number of the papillæ is nineteen, the hindmost is placed close before the anus, the space between the last four is twice the space between the others. The spicules are short, thick and provided with two longitudinal lists; the proximal end of the former is globular and no accessory pieces are seen (fig. 40).

The movements of the animal are exceedingly sluggish.

Zeiss Okularmikrom. A. Oc. 2.

Female:	Male:
Length 372 = 6 mm.	Length 287 = 4,6 mm.
Oes. 24.	Oes. 22.
Vulva 144.	Tail 8.
Tail 10.	Width 3.
Width 4.	

The formula of de Man gives  $\left\{ \begin{array}{l} \text{♀, } a = 93, \beta = 15\frac{1}{2}, \gamma = 37. \\ \text{♂, } a = 96, \beta = 13 \quad ; \quad \gamma = 36. \end{array} \right.$

### **Dorylaimus stagnalis** Dujardin.

1845. Dujardin, p. 231, T. III. fig. c.

1865. Bastian, p. 106, Pl. IX. fig. 35--37.

1873. Bütschli, p. 27, T. I. fig. 4 a—d.

1876. — p. 379, T. XXV. fig. 13 a—c.

1884. De Man, p. 186, T. XXXII. fig. 132.

1907. — p. 17, T. II & III. fig. 5.

As might well be expected this species is widely distributed in this country. It is not confined to the larger basins as lakes

and rivers but occurs in the smallest pools and ditches; moreover it has been taken in bogs in damp moss. On Sjælland it has been collected in Lyngby Mose, in Ordrup Mose, in Brønshøj Mose; at the Fuglesangssø in Dyrehaven together with *Ironus ignavus*; on the "Eremitageslette" near Springforbi and at the Furesø on roots of plants in the edge of the water. Moreover it has been collected on Langeland in a little pool in a garden. In Jutland it has been taken in a very ferruginous ditch between Skagen and Gammelskagen and in the bogs between Hulsig and Kandestederne. The male has only been taken once, namely in the Furesø, in a rather considerable number.

**Dorylaimus Bastiani** Bütschli.

1873. Bütschli, p. 29, T. I. fig. 3 a—b.

1884. De Man, p. 185. T. XXXI. fig. 131.

It was only taken once, in the bogs between Hulsig and Kandestederne, near Skagen.

**Dorylaimus longicaudatus** Bütschli.

1874. Bütschli, p. 20.

1884. De Man, p. 189, T. XXXIII. fig. 136.

Of the two very longtailed species this was collected most frequently. I can say nothing about its distribution in this country all the localities being in the surroundings of Copenhagen; it has been collected in „Vintappergaardens Mose“; at the Fuglesangssø in Dyrehaven, on roots of plants; in the Kildeskov and in Dyrehaven, near Springforbi. Males and females occur with the same frequency.

**Dorylaimus brigdammensis** de Man.

1884. De Man, p. 188, T. XXXII. fig. 135.

It was collected in Ordrup Mose, on roots of plants, both sexes.

**Dorylaimus macrolaimus** de Man.

Pl. IV. fig. 38, Pl. V. figs. 41, 44, 45, 47, 48.

1884. De Man, p. 191, T. XXXIII. fig. 138.

v. Daday, p. 125, T. XIV. fig. 12.

1907. De Man, p. 20.

This species, established by de Man in 1884 and later only collected by Daday in Hungary and by de Man near Meudon in France, has proved to be one of the most common Dorylaimi in Denmark and widely distributed in this country. On account of the presumed scarceness of the animal and in spite of its appearance being very characteristic I sent my first specimens to Dr. de Man asking his opinion, and he affirmed the correctness of my determination. In this country the species has been taken in the following localities: The first specimens were collected in Lynæs in a bog near the plantation and in a little pool behind the church. Then it was taken in Lyngby Mose where it occurs abundantly in the Sphagnum; moreover in Lyngby Sø itself in mud on the roots of Stratiotes together with *D. tenuis*. At the Furesø it has been collected among plants in the edge of the water together with *D. stagnalis*. On Langeland it has been taken in a pool on roots of plants. Finally I have one specimen from Jutland, a male taken on roots of plants near the bank of Varde Aa.

The species seems to vary within rather wide limits both as to largeness and — as can be seen by the noted measurements — with respect to the relative proportions. A female from Lyngby Sø with seven eggs in the uterus has a length of 2,8 mm; a female from the Furesø still without eggs in the uterus measures 4,0 mm. De Man notes for the female 4,5 mm; I have met with no specimens of that length. A male from Lynæs measures 2,04 mm in length, de Man's male had the length of 3,7 mm.

With respect to the male I have made a rather interesting observation which might perhaps prove to apply to other species,

f. i. *D. stagnalis* and perhaps to other genera too, in which the tail of the male is different from that of the female. In the month of June a male in moult was taken at the Furesø; the animal had the appearance of a female with long pointed tail, but the old cuticula contained a fully developed male with the tail rounded and with spicules and preanal papillæ. I give a figure of my preparation of this specimen (fig. 38); it proves that the young male has the shape of a female till maturation.

The number of the papillæ is varying individually in the male. De Man indicates 19 for his male; the same number I count in the above named male from Varde Aa; on the young male, still inclosed in the larval skin is seen 15; on a male from Lynæs I count 17; in another, abnormally having the papillæ arranged in groups I count 18. This specimen is figured (fig. 48).

As to the front part of the animal I do not find the Danish specimens agreeing perfectly with the figure and description of de Man; he writes: „Die Kopfregion ist abgesetzt, niedrig, scheibenförmig“. In the Danish specimens the front end is more rounded and the constriction behind the „head“ not so strongly marked.

Zeiss Okularmikrom. A. Oc. 2.

♀ with 7 eggs in the uterus.	♀ without eggs.	♂ from Lynæs.
Length 175 = 2,83 mm.	Length 247 = 4,00 mm.	Length 126 = 2,04 mm.
Oes. 40.	Oes. 52.	Oes. 42.
Vulva 85.	Vulva 127.	Tail 2.
Tail 10.	Tail 16.	Width 3.
Width 4.	Width 4.	
$\alpha = 44$	$\alpha = 62$	$\alpha = 42$
$\beta = 4\frac{1}{2}$	$\beta = 4\frac{1}{2}$	$\beta = 3$
$\gamma = 17\frac{1}{2}$	$\gamma = 15\frac{1}{2}$	$\gamma = 63$

**Dorylaimus doryuris** n. sp.

Pl. III. figs. 28, IV. fig. 29, 31.

On account of the peculiar form of the tail I have named this species *D. doryuris*. It has some resemblance with *D. Carteri*; there is also a resemblance with the form *centrocercus*, but in the form of the tail it is different from both of these and does not resemble any of the species of this genus which I know. It seems to be not uncommon in this country as it has been taken in rather different localities: in Lynæs on roots of plants near the harbour; in Kildeskoven among putrefying leaves and finally at the Furesø in the edge of the water on roots of plants. The male was not seen.

The body is slender, tapering rather quickly towards the front end; this is inconspicuously head-shaped, provided with little prominent lips each of which carries two inconsiderable papillæ. The spear is of the usual form and rather strong; two ring-shaped thickenings of the chitin-intima are seen. The oesophagus being slender in the distal half increases evenly and is in its proximal end provided with a thickening resembling an inconspicuous bulbus. On the limit between oesophagus and intestine is found a strongly marked constriction. The cells of the intestine contain dark refractive granules, arranged in groups. The tail is domical and provided with a rather quickly narrowing pointed spine inconspicuously bent towards the vent (fig. 29). Vulva is placed nearly in the middle of the body, often a little before, at times a little behind. The female organ is bifid; the antevaginal ovary is to its bending longer than the postvaginal. Four eggs are seen in the uterus. The animal appears to produce eggs all the year round.

I give the measurements for three females; the numbers 1 and 2 originate from Lynæs, the number 3 was taken in the Kildeskov.

## Zeiss Okularmikrom. A. Oc. 2.

1) Length 136 = 2,2 mm.	2) Length 142 = 2,3 mm.	3) Length 102 = 1,6 mm.
Oes. 31.	Oes. 31.	Oes. 17.
Vulva 63.	Vulva 65.	Vulva 59.
Tail 5.	Tail 6.	Tail 4.
Width 4.	Width 5.	Width 3.
$\alpha = 34$	$\alpha = 28$	$\alpha = 34$
$\beta = 4^{1/2}$	$\beta = 4^{1/2}$	$\beta = 6$
$\gamma = 27$	$\gamma = 24$	$\gamma = 25^{1/2}$

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1907. De Man, Contribution a la connaissance des Nématodes libres de la Seine et des environs de Paris (Ann. de Biol. lacustre. T. II.)
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## Explanation of Plates.

Zeiss' Microscope was used.

### Pl. II.

Figs.

1. *Rhabditis marina*, Bastian, ♂; tail in profile. Apochr. 8 mm, Comp. 8.
2. *Rhabditis marina*, Bastian, ♂; tail from the dorsum. Apochr. 8 mm. Comp. 8.
3. *Rhabditis marina*, Bastian, ♂; spicules. Homog. Imm.  $\frac{1}{12}$  Oc. 2.
4. *Rhabditis marina*, Bastian, ♀; female organs. Apochr. 8 mm, Comp. 4.
5. *Rhabditis marina*, Bastian, ♀; front part. Apochr. 8 mm, Comp. 8.
6. *Mononchus dolichurus*, n. sp. ♀; front part. Apochr. 8 mm. Comp. 8.
7. *Rhabditis marina*, Bastian, ♀; tail. Obj. E, Oc. 2.
8. *Oncholaimus oxyuris*, n. sp. ♀; female organs. Apochr. 8 mm, Comp. 4.
9. *Oncholaimus oxyuris*, n. sp. ♂; tail. Apochr. 8 mm, Comp. 8.
10. *Mononchus dolichurus*, n. sp. ♀; tail. Apochr. 8 mm, Comp. 4.
11. *Mononchus dolichurus*, n. sp. ♀; limit between the oesophagus and the intestine. Apochr. 8 mm, Comp. 4.
12. *Oncholaimus oxyuris*, n. sp. ♀; head. Obj. E. Oc. 2.
13. *Oncholaimus oxyuris*, n. sp. ♀; tail. Apochr. 8 mm, Comp. 8.

### Pl. III.

14. *Monohystera crassissima*, n. sp. ♀; hind part of the animal. Apochr. 8 mm, Comp. 4.
15. *Monohystera crassissima*, n. sp., ♂; spicules. Homog. Imm.  $\frac{1}{12}$  Oc. 2.
16. *Trilobus gracilis*, Bastian, ♀; tail with masculine papillæ. Apochr. 8 mm, Comp. 4.
17. *Mononchus spectabilis* n. sp., ♀; head. Apochr. 3 mm, Comp. 4.
18. *Prismatolaimus dolichurus*, de Man. Limit between the oesophagus and the intestine. After a sketch in my notes.
19. *Mononchus spectabilis*, n. sp., ♂; tail. Apochr. 8 mm, Comp. 8.
20. *Trilobus gracilis*, Bastian, ♀; the female organs from the specimen in which are found preanal masculine papillæ. Apochr. 8 mm, Comp. 4.
21. *Cylindrolaimus tristis* n. sp., ♀; head. Apochr. 3 mm, Comp. 4.
22. *Monohystera crassissima* n. sp., ♀; head. Homog. Imm.  $\frac{1}{12}$  Oc. 2.
23. *Cylindrolaimus tristis*, n. sp., ♀; tail. Apochr. 8 mm, Comp. 8.
24. *Dorylaimus doryuris*, n. sp., ♀; head. Apochr. Homog. Imm. 2 mm, Comp. 4.
25. *Dorylaimus eurydorys*, n. sp., ♀; head. Apochr. 8 mm, Comp. 8.

## Figs.

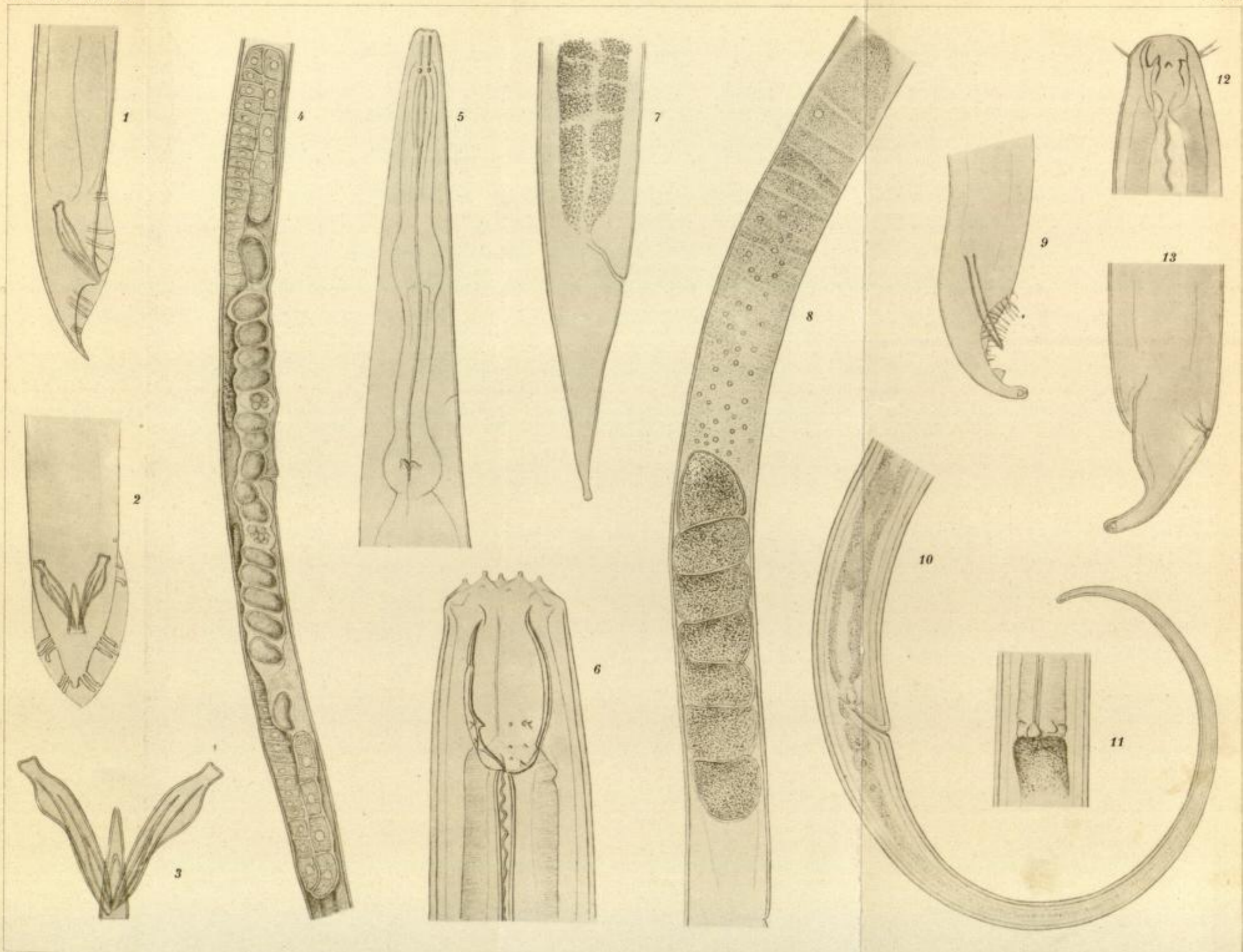
26. *Cylindrolaimus tristis*, n. sp., ♀; female organs. Apochr. 8 mm, Comp. 8.  
 27. *Mononchus spectabilis*, n. sp., ♀; female organs. Apochr. 8 mm, Comp. 4.  
 28. *Mononchus spectabilis*, n. sp., ♀; tail. Apochr. 8 mm, Comp. 8.

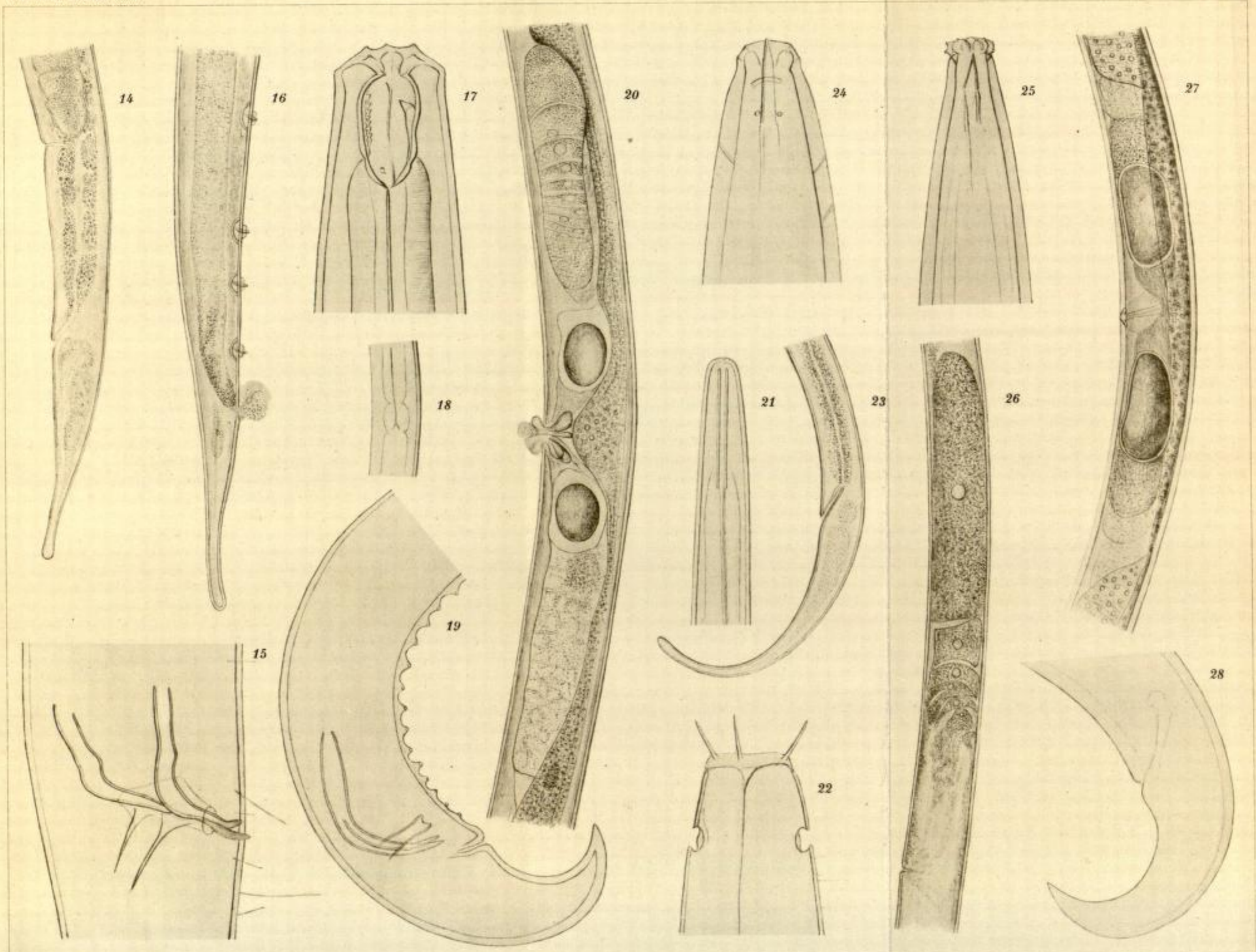
## Pl IV.

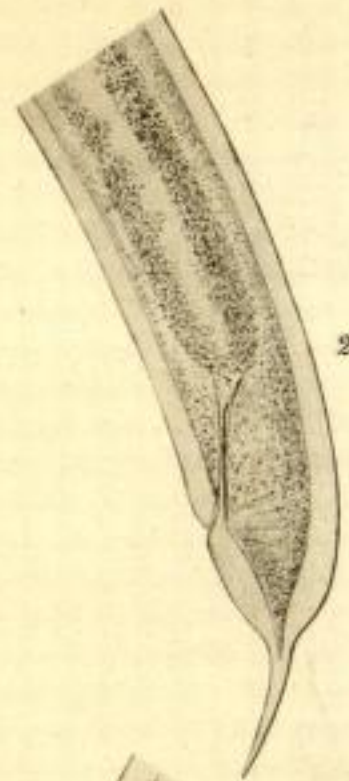
29. *Dorylaimus doryuris*, n. sp., ♀; tail. Apochr. 8 mm, Comp. 8.  
 30. *Dorylaimus eurydorys*, n. sp., ♂; tail. Apochr. 8 mm, Comp. 4.  
 31. *Dorylaimus doryuris*, n. sp., ♀; female organs. Apochr. 8 mm, Comp. 8.  
 32. *Spilophora geophila*, de Man, ♂; front part; Obj. E. Oc. 3.  
 33. *Ironus ignavus* Bastian; the musculature of the utero-vaginal-apparatus. Apochr. 8 mm, Comp. 8.  
 34. *Spilophora geophila*, de Man, ♂; tail. Obj. E. Oc. 3.  
 35. *Chromadora Örleyi*, de Man, ♂; tail. Obj. E, Oc. 3.  
 36. *Mononchus spectabilis*, n. sp., ♂; the spicules and their surroundings. Homog. Imm.  $\frac{1}{12}$  Oc. 2.  
 37. *Chromadora Örleyi*, de Man, ♀; front part. Obj. E. Oc. 3.  
 38. *Dorylaimus macrolaimus*, de Man; Young male in moult. Hind part of the animal. Apochr. 8 mm, Comp. 8.

## Pl. V.

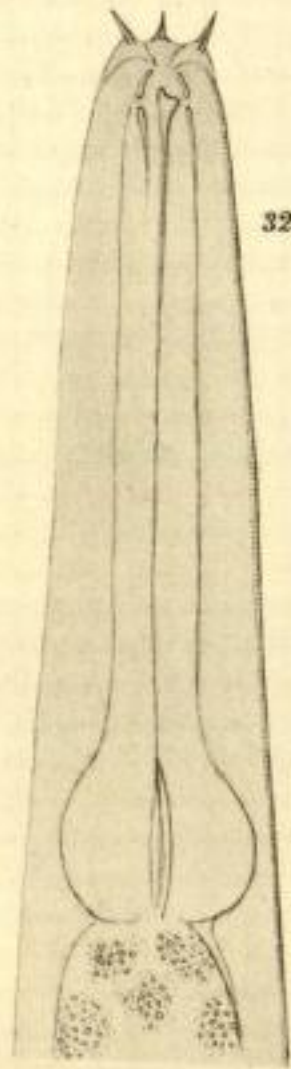
39. *Dorylaimus tenuis*, n. sp., ♀; tail. Apochr. 8 mm, Comp. 8.  
 40. *Dorylaimus tenuis*, n. sp., ♂; hind part of the animal. Apochr. 8 mm, Comp. 8.  
 41. *Dorylaimus macrolaimus* de Man, ♂; hind part of the animal, Obj. E. Oc. 2.  
 42. *Dorylaimus tenuis*, n. sp., ♀; head. Homog. Imm.  $\frac{1}{12}$ . Oc. 2.  
 43. *Dorylaimus tenuis*, n. sp., ♀; female organs. Obj. A. Oc. 3.  
 44. *Dorylaimus macrolaimus*, de Man, ♀; female organs. Apochr. 8 mm, Comp. 4.  
 45. *Dorylaimus macrolaimus*, de Man, ♀. Homog. Imm.  $\frac{1}{12}$ . Oc. 2.  
 46. *Dorylaimus tenuis*, n. sp., ♀; vulva. Apochr. 8, Comp. 8.  
 47. *Dorylaimus macrolaimus*, de Man, ♀; tail. Apochr. 8 mm, Comp. 4.  
 48. *Dorylaimus macrolaimus*, de Man; hind part of an abnormal male with the papillæ arranged in groups. (This figure shows two longitudinal lists instead of one; it is the list of the underlying spicule which has been erroneously placed here.)



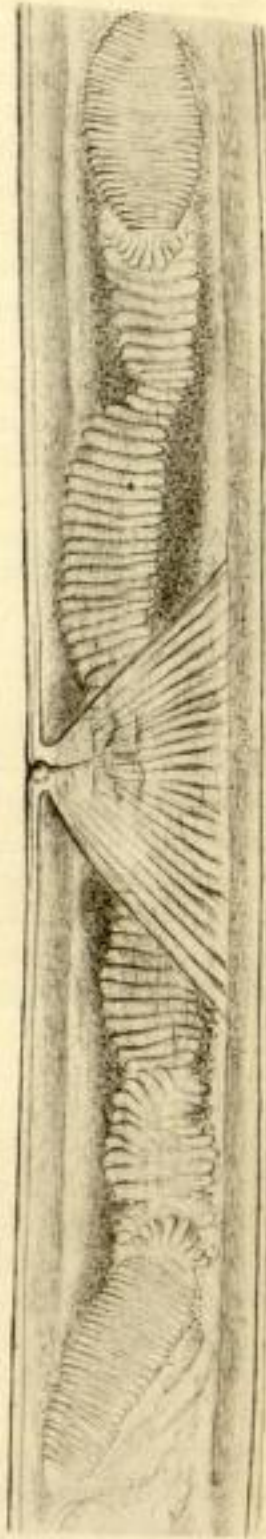




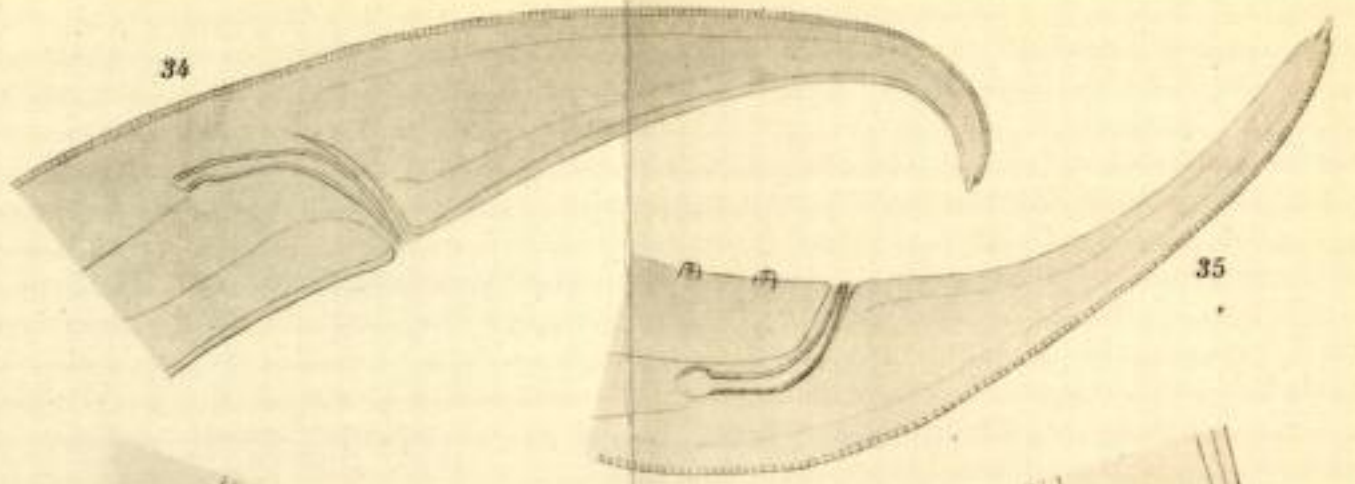
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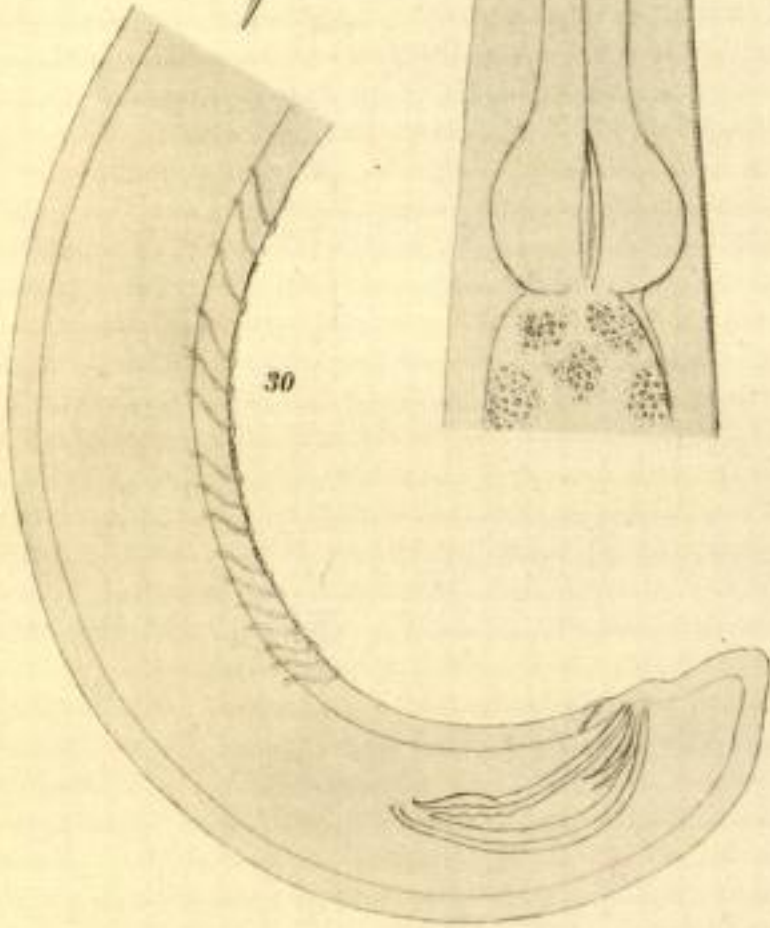


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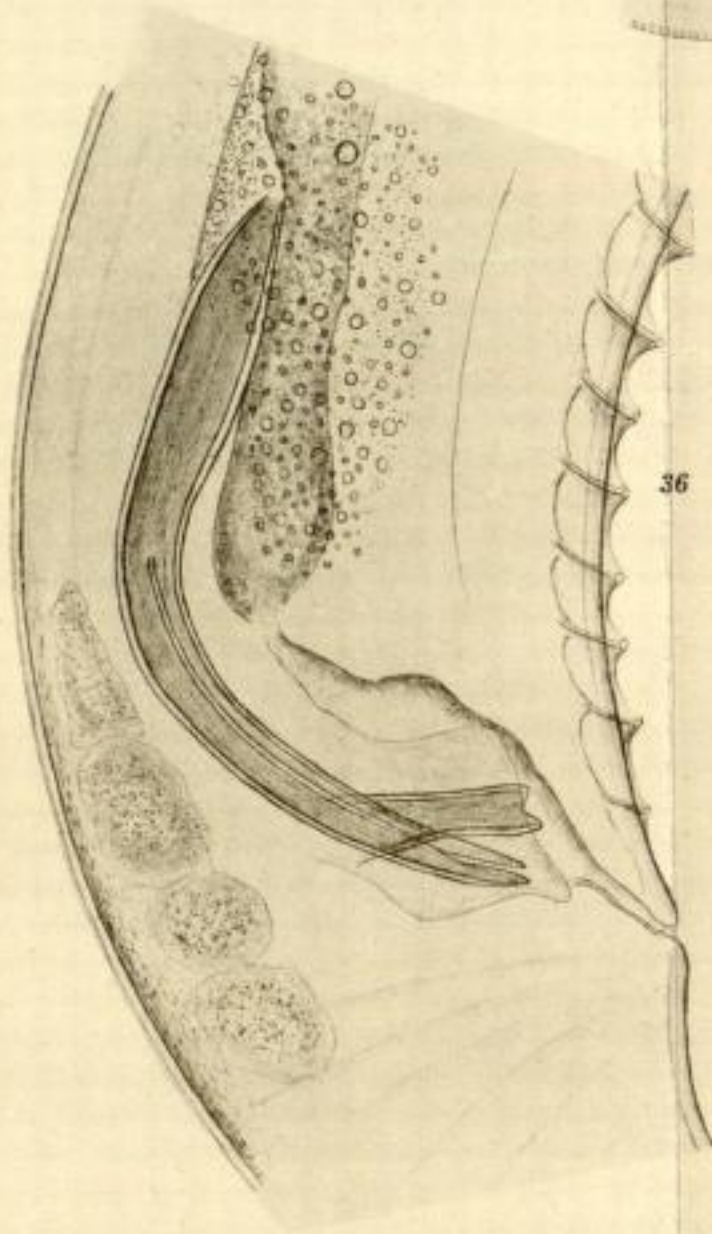


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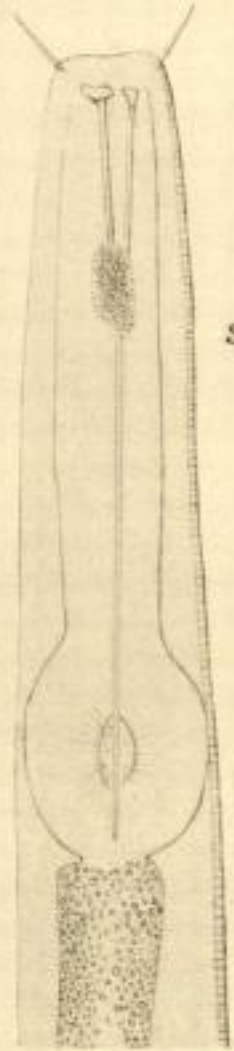
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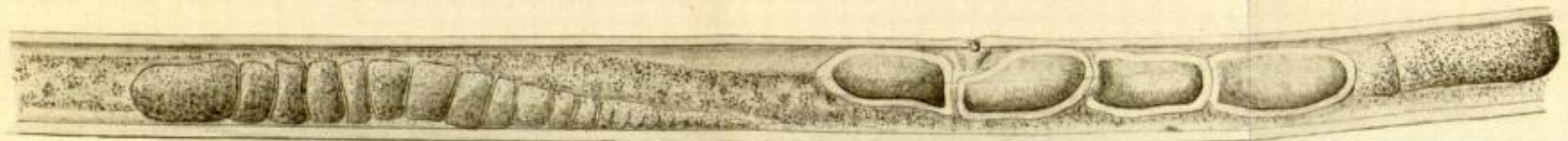
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37



38



31

