THE ROTIFER FAUNA OF WISCONSIN. IV.
THE DICRANOPHORINAE

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INTRODUCTION

Confusion has long reigned among the forcipate Notommatids or Dicranophorinae. Attention was called to the problem by De Beauchamp in his fundamental work of 1909, and Von Hofsten attempted in his papers of 1912 and 1923 to bring order out of the chaos without, however, achieving any striking results. With a large number of undescribed species belonging to this group on our hands some rearrangement becomes necessary.

As explained in earlier papers of this series, the work on the Wisconsin rotifers originated as a faunal list, but with the lapse of time it has unavoidably taken on somewhat larger proportions. Obviously no hopes were entertained at any time that it would be possible to exhaust the rotifer fauna of any such extensive territory, but it was thought practicable to reach within a reasonable time a stage where new species would be found only at rare intervals. This has been attained for Lecane and Monostyla, but for no other genera, and there is as yet no reason for hoping that it will be, at least not for the larger genera. Even now it is possible to go to old, favorite collecting grounds that have been visited regularly for years, and bring home a dozen undescribed rotifers in a week, always including some additions to the Dicranophorinae. We have therefore come to the conclusion that there is no real gain in deferring publication of descriptions and figures of the species found up to the present. Even an incomplete paper may be of some help, if it is taken only for what this claims to be: a collection of descriptions and figures of species studied by the writers, and nothing more. It should not
be considered a monograph of all existing Dicranophorinae; very evidently it deals with only a small fraction of the species that will eventually be described. Nevertheless, fragmentary as the work admittedly is, it may be of some service in making comparisons with the fauna of other regions without time-consuming correspondence and also as the only substitute for identified type material at present available.

We are indebted to Mr. David Bryce and to Mr. F. E. Cocks for essential material from England, and to Dr. P. de Beauchamp for drawings and material collected in France, and also for his friendly advice and cooperation. Herr J. Hauer, of Obereschach, Baden, kindly sent us material of what proved to be an undescribed species, which we take pleasure in naming for him.

In subdividing this group consideration has been given not only to the inert contour of the trophi, the sclerified parts of the mastax wall, but also to the musculature, which is probably less subject to specific variation and of deeper significance. The most primitive rotifer family, the Notommatidae, must have divided early into two branches, the Notommatinae, plant and detritus feeders, and the Dicranophorinae, carnivores. The originally malleate mastax has been correspondingly modified, the terminal types being the virgate or pumping and the forcipate, each with its subtypes. The most primitive type of the forcipate mastax is found in Dicranophorus, as constituted here; the mallei have been turned into the plane of the incus and the entire mastax is longitudinal with reference to the axis of the body. The unci have retained but a single tooth, showing occasionally remnants of a second; but they are hinged at or near their tips on the rami, the whole forming a highly efficient grasping organ. The muscles belonging to the mallei are well developed, the flexors attached to the external edges of the rami and the posterior ends of the manubria, the extensors to the anterior edges of the unci and the external edges of the manubria, passing over the joint.

In Encentrum the malleus muscles have been lost and the weak, needle-like unci ankylosed to the external edges of
the rami; even the original connection with the manubria has disappeared and they are distinctly separated longitudinally, the intervening space being filled by a sclerified invagination of the pharyngeal wall. The movements of this type of mastax are obviously extremely simple, the opening being performed by the muscles attached to the fulcrum and the posterior edges of the rami and alulæ, the closing by the circular muscles in the walls of the mastax.

In Aspelta the disposition of the musculature is much the same as in Encentrum, but the unci have lost all resemblance to their original form and are very irregular, roughly triangular, conchoid structures, attached with their inner surfaces to the external edges of the rami near mid-length; they are jointed to the anterior ends of the manubria and in some species at least remnants of the extensor muscles appear to persist.

The mastax of Albertia does not differ materially from Dicranophorus, if one may judge from A. naidis, figured by De Beauchamp, and the single species we have been able to study; little is known of the remaining forms. Streptognatha is probably nothing but an aberrant Dicranophorus, but it departs so widely that generic separation is necessary.

Erignatha is nearer to Dicranophorus than are Encentrum and Aspelta. The unci retain their form, but their basal joint of the manubria is in reality a triple joint, as they are articulated also to the external edges of the rami. The malleus muscles are less reduced than in Aspelta; the extensors are present, but the flexors lost.

A new genus, Itura, is proposed for Diglena or Eosphora aurita and related species. Material of the European species, drawings of the trophi kindly contributed by Dr. P. de Beauchamp, and the study of American material has convinced us that these forms are really specialized Notommatinae. Although the trophi strongly resemble the forci-pate type, they have retained remnants of the dorsal extensions of the rami, which are necessary for the support of the walls of the virgate mastax in order to withstand the hydrostatic pressure of the pumping action. The lateral view of the trophi shows clearly the basal apophysis, and the fulcrum also has the characteristic elongate form, ex-
panded posteriorly, which is found among the Notommatinae. And, last, but not least, the mastax is not protrusible; all Dicranophorinae, however specialized, are able to thrust the trophi through the mouth for half their length or more. For these reasons it seems justified to refer the genus Itura to the Notommatinae, where it occupies a rather isolated position; there are several genera and species in this subfamily that have become carnivorous, with consequent modifications of the mastax, such as Eosphora, Sphyrias and Eothinia, but they indicate the line of development, rather than any actual relationship.

Various redundant mastax elements are found in this subfamily, such as longitudinal rods supporting the ventral wall in Dicranophorus forcipatus, pectinate pieces for the same purpose in D. thysanus, L-shaped epipharyngeal rods in Erignatha clastopis etc.; it must not be forgotten that the normal elements of the trophi, even though very persistent and highly characteristic, are only sclerified or indurated local invaginations of the pharyngeal wall. De Beauchamp has demonstrated that the flexible cuticle, the loria and the trophi are identical in chemical composition, and the difference is simply one of varying degrees of hardening; there is consequently no serious hindrance to the development of new elements where needed.

No convincing answer to the question of the specific importance of the subserebral glands has been discovered. In the American representatives of the genus Itura and in Erignatha clastopis they are absent; in the corresponding European forms they are highly developed; records of the presence of the glandless forms in Europe or the glandulate forms in America are so far lacking. Under the circumstances an arbitrary decision is the only possible recourse: the presence or absence of subserebral glands has not been used as a specific distinction if unaccompanied by other anatomical differences. We believe, however, that they will eventually be demonstrated to be valid specific characters.

One of the most fascinating, and frequently one of the most puzzling, problems in the study of any group of animals is the question of geographical distribution. This
was ruled out in the very beginning by Ehrenberg, as far as the rotifers are concerned; his travels in Egypt and Nubia with Hemprich and later in Siberia with Humboldt, combined with the study of the fauna in the neighborhood of Berlin, proved to him that the same “Infusionsthierchen”, which included protozoa, diatoms, desmids and rotifers, were to be found anywhere on the face of the earth if water was present and a diligent search made for them. This view was propounded in spite of the already then well known fact that the higher groups of the animal kingdom exhibit very evident discontinuities and localizations in their distribution on land and in the ocean, caused by barriers of various kinds, dependent on the means of dispersion available to the group in question. However, the lower we descend in the scale of organization, the more effective and the more varied become the means of distribution, the barriers losing correspondingly in importance. The prevalent impression that the microscopic animals are cosmopolitan and that their distribution is not a problem, is therefore not difficult to account for, especially if the unsatisfactory condition of “invertebrate” taxonomy is considered; zoosegetic speculations are bootless without adequate descriptions of the species concerned.

As the rotifers are so readily transported, they have always been pressed into service as typical examples of a cosmopolitan group, whenever such were needed. This continued until Jennings published his Rotatoria of the Great Lakes, in 1900; although formally accepting the universal distribution theory, he emphasized the importance of variations in the environment. “The problem of the distribution of the Rotifera is, then, a problem of the conditions of existence, not a problem of the means of distribution”. We believe, on the strength of our own observations, that this is a correct statement of the problem. “Potentially cosmopolitan” the rotifers probably are, but, as used by Jennings, this refers principally to the means of distribution.

The rotifers must of necessity be a very old group, and we are evidently justified in the inference that any given species has at some time in the past had abundant opportunities to reach any given spot on the present-day land
surface of the globe. Our primary concern is then with the conditions of existence. Their importance became very evident when, some 15 years ago, we began to compare the lists of the rotifers found around Washington and in the neighborhood of Atlantic City. The differences were so great that we were completely at a loss as to how to account for them; hardly any species were to be found on both lists. The conclusion that there must be important differences in the environment seemed unavoidable; no geographic or physiographic barriers intervene to prevent a thorough mixing of the two faunas; the differences were tentatively attributed to the water and the substances present in solution, derived from the soil, but there was very little in the way of actual facts to start with. We knew that the natural waters of the region around Washington are moderately hard and of the New Jersey Coastal Plain at Atlantic City very soft. The District of Columbia, actually almost synonymous with the city of Washington, is on the dividing line between the Piedmont Plateau and the tertiary lowland; the soils are mainly unconsolidated cretaceous clays, sand and gravel, eroded and transported from the plateau. The surface waters are generally classed as moderately hard, containing appreciable amounts of calcium and magnesium salts in solution. The New Jersey Coastal Plain is a post-glacial elevation of the slightly sloping ocean bottom and the soil is sand; the surface waters are all acid and their solid contents extremely low.

The difference between “hard” and “soft” water is mainly the relative amount of dissolved calcium carbonate, so the most obvious line of attack was a determination of hardness and also of the total available carbon dioxide. This was continued for some time, until it seemed doubtful that any explanation would be forthcoming. The difference between hard- and soft-water rotifers could always be found; a glance at a collection told its origin at once. But the transition from one to the other was entirely too sharp, and, in addition, there were differences between hard-water rotifers and between soft-water rotifers that could not be explained by and did not agree with the variations in the amount of dissolved calcium salts.
The opportunity to study the rotifers of the state of Wisconsin offered a welcome opportunity to check what had already been learned. Geological conditions here are substantially parallel to both Washington and Atlantic City; the southern part of the state is covered with Silurian and Ordovician limestones and dolomites, and the surface waters are hard. In the northern counties the last stage of glaciation removed all soils down to the Archean and Proterozoic bed rock which the retreating glaciers eventually buried under 200–800 feet of till, derived from the siliceous Archean rocks in adjacent portions of Canada; the water in the numerous lakes and ponds is everywhere soft. The results of the rotifer collections agreed generally with what had been observed at Washington and in New Jersey; it was evident that rotifer distribution could not be correlated with dissolved calcium carbonate or total available carbon dioxide.

About this time our attention was called to the work of Coville and Wherry on soil acidity and plant distribution. This seemed to offer a promising line of attack. Hydrogen ion concentration was being demonstrated as very important in physiological processes and, if it plays a part in plant distribution, the same effect might hold good for rotifers. That this is really the case has been abundantly proved since systematic measurements of hydrogen ion concentration have been made, and we believe that we are justified in stating that rotifer distribution is directly dependent on it. Neutrality, or pH 7.0, seems to be the dividing line; above this, in alkaline waters, are found all the "cosmopolitan" rotifers, enormous numbers, but relatively few species. A complete change occurs when the reaction drops below pH 7.0; the number of individuals is much smaller, but there seems to be no end to the number of species. This continues until the acidity becomes very pronounced, and at pH 4.0 but very few species of rotifers remain. Some numerical comparisons of acid and alkaline waters may be of interest. During three months collections were made daily in alkaline waters of southern California, and 106 species were found; a single trip to Lenape Lake, near Atlantic City, made for the purpose of checking, netted 84 species. Exactly 100 species were collected in
one week among the hard water lakes and ponds around Madison, Wisconsin; the same number was gathered in one hour from a small, soft water lake at Eagle River, in northern Wisconsin.

The pH range of individual species appears to be as a rule quite narrow, from 2 to 3 units pH; a few are able to thrive through a greater range, but, as far as may be judged from field observations, they are not numerous. Perhaps, the most striking fact observed is the total disappearance of the genus Brachionus in acid waters, with the single exception of *B. polyacanthus*. It is now quite evident why no Brachionids were found in Johansen’s and Jessup’s collections in Alaska; the tundras are covered with sphagnum growing knee-high and decaying rapidly, with continuous accumulation of humic acid, leaching into the shallow pools and ponds. Two Euchlanids are especially interesting in this connection; *E. triquetra* is ubiquitous in alkaline waters, but not in acid, while *E. pellucida* is just as abundant in acid water, but has never been found in alkaline. The explanation of the rarity of certain rotifers is now fairly simple; acid waters are not common where rotifers have hitherto been studied most intensely. Thus, *Tetrasiphon hydrocora* (= *Copeus spicatus*) is usually accounted rare; as a matter of fact it is common in acid water regions. *Brachionus polyacanthus* was long supposed to be non-extant; it is simply an acid water form. The same is true of *Proales doliaris*, *Notommata saccigera*, *Plenotrophcha robusta*, *Cephalodella globata*, *C. eva*, *Lecane brachydactyla* and *L. ligona*, not to mention a host of recently described species; all are acid water animals, and it would be useless to search for them in alkaline ponds. It will now be fairly evident that, the large number of new rotifers we have found is not due to any superior skill or esoteric information, but solely to the fact that we have been fortunate enough to have had access to numerous bodies of water with different degrees of acidity.

The years given to the gathering of evidence that might establish a correlation between rotifer distribution and hydrogen ion concentration have gradually brought forth a considerable body of literature, bearing more or less directly on our subject. A few of the most important papers
are briefly noted below, as they tend to confirm our conclusions.

Skadovski has investigated the influence of hydrogen ion concentration upon the zooplankton at the Zvenigorod Biological Station. He finds that all the groups studied, Flagellata, Sarcodina, Ciliata, Rotifers and Entomostraca are limited to well defined pH ranges. Miss Tauson has contributed the results of her highly significant experiments on a species of Asplanchna, demonstrating that its entire life history is controlled by the hydrogen ion concentration of the water in which it lives, its appearance in the spring, its disappearance, feeding and sex determination. The latter is of the greatest interest and should be of far-reaching importance, solving, as it does, a baffling problem of long standing.

Attention may be called to Labbé's allelogenesis theory, which, if substantiated experimentally, should go far to clear up the so-called seasonal variations of many plankton organisms and establish their dependence on variations in hydrogen ion concentration.

A vast amount of work is necessary to determine the optimum and extreme conditions for each species before the dependence of rotifer distribution upon hydrogen ion concentration can be definitely established; this is at least in part a laboratory problem and beyond our facilities and powers. All that we are able to do is to indicate the probability of this interdependence. We do not mean that knowing the pH reaction, the composition of the rotifer fauna is determined; there are unquestionably other factors in this equation, but this is one that apparently must be satisfied. We are giving below some representative pH values from Atlantic county, New Jersey, and Mount Desert.

Island, Maine, which will aid in interpreting this and earlier papers. As far as we are able to learn "Annecta Pool" has the lowest pH reaction of any permanent body of water; the 3rd zone of Skadovski's Lutzino moor is also given as pH 3.8, but the water is here in the form of temporary pools in peaty soil.

In Atlantic county: "Annecta Pool", 3.8–4.0; "Paradise Ditch", 4.0–4.2; "Lost Pond", 4.4; Indian Cabin Creek, 4.5; Lenape Lake, 4.8; Marigold Creek, 5.2; Corduroy Creek, 5.3; Tuckerton, 5.4; Oceanville and Dorsey Creek, 5.6; Gravelly Run, and pond at Sea Isle City, 5.7; Estellesville, 6.2; Doughty Pond, 6.4; Bargaintown 6.4–6.6; Battsto, 6.6; Mullica River (brackish), 8.5; salt pools on meadows, 8.1–8.8. On Mount Desert Island, Maine, the conditions are more uniform: Round Pond, 5.8–6.2; Long Pond and Barcelona Creek, 6.0; Aunt Betties Pond, Fawn Pond and pond No. 1 at Manset, 6.2; Lake Wood, Lower Breakneck, Witches Hole, New Mill Meadow, Duck Brook and Pond Heath, 6.4; pond No. 2 at Manset, 6.6; Eagle Lake, Bubble Pond, Trout Brook, Half Moon Pond and Toad Hole, 6.8.

The species described in the present paper are listed below. The larger genera have been broken up into artificial groups with some common, preferably external, characteristic that may be of assistance in locating approximately an unfamiliar form.

Family NOTOMMATIDA.E.

Subfamily NOTOMMATINAE.

Genus Itura.

aurita ................................................ p. 685
causina ................................................ p. 688
proteroa .............................................. p. 690
viridis ................................................ p. 692
chamaedis ............................................. p. 694

Subfamily DICRANOPHORINAE.

Genus Diceranophorus.

Group A; rami with functional shearing teeth on inner margin.

Aa. Toes short, blunt, shearing teeth numerous.

forcipatus ............................................. p. 697
prionacis ............................................. p. 702
Harring & Myers—Rotifer Fauna of Wisconsin.—IV.

tegillus ........................................ p. 703
mesotis .......................................... p. 704
epicharis ........................................ p. 705
dolorus .......................................... p. 707
isothes .......................................... p. 708
thyssanus ....................................... p. 710
robustus ......................................... p. 711
stultus .......................................... p. 712
procestes ....................................... p. 714

Ab. Toes long; rami with 1–2 large, many small teeth.

artamus .......................................... p. 715
poncrus .......................................... p. 716
cestes ........................................... p. 717

Ac. Toes long, clawed, rami with 5 long, unequal teeth.

lütkeni .......................................... p. 718
semnus .......................................... p. 720

Group B; rami with few, rudimentary, non-functional shearing teeth; toes long, clawed.

alcimus .......................................... p. 721
aspondus ....................................... p. 723
capucinus ...................................... p. 724
haueri .......................................... p. 725
saevus .......................................... p. 726

Group C; rami without shearing teeth.

Ca. Rami with single terminal tooth.

Ca 1. Toes very long, slender.

corysitis ........................................ p. 727
strigosus ........................................ p. 729
facinus ......................................... p. 730
colastes ........................................ p. 731

Ca 2. Toes short, acute.

biasis ........................................... p. 732
myriophylli .................................... p. 733
scotius .......................................... p. 734
permollis ...................................... p. 735
difflugiarum ................................... p. 736
pennatus ........................................ p. 737
sebastus ........................................ p. 738

Ca 3. Toes long, slender; unci double.

cernuae ......................................... p. 740
grypus .......................................... p. 741
Cb. Rami with 2 terminal teeth; toes very long.

caudatus .................................................. p. 742
torvitus .................................................. p. 744
uncinatus ................................................ p. 745

Genus Streptognatha.

lepta ...................................................... p. 748

Genus Erignatha.

clastopis ................................................ p. 750
sagitta .................................................... p. 752
belodon .................................................. p. 753
capula ................................................... p. 754

Genus Encentrum.

Group A; corona frontal; toes short, decurved.

Aa. With subcerebral glands.

marinum .................................................. p. 756
cruentum ................................................ p. 758
lacadum .................................................. p. 759
nesites .................................................. p. 760
cristes .................................................. p. 761

Ab. Without subcerebral glands.

algente ................................................... p. 762
oculatum ................................................ p. 764
bellatinum .............................................. p. 765
parime .................................................. p. 766
boreale .................................................. p. 767
grande ................................................... p. 768

Group B; corona very oblique or ventral.

Ba. Toes short, stout.

felis ...................................................... p. 770
villosum ................................................ p. 772

Bb. Toes long and slender.

otois ..................................................... p. 773
elongatum ............................................. p. 774
zetetum ................................................ p. 775

Group C; toes short, weak, telescopic.

ricciae .................................................. p. 777
Group D; body plicate.

saunderiae ........................................... p. 778
plicatum .............................................. p. 780
luteiae .............................................. p. 781

Genus Aspelta.

Group A; trophi slightly asymmetric.
circinator ........................................... p. 783
aper .................................................. p. 785
labri ................................................ p. 786

Group B; trophi highly asymmetric.
angusta .............................................. p. 787
beltista .............................................. p. 788
psitta ............................................... p. 790
lestes ............................................... p. 791
imbata .............................................. p. 792
alastor ............................................. p. 793
clionata ............................................ p. 795
macra ............................................... p. 796

Genus Albertia.

typhlina ............................................. p. 798

As usual it is necessary to include quite a list of species that we have not seen. Some of these are perfectly good species, but the majority may perhaps as well be considered useless baggage; this applies to the species described by Ehrenberg, Schmarda, Hudson and Gosse, Bergendal and Glasscott, which have not up to the present been recognized and provided with adequate descriptions. *Theorus uncintatus* Ehrenberg, the type of *Theorus*, was described as being “ohne Stirnhaken”, probably a Proales or kindred species not belonging to this subfamily. *Diglena beauchampi* Von Hofsten is *Lecane clara* (Bryce).

*Albertia aciliata* RADKEVICH.


*Albertia anguiformis* (ISSEL).


Albertia bernardi HLAVA.

Albertia calva (CLAPARÈDE).

Albertia crystallina SCHULTZE.

Albertia intrusor GOSSE.

Albertia naidis BOUSFIELD.
Harrington & Myers—Rotifer Fauna of Wisconsin.—IV. 681

**Albertia vermiculus** Dujardin.


**Albertia woronkowi** Zernkevich.


**Dicyranophorus rostratus** (Dixon—Nuttall and Freeman).


**Diglena andesina** Schmarda.

*Diglena andesina* Schmarda, Neue wirbellose Thiere, vol. 1, 1859, p. 55, pl. 13, fig. 115.

**Diglena bidentata** (Lie—Pettersen).

*Pleurotrocha bidentata* Lie—Pettersen, Bergens Mus. Aarbog, 1905, No. 10, p. 32, pl. 2, figs. 6, 7.


**Diglena capitata** Ehrenberg.


**Diglena coezi** De Beaufchamp.


**Diglena contraria** Ehrenberg.

Diglена диадена SCHMARDА.
Diglena diadema SCHMARDА, Neue wirbellose Thiere, vol. 1, 1859, p. 54, pl. 13, fig. 113.

Diglена elongata GLASSCOTT.

Diglena heterodon SCHMARDА.
Diglena heterodon SCHMARDА, Neue wirbellose Thiere, vol. 1, 1859, p. 52.

Diglena hudsoni GLASSCOTT.

Diglena longipes SCHMARDА.
Diglena longipes SCHMARDА, Neue wirbellose Thiere, vol. 1, 1859, p. 55, pl. 13, fig. 114.

Diglena macrodonta SCHMARDА.
Diglena macrodonta SCHMARDА, Neue wirbellose Thiere, vol. 1, 1859, p. 54, pl. 13, fig. 112.

Diglena pachida GOSSE.

Diglena revolvens GLASSCOTT.

Diglena rosa GOSSE.

Diglena rousseleti LIE-PETTERSEN.
Diglena rousseleti LIE-PETTERSEN, Bergens Mus. Aarbog, 1905, No. 10, p. 34, pl. 2, figs. 9–11.
Diglena rugosa GLASSCOTT.


Diglena suilla GOSSE.

Diglena suilla GOSSE, Journ. Royal Micr. Soc., 1887, p. 365, pl. 8, fig. 9.—Hudson and GOSSE, Rotifera, Suppl., 1889, p. 29, pl. 31, fig. 24.

Diglena tenuidens DE BEAUCHAMP.


Distemma collinsii GOSSE.


Distemma dubia BERGENDAL.

Distemma dubia BERGENDAL, Acta Univ. Lundensis, vol. 28, 1892, sect. 2, No. 4, p. 100, pl. 6, fig. 31.

Distemma labiatum GOSSE.

Distemma labiatum GOSSE, in Hudson and GOSSE, Rotifera, 1886, vol. 2, p. 56, pl. 18, fig. 13.—Hood, Scottish Natural., vol. 11, 1891, p. 74.

Distemma larva EICHWALD.

Distemma larva EICHWALD, Bull. Soc. Imp. Nat. Moscou, vol. 20, 1847, pt. 2, 244, pl. 9, fig. 5.

Enconicum littorale (LEVANDER).


Enconicum murrayi BRYCE.


Enconicum mustela (MILNE).


Diglena mustela HUDSON and GOSSE, Rotifera, Suppl. 1889, p. 30, pl. 33, fig. 14.—Weber and Montet, Cat. Invert. Suisse, pt. 11, 1918, p. 130.

Pleurotrocha constricta Ehrenberg.


Pleurotrocha elegans Zavadowski.


Taphrocamp a nitida Lord.


Theorus uncinatus Ehrenberg.


Family NOTOMMATIDAE

Subfamily NOTOMMATINAE

Genus ITURA Harring and Myers, new genus

Notommatine rotifers with spindle-shaped, illoricate body, with a neck segment separating the head and abdomen; posteriorly the body is abruptly reduced to a relatively long, two-jointed foot with two short, pointed toes; the cloaca opens dorsally at the base of the foot, under a broad, projecting tail.

The corona is an elongate oval area covering the oblique anterior surface of the head and continuing beyond the mouth on the ventral surface as a slightly projecting chin; the marginal cilia are short, except on the auricles, which have long and powerful cilia adapted to swimming. The apical plate is enclosed by the marginal ciliation; the buccal
field is covered with short, dense cilia; the mouth is approximately in the center of the corona.

The mastax is a specialized form of the virgate type, but the pumping action has been lost; the trophi are asymmetric and very robust; the rami are lyrate, with large, deeply curved and pointed alulæ; the tips are armed with 5 to 15 slender, pointed teeth; on the inner edges of the rami there is a broad, striate, denticulate lamella on one or both sides. The fulcrum is rather short and somewhat expanded posteriorly. The unci are single-toothed, with an accessory tooth at the tip. The manubria are long, broadly expanded anteriorly and crutched or abruptly curved posteriorly; the piston, if present at all, is rudimentary.

The retrocerebral sac is long; subcerebral glands are present in some species and not in others. The cervical eye-spot is at the end of the ganglion; near the opening of the ducts of the sac are two frontal eye-spots.

**ITURA AURITA** (Ehrenberg)

Plate 23, figures 1-4.


*Typhlina canicula* EHRENBERG, in Hemprich and Ehrenberg, Symbolae Physicae Anim. Evert., 1831, Phytozoa, pl. 1, fig. 16; not Vorticella canicula Müller.

The body is elongate, spindle-shaped and gibbous posteriorly; its greatest width is about one fourth of the total length. The integument is very flexible and the outline variable. The body is colored green by symbiotic zoochlorellae.

The head and neck segments are of nearly equal width, the head slightly longer than the neck, with a well marked transverse fold separating the two. The abdomen increases gradually in width towards the rounded posterior end; in young animals the cuticle is striate or faintly plicate. The tail is short, broad and rounded posteriorly. The foot is relatively long, slightly tapering and two-jointed. The toes are short and conical, with slightly blunted points; their length is about one twentieth of the total length.

The dorsal and lateral antennae are small setigerous papillae in the normal positions.

The corona extends down on the ventral side about one third of the length of the body; the post-oral portion pro-
jets from the body as a slight chin. The auricles are rather small and the ciliation continuous with the corona.

The mastax is virgate, but the pumping action appears to be lost. The trophi are asymmetric and very robust. The rami are lyrate, broad and strongly divergent at the base, continuing as parallel, rather slender rods of irregularly triangular cross section, abruptly bent inward and knobbed at the tip, which is armed with five or six long acutely pointed and slightly divergent teeth. The basal apophysis, characteristic of the Notommatinae, is preserved as a broad, rounded elevation on the ventral surface of the rami, as shown in the lateral view. On the dorsal side there is an irregularly triangular lamella, an atrophied remnant of the normally hemispherical dome-like structure of the virgate mastax; a comb-like element, shown in figure 4, is imbedded in the tissues on each side of the mouth, the rib-like sections facing each other and the broad ends towards the ventral side. On the inner margin of the left ramus is a thin, narrow lamella, beginning at the base and continuing nearly to the terminal knob; on the right ramus is a broad finely striated and denticulate lamella, beginning at the base and continued to the long anterior teeth. The alulæ are very large, acutely pointed and curved, continuing as thin lamellæ nearly to the tips, the right much broader than the left. The fulcrum is as long as the rami, broad at the base, reduced in the middle and expanded posteriorly. The unci are long, stout, slightly curved and acutely pointed; near mid-length is a knob-like enlargement, resting on the rami and serving as a hinge in the movements of the mallei; to it is attached a large secondary tooth, diverging slightly from the main tooth. The manubria are as long as the incus, nearly straight, broadly expanded anteriorly and abruptly curved posteriorly. The mastax as a whole is not protrusible through the mouth, but the unci evidently are, and there can be little doubt that the animal is carnivorous.

Gastric glands are absent, as in the majority of rotifers sheltering symbiotic zoochlorellae. The stomach has anteriorly two blind, fingerlike caeca, extending forward on the sides of the mastax almost to the ganglion; there is no separation between the stomach and intestine. A bladder
is not present, the lateral canals apparently emptying directly into the cloaca. The foot glands are slender, cylindrical and nearly as long as the foot.

The retrocerebral sac is nearly spherical and its contents granular; the duct is bifurcate anteriorly, slender and so long that the sac itself reaches almost to the posterior end of the mastax. The subcerebral glands are nearly as long as the sac, ribbon-like, vacuolate and pointed posteriorly, where they conform to the outline of the sac. The cervical eyespot is at the end of the ganglion and near the openings of the duct are two frontal eyespots.

Total length of specimens studied, 180–200\(\mu\); toes 9–10\(\mu\); trophi 45\(\mu\).

The material for this description was kindly placed at our disposition by Dr. P. de Beauchamp, who collected it in the Jardin de L'Arquebuse, at Dijon, and records this form also from the neighborhood of Paris, Strasbourg and Bourg-en-Bresse; he believes this to be Ehrenberg's Diglena aurita, as his figures indicate the longitudinal division of the ramus, and in our opinion this conclusion is fully justified. It will be understood that the literature citations may refer to any one of the forms here described; there is not now any possibility of separating them properly.

**ITURA CAYUGA** Harring and Myers, new species

Plate 23, figure 5.

The body is elongate, spindle-shaped and gibbous posteriorly; its greatest width is about one fourth of the total length. The integument is very flexible and the outline variable. The body is colored green by symbiotic zoochlorellae.

The head and neck segments are of nearly equal width, the head slightly longer than the neck, with a well marked fold separating the two. The abdomen increases gradually in width towards the rounded posterior end; in young animals the cuticle is striate or faintly plicate. The tail is short, broad and rounded posteriorly. The foot is fairly long, about one seventh of the total length, slightly tapering and two-jointed. The toes are short, conical and pointed; their length is about one twentieth of the total length.
The dorsal antenna is a small, setigerous pit in the normal position; the lateral antennae are tubular, with a small tuft of sensory setae.

The corona extends down on the ventral side about one third of the length of the body; the post-oral portion projects from the body as a rudimentary chin. The auricles are rather small and the ciliation continuous with the corona.

The mastax is virgate, but the pumping action is lost. The trophi are asymmetric and robust. The rami are lyrate, broad and strongly divergent at the base, continuing as parallel, rather slender rods of irregularly triangular cross section, abruptly bent inward and knobbed at the tip, which is armed with five or six long, acutely pointed and slightly divergent teeth. The basal apophysis, which is nearly always present in the Notommatinae, is preserved as a broad rounded elevation on the ventral surface of the rami. On the dorsal side there is a remnant of the triangular, lamellar extension of the rami in I. aurita, similar in form, but smaller; the oral combs are also present in this species. On the inner margin of the left ramus is a thin, narrow lamella nearly as long as the ramus itself, on the right a broad, finely striated, denticulate lamella, continuing from the base to the terminal, toothed knob. The alulae are large, pointed and decurved, with a lamellar extension continuing nearly to the tips, the right much broader than the left. The fulcrum is as long as the rami, broad at the base, reduced in the middle and expanded posteriorly. The unci are long, stout, slightly curved and acutely pointed; near mid-length is a knoblike enlargement resting on the rami and serving as a hinge; to it is attached a large secondary tooth, diverging slightly from the main tooth. The manubria are as long as the incus, nearly straight, broadly expanded anteriorly and abruptly curved posteriorly. The mastax is not protrusible through the mouth.

Gastric glands are absent. The stomach has anteriorly two blind, fingerlike caeca, extending forward on the sides of the mastax almost to the ganglion; there is no distinct separation between stomach and intestine. A bladder is not present, the lateral canals emptying directly into the
cloaca. The foot glands are very long, slender and slightly clubshaped.

The retrocerebral sac is nearly spherical and its contents granular; the duct is bifurcate anteriorly, slender and so long that the sac reaches nearly to the posterior end of the mastax. Subcerebral glands are not present. The cervical eyespot is at the end of the ganglion and near the openings of the duct are two frontal eyespots.

Total length 275–350μ; toes 14–18μ; trophi 45μ.

*Itura cayuga* has been found in Fairmont Park, Philadelphia, and Dr. R. Petrie of Johnstown, New York, has sent us material collected near there. It is closely related to *I. aurita*, the principal difference being the total absence of the subcerebral glands; in addition to this, the foot and foot glands are considerably longer, the posterior extension of the rami is much smaller and thinner, and the lateral antennae are tubular. It seems advisable to separate this form as a distinct species, until more is known about the genus.

**ITURA PROTERVA Harring and Myers, new species**

Plate 23, figures 6, 7.

The body is elongate, slender, spindle-shaped and gibbous posteriorly; its greatest width is less than one fourth of the total length. The integument is very flexible and the outline somewhat variable. The body is colored green by symbiotic zoochlorellae.

The head and neck segments are of nearly equal width, the head longer than the neck, and two well marked transverse folds separating head, neck and abdomen. The abdomen increases gradually in width towards the rounded posterior end; in young animals the cuticle is striate. The tail is short, broad and rounded posteriorly. The foot is rather short, about one eighth of the total length, conical and two-jointed. The toes are short, slender, blade-shaped and acutely pointed; their length is about one sixteenth of the total length.

The dorsal antenna is a small setigerous pit in the normal position; the lateral antennae are tubular, with a small tuft of sensory setae.
The corona extends down on the ventral side about one third of the length of the body; the post-oral portion projects from the body as a rudimentary chin. The auricles are rather small and the ciliation continuous with the corona.

The mastax is virgate, but the pumping action is lost. The trophi are asymmetric and very robust. The rami are lyrate, broad and strongly divergent at the base, continuing as parallel, rather slender rods of irregularly triangular cross section, bent inward and knobbed at the tip, which is armed with five or six long, acutely pointed and slightly divergent teeth. The basal apophysis is present as a broad, rounded elevation on the ventral surface of the rami. The dorsal extension of the rami in *I. aurita* is totally lacking; the oral combs are, however, present. On the inner margin of the left ramus is a thin, narrow lamella, extending nearly the full length of the ramus; on the right is a broad, finely striated, denticulate lamella, continuing from the base to the knobbed tip. The alulæ are large, pointed and decurved, with lamellar extensions continuing nearly to the tips, the right much broader than the left. The fulcrum is as long as the rami, broad at the base, reduced in the middle and expanded posteriorly. The unci are long, stout, slightly curved and acutely pointed; near mid-length is a knoblike enlargement, resting on the rami and serving as a hinge; to this is attached a large secondary tooth, diverging slightly from the main tooth. The manubria are as long as the incus, nearly straight, broadly expanded anteriorly and abruptly curved posteriorly. The mastax is not protrusible through the mouth.

Gastric glands are absent. The stomach has anteriorly two blind caeca, extending forward on the sides of the mastax nearly to the ganglion; there is no distinct separation between stomach and intestine. A bladder is not present, the lateral canals emptying directly into the cloaca. The foot glands are long, slender and clubshaped.

The retrocerebral sac is nearly spherical and its contents granular; the duct is bifurcate anteriorly, slender and so long that the sac reaches nearly to the posterior end of the mastax. Subcerebral glands are not present. The cervi-
cal eyespot is at the posterior end of the ganglion and near the openings of the duct are two frontal eyespots.

Total length 300–400μ; toes 18–22μ; trophi 45μ.

Itura proterva is common in weedy ponds and pools near Washington, District of Columbia. The principal differences between this species and I. cayuga are the total absence of the posterior extensions of the rami and the very different form of the toes; it appears also to be consistently larger.

**ITURA VIRIDIS** (Stenroos)

Plate 24, figures 1, 2.


The body is elongate, slender, spindle-shaped and gibbous posteriorly; its greatest width is less than one fourth of the total length. The integument is very flexible and the outline somewhat variable. The body is colored green by symbiotic zoochlorellae.

The head and neck segments are of nearly equal width, the head longer than the neck, with a well marked transverse fold separating the two. The abdomen increases gradually in width towards the rounded posterior end. The tail is short, broad and rounded posteriorly. The foot is rather short, slightly tapering and two-jointed. The toes are short, conical and pointed; their length is about one twentieth of the total length.

The dorsal and lateral antennae are small setigerous pits in the normal positions.

The corona extends down on the ventral side about one third of the length of the body; the post-oral portion projects from the body as a rudimentary chin. The auricles are rather small and the ciliation is continuous with the corona.

The mastax is virgate, but the pumping action is lost. The trophi are asymmetric and very robust. The rami are lyrate, very broad at the base and taper gradually towards the tips, which are irregularly knobbed and armed with about 12 acutely pointed, slightly divergent teeth. The basal apophysis is barely indicated on the ventral sur-
face of the rami. On the inner margin of the right ramus there is a broad, striate, denticulate lamella, beginning near mid-length and adjoining the anterior teeth without any interspace; the left ramus is entirely without any armature on the inner edge. The alulæ are very large, broad at the base, abruptly decurved and pointed posteriorly. The fulcrum is nearly as long as the rami, broad at the base and gradually narrowed towards the posterior end. The unci are long, very stout, nearly straight and acutely pointed; near mid-length is a slight enlargement, resting on the rami and serving as a hinge; to this is attached a large secondary tooth. The manubria are as long as the incus, broadly expanded anteriorly, slightly curved and strongly crutched posteriorly. The mastax is not protrusible through the mouth and the posterior extension of the rami is absent.

Gastric glands are absent. The stomach has anteriorly two blind caeca, extending forward on the sides of the mastax nearly to the ganglion; there is no distinct separation between stomach and intestine. A bladder is not present, the lateral canals opening directly into the cloaca. The foot glands are long, slender and slightly clubshaped.

The retrocerebral sac is pyriform and vacuolate, giving it the appearance of being filled with small round balls; the duct is bifurcate anteriorly, slender and relatively short, so that the sac extends only slightly beyond the ganglion. In the European form of this species the subcerebral glands are nearly identical with the glands of *I. aurita*, extending to the posterior end of the mastax; in the American form the subcerebral glands are totally lacking. The cervical eyespot is at the posterior end of the ganglion and near the openings of the duct are two frontal eyespots, with accessory external pigment spots.

Total length 300–400μ; toes 16–20μ; trophi 45μ.

*Itura viridis* differs from the *aurita*-group in the much shorter retrocerebral sac, vacuolate in this species and *I. chamadis*, granular in *aurita*; the form of the trophi is also quite different. The American form agrees in every detail, as far as we know, with the European, but lacks the subcerebral glands; for the present it may be advisable to
leave them as varieties of a single species. We are indebted to Dr. P. de Beauchamp for material and sketches of the European form, collected at Bourg-en-Bresse and St. Roman-de-Colbosc (Seine-Inférieure); our specimens were collected in Fairmount Park, Philadelphia, and by Dr. R. Petrie, of Johnstown, New York, in "Warrens pool."

**ITURA CHAMADIS** Harring and Myers, new species

Plate 24, figures 3-5.

The body is relatively short, broad and strongly compressed dorso-ventrally; its greatest width is about one third of the total length. The body is colored green by symbiotic zoochlorellae, but they are much less numerous than in other species of this genus and lighter in color, evidently a different symbiont.

The head and neck segments are of approximately equal width, the head longer than the neck, and well marked transverse folds separating the two. The abdomen increases rapidly in width towards the broadly rounded posterior end and is strongly depressed. The tail is short, very broad and rounded posteriorly. The foot is long, fairly slender, slightly tapering and two-jointed; it is covered by the projecting abdomen and tail to the base of the second joint. The toes are long, slender, conical and acutely pointed; their length is about one twelfth of the total length.

The dorsal and lateral antennae are small setigerous papillae in the normal positions.

The corona extends down on the ventral surface about one third of the length of the body; the post-oral portion projects from the body as a rudimentary chin. The auricles are rather small and the ciliation is continuous with the corona.

The mastax is a specialized form of the virgate, but the pumping action is lost. The trophi are very large and robust. The rami are lyrate, very broad at the base and taper gradually toward the tips, which are bent inwards and have a small knoblike projection, thus forming a shallow notch in which the uncus rests; on the tips are 5 needle-like teeth and below these a broad, striate, denticulate lamellae, nearly half as long as the rami, the left slightly narrower than the right. The alulae are very large, sickle-
shaped and acutely pointed posteriorly. The unci are short, very stout, slightly curved and acutely pointed; near mid-length is a slight knob-like enlargement, resting on the rami and serving as a hinge; to this is attached a large secondary tooth. The manubria are somewhat longer than the incus, broadly expanded anteriorly, slightly curved and crunched posteriorly. The mastax is not protrusible through the mouth and the posterior extension of the rami is absent.

No gastric glands are present. The stomach has anteriorly two blind caeca, extending forward on the sides of the mastax nearly to the ganglion; there is no distinct separation between stomach and intestine. A bladder is not present, the lateral canals opening directly into the cloaca. The foot glands are very long and nearly cylindric.

The retocerebral sac is pyriform and vacuolate, giving it the appearance of being filled with small round balls; the duct is bifurcate anteriorly, slender and relatively short, so that the sac extends only as far as the middle of the mastax. Subcerebral glands are not present. The cervical eyespot is at the end of the ganglion and near the openings of the ducts are two frontal eyespots, each accompanied by an external pigment spot.

Total length 450–500μ; toes 36–40μ; trophi 60μ.

Ithura chamadis was collected in Fairmont Park, Philadelphia. It differs considerably from other species of the genus, notably in the form of the mastax, the depressed abdomen and the light yellowish-green color of the body; the animal is hardly ever seen swimming, but glides slowly over the bottom with constant change of direction, and it is very difficult to narcotize, as compared with the other species of the genus.

Subfamily DICRANOPHORINAE

Notommatid rotifers with elongate, spindle-shaped or fusiform, illoricate or partially loricate body, with a well marked neck separating the head and abdomen; posteriorly the body tapers to a small, conical foot with two toes, varying in length in different species.
The corona is oval and ventral, with the mouth at the center, or subcircular and oblique, with the mouth at the ventral edge; the marginal cilia are short, with the exception of two lateral, auricle-like tufts of long cilia. The rostrum is large and not enclosed by the marginal ciliation, except in one species. The buccal field is evenly ciliated.

The mastax is forcipate, a specialized form of the mal-leate type, with the mallei in the plane of the incus, and the trophi protrusible through the mouth for capturing prey. The rami are lyrate, terminating in one or two stout, incurved teeth, the inner margin frequently with shearing teeth; the uncus with one, rarely two teeth, hinged at the tips of the rami or firmly united with them; the manubria are long.

The retrocerebral sac is usually present, the subcerebral glands rarely. Eyespots, when present, usually two, frontal.

Genus DICRANOPHORUS Nitzsch

Dicranophorine rotifers with elongate, fusiform, usually partially loricate body; a head segment, separated from the abdomen by a distinct neck; the abdomen is subcylindric, tapering posteriorly to a small tail; foot conical and rather small; length of toes variable.

The corona is long, narrow and nearly ventral, with two lateral, auricle-like tufts of long cilia; the rostrum is prominent.

The trophi are forcipate, the rami lyrate, frequently with shearing teeth on inner margin; fulcrum short and broad, alulae prominent; the unci are long, with one or two teeth, hinged on the tips of the rami; the manubria long and stout, expanded anteriorly; many species have salivary glands.

The retrocerebral sac is usually large, subcerebral glands wanting; two frontal eyespots in nearly all species.

*Type of the genus.—Dicranophorus forcipatus* (Müller) = *Cercaria forcipata* Müller.

The reasons for not using the name *Diglena* were given in part II under *Cephalodella*. The type of *Diglena* Ehren-
berg is *D. catallina*, which is not congeneric with *Dicranophorus forcipatus*. It is perfectly true that Müller's figure of *Cercaria forcipata* is unrecognizable, as stated by De Beauchamp; the best that can be said for it is, that it can not be proved to be something else. But as Ehrenberg cites it without qualification as a synonym of his *Diglerna forcipata*, including names given by Lamarck, Nitzsch etc., there are no good reasons for not adhering to the strict interpretation of the rules. This permit the retention of the specific name *forcipatus*, which is of some advantage; having already lost the generic name, there is nothing to be gained by throwing the specific name after it. And, last, but not least, by accepting Müller's specific name, with Nitzsch's generic, we are spared the necessity of using Bergendal's ridiculous combination *Arthroglerna*, "jointed eyeballs."

**DICRANOPHORUS FORCIPATUS** Müller

Plate 25, figures 3-4.


? *Cercaria vermicularis* MÜLLER, Animalcula Infusoria, 1786, p. 133, pl. 20, figs. 18-20.

*Cercaria forcipata* MÜLLER, Animalcula Infusoria, 1786, p. 134, pl. 20, figs. 21-23.


Kermodon ehrenbergii Corda, Almanach de Carlsbad, vol. 13, 1843, p. 230, pl. 2, figs. 9–12.


The body is moderately elongate, rather slender, subcylindric and very slightly gibbous posteriorly; the ventral surface is straight. The integument is leathery and the outline is fairly constant. The animal is usually fairly transparent.

The head is long, about two fifths of the length of the body, and separated from the abdomen by a well marked neck. The corona is almost ventral and nearly as long as the head. The rostrum is short, broad, rounded anteriorly and strongly decurved. The abdomen is relatively short,
nearly cylindric and very slightly gibbous at about two thirds length, tapering gradually towards the very small tail. The integument is divided longitudinally by well marked lateral sulci, increasing in width towards the posterior end, into a dorsal and a ventral plate, limited posteriorly by a transverse fold. The foot is short, very stout and oblique anteriorly. The toes are fairly short, about one sixth of the total length, almost straight, stout, slightly tapering and end in bluntly conical tips.

The trophi are large and stout. The rami are broadly triangular at the base and taper gradually to the strongly curved, bifid, terminal teeth; the median opening is large and pyriform and the inner margin is armed with 7–9 large teeth, decreasing gradually in size towards the fulcrum. The alulæ are rather small and triangular, continuing forwards as a winglike lamella more than half the length of the ramus. The fulcrum is about half as long as the rami, broad and triangular. The unci are very long and strongly curved, with one large, robust, ventral tooth and an attached, linear, dorsal tooth; the ventral tooth has at two thirds length a knoblike enlargement, resting on the rami and serving as a hinge. The manubria are slightly shorter than the incus, stout, straight and knobbed posteriorly, with broad, lamellar, anterior expansions for the attachment of the muscles. No salivary glands are present.

The gastric glands are small and rounded. The stomach and intestine are not distinctly separated. The ovary and bladder are normal. The foot glands are rather small and clubshaped.

The retrocerebral sac is moderately large and its contents granular; the duct is well marked and bifurcate anteriorly, and the line of granules easily traced to the front. The two eyespots are very small and at the base of the rostrum.

Total length 300μ; toes 50μ; trophi 50μ.

*Dicranophorus forecipatus* is not common in the United States and according to our records it is apparently to be found in neutral or slightly acid water. We have collected it on Mount Desert Island, Maine, in Oneida and Vilas coun-
ties, Wisconsin and around Atlantic City. Dr. P. de Beau-
champ set us material from Strasbourg, France, and Mr.
David Bryce from near London, England. Whether this
is actually the species seen by Müller, Ehrenberg and all
others listed in the synonymy can not now be decided, but,
having to select one species from these closely related
forms, we chose the one that had, as far as ascertainable,
the widest distribution.

DICRANOPHORUS PRIONACIS Harring and Myers, newe species.
Plate 25, figures 5, 6.

The body is elongate, subcylindric and slightly gibbous
posteriorly; the ventral surface is nearly straight. The
integument is leathery and the outline fairly constant.

The head is long, about one third of the length of the
body, and separated from the abdomen by a well marked
neck. The corona is virtually ventral and almost as long
as the head. The rostrum is short, broad and rounded an-
teriorly. The abdomen is moderately elongate, nearly
cylindric, very slightly gibbous at two thirds length and
tapering gradually to the very small tail. The integument
is divided longitudinally by fairly distinct lateral sulci into
a dorsal and a ventral plate, limited posteriorly by a trans-
verse fold. The foot is large, stout and oblique anteriorly.
The toes are moderately long, about one sixth of the total
length, parallel-sided, very slightly decurved and end in
blunt, conical tips.

The trophi are fairly large and very robust. The rami
are very large, broadly triangular and plate-like at the
base and terminate in two stout, incurved teeth; the median
opening is rather small and pyriform and the inner margin
is armed with 10 to 12 fairly long teeth, decreasing in size
towards the fulcrum. The alulæ are elongate, wing-like
lamellæ extending forward nearly half the length of the
rami. The fulcrum is broad, triangular and less than half
the length of the rami. The unci are long and curved, with
one large ventral tooth and an attached, linear, dorsal
tooth; the ventral tooth has near midlength a knoblike en-
largement, resting on the rami and serving as a hinge in
the movements of the trophi. The manubria are slightly
longer than the incus, nearly straight, with broad, wing-
like anterior expansions for the attachment of the muscles and slightly flattened at the posterior ends. No salivary glands are present.

The gastric glands are small and oval. There is no distinct separation between stomach and intestine. The ovary and bladder are normal. The foot glands are fairly large and clubshaped.

The retrocerebral sac is about half as long as the ganglion and slightly granular; the ducts are rudimentary. The two eyespots are small and at the base of the rostrum.

Total length 365–400 \( \mu \); toes 65–75 \( \mu \); trophi 40 \( \mu \).

*Dicranophorus prionacis* is very widely distributed in neutral and alkaline ponds, but seems not to occur in acid water. We have found it in the collections of the Panama Biological Survey and nearly everywhere in the United States except as noted above. It is distinguished from *D. forcipatus* mainly by the differences in the trophi and the slightly longer toes, as well as the rudimentary ducts of the retrocerebral sac.

**DICRANOPHRUS TEGILLUS** Harring and Myers, new species.

Plate 26, figures 3, 4.

The body is elongate, rather slender, subcylindric and slightly gibbous posteriorly; the ventral surface is straight. The integument is leathery and the outline fairly constant. The animal is usually very transparent.

The head is long, a little less than one third of the length of the body, and separated from the abdomen by a well marked neck. The corona is almost ventral and very little shorter than the head. The rostrum is short, broad, rounded anteriorly and strongly decurved. The abdomen is moderately elongate, nearly cylindric and slightly gibbous at two thirds length, tapering gradually to the very small tail. The integument is divided longitudinally by wide lateral sulci into a dorsal and a ventral plate, limited posteriorly by a transverse fold. The foot is short, stout and oblique anteriorly. The toes are long, about one fourth of the total length, slender, parallel-sided and very slightly decurved, ending in blunt tips.

The trophi are very large and fairly stout. The rami are broadly triangular at the base and rather slender ante-
riorly, terminating in two stout, incurved teeth in each ramus; the median opening is unusually large and pyriform and the inner margin is armed with 9 to 10 teeth, very large anteriorly and decreasing gradually in size towards the fulcrum. The alulae are short and triangular, without the forward lamellar extension of some other species in this group. The fulcrum is about one half as long as the rami. The unci are very long and nearly straight, with one large, ventral tooth and an attached, linear, dorsal tooth; the ventral tooth has near midlength a slight enlargement, resting on the rami and serving as a hinge. The manubria are slightly longer than the incus, stout, slightly curved, with broad, winglike anterior expansions and slightly flattened posteriorly. Salivary glands are not present.

The gastric glands are small and oval. There is no distinct separation between stomach and intestine. The ovary and bladder are normal. The foot glands are small and club-shaped.

The retrocerebral sac is small and apparently always clear; the duct is rudimentary. The two eyespots are small and at the base of the rostrum.

Total length 225–260μ; toes 50–60μ; trophi 55μ.

*Dicranophorus tegillus* was collected in Witch Hole, on Mount Desert Island, Maine, in acid water, pH = 6.4. It is readily recognizable by the long, slender toes and the form of the trophi.

**DICRANOPHORUS MESOTIS** Harring and Myers, new species.

Plate 26, figures 5, 6.

The body is moderately elongate, subcylindric and very slightly gibbous posteriorly; the ventral surface is straight. The integument is leathery and the outline is fairly constant. The animal is moderately transparent.

The head is long, about one third of the length of the body, and separated from the abdomen by a well marked neck. The corona is almost ventral and nearly as long as the head. The rostrum is short, broad, rounded anteriorly and strongly decurved. The abdomen is rather short, nearly cylindric and very slightly gibbous at two thirds
length, tapering gradually to the very small tail. The integument is divided longitudinally by wide and well marked lateral sulci into a dorsal and a ventral plate limited posteriorly by a transverse fold. The foot is short, stout and oblique anteriorly. The toes are long, about one fourth of the total length, rather slender, tapering, slightly decurved and somewhat blunt at the tips.

The trophi are fairly large and stout. The rami are broadly triangular at the base, tapering rapidly to bifid, robust, incurved, terminal teeth; the median opening is large and pyriform, and the inner margin is armed with 9–10 teeth, six of these long and broad, the posterior 3–4 much smaller. The alulæ are large, triangular and slightly recurved. The fulcrum is about half the length of the rami. The unci are long and slightly curved, with one large ventral tooth and an attached, linear, dorsal tooth; the ventral tooth has at two thirds length an enlargement, resting on the rami and serving as a hinge. The manubria are somewhat longer than the incus, fairly stout and slightly curved, with broad, lamellar, anterior expansions and slightly knobbed posteriorly. The salivary glands are large and well developed.

The gastric glands are fairly large and rounded. The stomach and intestine are not distinctly separated. The ovary and bladder are normal. The foot glands are moderately large and club shaped.

The retrocerebral sac is large and usually contains bacteroids; the duct is well marked and bifurcate anteriorly. The two eyespots are small and at the base of the rostrum. Total length 280μ; toes 55μ; trophi 40μ.

*Dicranophorus mesotis* was collected in Witch Hole, Mount Desert Island, Maine, in acid water, pH = 6.4. It is readily distinguished by the form of the trophi, slender rami and large teeth on the inner edges of the rami, as well as by the large salivary glands.

**Dicranophorus Epicaris** Haring and Myers, new species.

Plate 25, figures 1, 2.

The body is elongate, fairly slender, subcylindric and very slightly gibbous posteriorly; the ventral surface is
straight. The integument is leathery and the outline fairly constant. The animal is moderately transparent.

The head is long, about one third of the length of the body, and separated from the abdomen by a well marked neck. The corona is strongly oblique, almost ventral, and but little shorter than the head. The rostrum is very short, broad and rounded anteriorly. The abdomen is somewhat elongate, nearly cylindric, very slightly gibbous at two thirds length and tapers gradually to the indistinct tail. The integument is divided longitudinally by fairly distinct lateral sulci into a dorsal and a ventral plate, limited posteriorly by a transverse fold. The foot is fairly long, stout and oblique anteriorly. The toes are rather short, about one seventh of the total length, straight or very slightly decurved, parallel-sided and end in blunt, conical tips.

The trophi are larger than in any other species of the *forcipatus* group and very robust. The rami are nearly parallel-sided, slightly wider anteriorly, and terminate in two stout anterior teeth; the median opening is large and pyriform and the inner margin is armed with 8 to 9 large teeth, decreasing in size towards the fulcrum. The alulæ are short and triangular, continuing forwards as a wing-like lamella nearly half the length of the rami. The fulcrum is broad, triangular and somewhat less than half the length of the rami. The unci are very long and nearly straight, with one large ventral tooth and an attached, linear, dorsal tooth; the ventral tooth has near midlength a slight enlargement, resting on the rami and serving as a hinge. The manubria are slightly longer than the incus, nearly straight, with broad, wing-like anterior expansions for the attachment of the muscles and slightly flattened at the posterior ends. The salivary glands are large and very evident.

The gastric glands are small and oval. There is no distinct separation between stomach and intestine. The ovary and bladder are normal. The foot glands are fairly large and club-shaped.

The retrocerebral sac is rather small; the duct is well marked and divides near the anterior openings. The two eyespots are small and at the base of the rostrum.

Total length 325–380µ; toes 45–60µ; trophi 60µ.
Dicranophorus epicharis was collected in New Mill Meadow and Toad Hole, on Mount Desert Island, Maine, both soft, acid water ponds, pH = 6.4–6.8. Although superficially resembling D. forcipatus it is readily distinguishable by the huge trophi and the well developed salivary glands.

DICRANOPHORUS DOLERUS Harring and Myers, new species.

Plate 26, figures 1, 2.


The body is moderately elongate, subcylindric and slightly gibbous posteriorly; the ventral surface is straight. The integument is slightly stiffened and the outline fairly constant. The animal is moderately transparent.

The head is long, more than one third of the length of the body, and separated from the abdomen by a somewhat indistinct neck. The corona is ventral and almost as long as the head. The rostrum is short, broad, rounded anteriorly and strongly decurved. The abdomen is relatively short, subcylindric and slightly gibbous at two thirds length, tapering gradually to the minute tail. The integument is divided longitudinally by wide lateral sulci into a dorsal and a ventral plate, limited posteriorly by a transverse fold. The foot is short, rather small and oblique anteriorly. The toes are moderately long, a little less than one fourth of the total length, parallel-sided and very faintly decurved, ending in slightly blunted tips.

The trophi are large and stout. The rami are fairly long, broad at the base, parallel-sided externally and terminate in two very stout, incurved teeth in each ramus; the median opening is rather small and pyriform and the inner margin is armed with 5 large, broad teeth, decreasing in size towards the fulcrum. The alae are large, triangular and decurved at the tips. The fulcrum is about two thirds as long as the rami. The unci are long and nearly straight, with one large, ventral tooth and an attached, linear, dorsal tooth; the ventral tooth has at two thirds length a knoblike enlargement, resting on the rami and serving as a hinge. The manubria are considerably longer than the incus, stout and slightly curved, with broad, lamel-
lar, anterior expansions and slightly knobbed posteriorly. Salivary glands are not present.

The gastric glands are fairly large and oval. There is no distinct separation between stomach and intestine. The ovary and bladder are normal. The foot glands are small and clubshaped.

The retrocerebral sac is fairly large and always clear; the duct is rudimentary and stains only locally, in disconnected sections. The two eyespots are small and at the base of the rostrum.

Total length 230μ; toes 50μ; trophi 45μ.

*Dicranophorus dolerus* was collected in Round Pond, on Mount Desert Island, Maine, in acid water, pH = 5.8 — 6.2. A few specimens occurred in the collections made by Johansen during the Canadian Arctic Expedition at Bernard Harbour, and in Jessup’s collections along the Alaskan Boundary, in muskeg lakes on the flats of the Old Crow river and in pools at Fort Yukon. This species is easily recognized by the few, very large teeth on the inner edges of the rami.

**DICRANOPHORUS ISOThES** Harring and Myers, new species.

Plate 27, figures 6–9.

The body is moderately elongate, rather slender, spindle-shaped and slightly gibbous posteriorly; the ventral surface is straight. The integument is leathery and the outline is fairly constant. The stomach is usually opaque, due to contained food.

The head is long, about two fifths of the length of the body, and separated from the abdomen by a well marked neck. The corona is very nearly ventral and about three fourths as long as the head. The rostrum is short, broad and deeply incised laterally, forming two pairs of finger-like processes or lappets, the second pair much larger than the anterior, as shown in figure 8. The abdomen is fairly long, slightly gibbous dorsally at three fourths length, and tapers gradually to the very small tail. The integument is divided longitudinally by wide, well marked lateral sulci into a dorsal and a ventral plate, limited posteriorly by a very distinct transverse fold. The foot is large, stout, oblique
anteriorly and obscurely two-jointed. The toes are short, about one seventh of the total length, straight, parallel-sided, obliquely truncate at the tips and slightly excavate dorsally.

The trophi are very large and robust. The rami are long, broad at the base, lyrate, and terminate in single, stout, incurved teeth; the median opening is very large and pyriform, the inner margin armed with 15–18 close-set, stout, recurved teeth, largest in the middle and decreasing in size towards the ends. The alulæ are large and slightly recurved. The fulcrum is stout and a little more than half as long as the rami. The unci are long and terminate in a single, very stout, curved tooth; near the tip is a knoblike enlargement, resting on the rami and serving as a hinge. The manubria are nearly as long as the incus, robust, straight and terminate in a posterior, oblique crutch, as shown in figure 9. Salivary glands are not present.

The gastric glands are large and oval. There is no distinct separation between the stomach and intestine. The ovary and bladder are normal. The foot glands are very large and pyriform.

The retrocerebral sac is large and the ducts are well marked, opening near two minute, colorless globules in the rostrum. The two eyespots are opposite the posterior edges of the second pair of rostral lappets.

Total length 275–350\(\mu\); toes 40–50\(\mu\); trophi 60\(\mu\).

*Dicranophorus isothes* is widely distributed in acid water ponds, pH = 6.8 and less; we have collected it in Oneida and Vilas counties, Wisconsin; on Mount Desert Island, Maine and around Atlantic City, New Jersey. Its feeding habits are remarkable: as far as known, it is strictly carnivorous and its diet limited to small Cladocera, as Alona, Chydorus and small Moinas. When coming in contact with one of these, the rotifer rapidly works its way towards the posterior end of the shell and, when this is opened, the head of the rotifer is inserted with lightning-like rapidity. The Entomostracan of course closes its shell, catching the rotifer by the neck, but shortly relaxes and this allows the rotifer to push its head in a little further; this process continues until the vital organs are within reach of the
trophi and the transfer of the body contents of the Entomostracan to the stomach of the rotifer begins. The process may be observed at almost any time by placing a D. isothes in a watch glass with one or two of the Entomostraca; it does not seem to have any preference among the species named.

The male is an absolute duplicate of the female, minus the mastax, even including the retrocerebral sac; its length is 225–250μ.

**DICRANOPHORUS THYSANUS Harring and Meyers, new species.**

Plate 27; figures 1–3.

The body is elongate and very nearly cylindric; the ventral surface is virtually straight. The integument is slightly stiffened and the outline fairly constant.

The head is short, about one fourth of the length of the body, and separated from the abdomen by a well marked neck. The corona is oblique and relatively small. The rostrum is short, broad and deeply incised laterally, forming three long, finger-like processes or lappets, as shown in figure 3. The abdomen is elongate and nearly cylindric for about two thirds of its length, tapering rapidly to the small, but distinct tail. The integument is divided longitudinally by indistinct lateral folds into a dorsal and a ventral plate, limited posteriorly by a transverse fold. The foot is large, stout and oblique anteriorly. The toes are short, about one sixth of the total length, parallel-sided, very faintly decurved, terminating in bluntly beveled points, slightly excavate dorsally.

The trophi are very large and robust. The rami are very broad at the base, slightly lyrate and terminate in two large incurved teeth; the median opening is elongate pyriform and its margins armed with 11 or 12 robust, nearly equal teeth, inclined backwards. The fulcrum is very short and broad; the alulae are large, triangular and at right angles to the fulcrum. The unci are long and stout, ending in a single, slightly curved tooth, at the base of which is a slight enlargement, resting upon the rami and acting as a hinge in the movements of the trophi. The manubria are stout and nearly straight, with broad, winglike anterior expansions for attachment of the muscles. On the ventral
side of the rami are two comblike, "ectopharyngeal" pieces, which serve to enlarge the oral opening. The salivary glands are rudimentary.

The gastric glands are very small and oval. There is no distinct separation between stomach and intestine. The ovary and bladder are normal; 4 flame cells are found on each lateral canal. The foot glands are large and club-shaped.

The retrocerebral sac is large; the ducts are threadlike, but traceable to the front of the head. The two eyespots are on a level with the second pair of lappets.

Total length 450–580μ; toes 60–80μ; trophi 65μ.

**Diercanophorus thysanus** is fairly common in soft, acid water ponds, pH = 6. 8 and less. We have collected this species in Oneida and Vilas counties, Wisconsin; in Polk county, Florida, and around Atlantic City, New Jersey. It is the largest species of the genus and thus easily recognizable; the form of the rostrum is unique. Its food consists of Copepod nauplii, small Cladocera, Alona, Chydorus etc.

**Diercanophorus robustus** Harring and Myers, new species.

Plate 29, figures 3, 4.

The body is elongate, spindle-shaped and rather slender, slightly convex dorsally and nearly straight ventrally. The integument is moderately flexible and the outline fairly constant. The animal is usually semi-opaque with a distinct orange-brown tint.

The head is relatively short, about one fourth of the length of the body, and separated from the abdomen by a distinct neck. The corona is but slightly oblique and its length is but little in excess of the diameter of the head. The rostrum is very small, rounded anteriorly and decurved. The abdomen is long and nearly cylindric for half its length, tapering gradually to the minute tail. The integument is divided longitudinally by wide, fairly distinct, lateral sulci into a dorsal and a ventral plate, limited posteriorly by a well marked transverse fold. The foot is very short, stout and slightly oblique anteriorly. The toes are short, about one sixth of the total length, slender, tapering and bluntly
pointed, usually straight, but occasionally with a slight sigmoid curvature, as shown in the lateral view.

The trophi are stout and somewhat elongate. The rami are long, nearly parallel-sided externally and straight on their inner edges, the anterior half with 15–20 rounded, knoblike, close-set teeth, gradually decreasing in size. The alulae are at right angles to the fulcrum, very long and robust. The fulcrum is about half as long as the rami, the actual basal joint being strongly oblique. The unci are long and terminate in curved, hooklike, single teeth. The manubria are as long as the incus, stout and slightly curved, with a lamellar, longitudinal, anterior rib. Salivary glands are not present.

The gastric glands are small and rounded. The stomach and intestine are without distinct separation. The ovary and bladder are normal. The foot glands are small and pyriform.

The retrocerebral sac is small and always clear; the duct is well marked. The eyespots are fairly close together at the base of the rostrum.

Total length 300–360μ; toes 45–60μ; trophi 40μ.

*Dicranophorus robustus* is widely distributed in neutral or slightly acid water ponds; we have collected it in Oneida and Vilas counties, Wisconsin; at Washington, District of Columbia; around Atlantic City, New Jersey, and on Mount Desert Island, Maine. It is readily recognizable by the small, nearly terminal corona, the toes and the peculiar trophi.

**DICRANOPHORUS STULTUS** HARRING and MYERS, new species.

Plate 27, figures 4, 5.

The body is elongate, slender, nearly cylindric and distinctly curved, the dorsal side convex and the ventral concave. The integument is flexible, but the outline is fairly constant. The animal is always transparent.

The head is long, about one third of the length of the body, decurved and separated from the abdomen by a well marked neck. The corona is ventral and considerably shorter than the head. The rostrum is fairly short, broad, rounded anteriorly and strongly decurved. The abdomen
is long, cylindric and slightly curved, tapering somewhat abruptly to the small tail. The integument is divided longitudinally by narrow, but fairly distinct, lateral sulci into a dorsal and a ventral plate, limited posteriorly by a well marked transverse fold. The foot is large, stout and oblique anteriorly. The toes are long, about one fourth of the total length, stout, tapering, very slightly recurved at the base and decurved posteriorly, terminating in very distinct claws.

The trophi are elongate and stout. The rami are parallel-sided externally, narrow and triangular, tapering anteriorly to stout, bifid, incurved terminal teeth; the median opening is pyriform and unusually short, with 9–10 teeth on the inner margin, decreasing in size towards the fulcrum. The alulae are large, slender, pointed and recurved. The fulcrum is about one third as long as the rami. The unci are long and curved, with one large ventral tooth and an attached, linear, dorsal tooth; the ventral tooth has at two-thirds length a slight enlargement, resting on the rami and serving as a hinge. The manubria are considerably longer than the incus, stout, slightly incurved posteriorly, and have broad, lamellar, anterior expansions for the attachment of the muscles. Salivary glands are not present.

The gastric glands are fairly large and oval. The stomach and intestine are not distinctly separated. The ovary and bladder are normal. The foot glands are very small and clubshaped.

The retrocerebral sac is fairly large and always clear; the duct is rudimentary. No eyespots are present.

Total length 190μ; toes 40μ; trophi 30μ.

*Dicranophorus stultus* was collected in a boggy area at the head of the reservoir at Tuckerton, near Atlantic City, New Jersey, in acid water, pH = 5.4. It is readily distinguished from related species by the elongate, slender, decurved body and the clawed toes. It appears to be intermediate between the *forcipatus* and *lutkeni* groups, but it is probably more closely related to the former than to the latter.
DICRANOPHORUS PROCLESTES Harring and Myers, new species.
Plate 32, figures 5, 6.

The body is elongate, slender and nearly cylindric, straight ventrally and very slightly gibbous dorsally. The integument is very flexible, but the outline is fairly constant. The animal is usually almost opaque from the contents of the stomach.

The head is short, less than one fourth of the length of the body, and separated from the abdomen by an indistinct neck. The corona is small and strongly oblique, and no rostrum is present. The abdomen is unusually long, very slightly gibbous and tapers gradually to the small tail; the integument has a somewhat obscure, transverse fold in front of the tail, but no trace of longitudinal divisions. The foot is short and globose. The toes are short, less than one sixth of the total length, blade-shaped and acutely pointed, very slightly recurved at the tips.

The trophi are small and slender. The rami are broadly lyrate and terminate in single, pointed, curved teeth; no alulae are present. The inner margins are armed with numerous, very close-set, fine teeth, having the appearance of striated lamellae. The fulcrum is long, about two thirds of the length of the rami. The unci are very long and slender, with a single, slightly curved terminal tooth, at the base of which there is a slight, knoblike enlargement, resting on the rami and serving as a pivot. The manubria are as long as the incus, nearly straight and much enlarged anteriorly. Salivary glands are not present.

The gastric glands are rounded and very small. There is no distinct separation between the stomach and intestine. The ovary and bladder are normal. The foot glands are rather small and pyriform.

The retrocerebral sac is small and the ducts rudimentary. The eyespots are round, very large, closely approximated and frontal.

Total length 225μ—245μ; toes 30μ—35μ; trophi 27μ.

Dicranophorus proclestes is widely distributed, but only in small numbers. We have found it in Oneida and Vilas counties, Wisconsin, around Atlantic City, New Jersey, on Mount Desert Island, Maine and at Hyattsville, near Wash-
Harrington, District of Columbia; it seems to occur only in acid water, pH = 6.8 and less. It is readily recognized by the large, close-set eyespots, small head, elongate body and the toes and trophi.

**DICRANOPHORUS ARTAMUS** Harring and Myers, new species.

Plate 28, figures 3–9.

The body is rather short, spindle-shaped and fairly stout; the ventral side is straight and the dorsal arched. The integument is relatively firm and the outline nearly constant. The animal is colorless except for the contents of the stomach.

The head is long and separated from the abdomen by a distinct neck. The corona is very nearly ventral and longer than usual. The rostrum is not very large, rounded and strongly decurved. The abdomen is short and nearly parallel-sided; there are traces of a division of the integument into a dorsal and a ventral plate, separated by a wide lateral cleft; the posterior transverse fold limiting this rudimentary lorica is well marked. The body tapers slightly to the inconspicuous tail; the foot is short and stout. The toes are long and stout, especially at the base, and end in rather blunt tips; occasionally a faint transverse septum near the tip produces the semblance of a claw. Specimens from different localities vary somewhat in the form and length of the toes; figure 6 is from Starvation Lake, Oneida county, Wisconsin (body 225\(\mu\); toes 66\(\mu\)); figure 7 is from Lenape Lake, Atlantic county, New Jersey (body 210\(\mu\); toes 70\(\mu\)); figure 8 is from Oceanville, Atlantic county, New Jersey (body 200\(\mu\); toes 60\(\mu\)); figure 9 is from Witch Hole, Mount Desert Island, Maine (body 225\(\mu\); toes 72\(\mu\)). Figure 3 is drawn from material collected at Eagle River, Vilas county, Wisconsin; the clawlike termination of the toes is found only in this form (body 210\(\mu\); toes 75\(\mu\)). Between the toes is a very small papilla, as shown in figure 5, and in the foot there is a small, rounded vacuole, lying above and between the foot glands; the true nature of this vacuole is not known, but it is always present and is characteristic of this species.

The trophi are broad and robust. The rami are large and terminate in a powerful, strongly incurved tooth; the
alulae are triangular and unusually large. The median opening is large and pyriform; on the left inner margin are two large shearing teeth, followed by many excessively fine teeth, united into a blade; the dentition of the right margin differs in having only a single large tooth. The fulcrum is somewhat shorter than the rami and tapers towards the posterior end. Each uncus has a single, large, long, curved tooth, with a projecting boss near the middle resting on the external angles of the rami. The manubria are slightly longer than the incus and have large, blade-like projections for the attachment of the adductor muscles. The salivary glands are large.

The gastric glands are small and near the dorsal side. There is no distinct separation between stomach and intestines. The ovary and bladder are normal. The foot glands are small and elongate pyriform.

The retrocerebral sac is small and at the posterior end of the ganglion. The eyespots are small and frontal, at the base of the rostrum; immediately below and slightly inside of them are two short bundles of straight setae.

Total length 200–225μ; toes 60–75μ; trophi 30μ.

*Dicranophorus artamus* is widely distributed and abundant among weeds in soft, acid water ponds, pH = 7.0 and less. We have collected it in Vilas and Oneida counties, Wisconsin; around Atlantic City, New Jersey; on Mount Desert Island, Maine and at Los Angeles, California. The characteristic vacuole in the foot joint is sufficient to distinguish this from all other species of the genus.

**DICRANOPHORUS PONERUS** Harring and Myers, new species.

Plate 28, figures 1, 2.

The body is fairly short, fusiform and slightly gibbous dorsally; the ventral side is nearly straight. The integument is flexible and there is no indication of a division into plates; the animal is transparent.

The head is long, about one third of the length of the body, and separated from the abdomen by a distinct neck. The corona is virtually ventral and almost as long as the head. The rostrum is small, rounded and decurved. The abdomen is rather short and slightly convex dorsally; the
only indication of a stiffening of the integument is an obscure posterior transverse fold. The body tapers gradually to the very small tail; the foot joint is short and stout. The toes are slightly decurved, rather short and slender, somewhat stouter at the base, and the tips rounded.

The trophi are large and robust. The terminal tooth of the rami is very large and powerful; the alulæ are prominent. On the inner margin of the lyrate central opening are two large shearing teeth on each side, followed on the left side by five and on the right by four slender, closely spaced, comblike teeth. The fulcrum is somewhat shorter than the rami. Each uncus has a single, large, long, curved tooth with a projection near the middle, where it pivots on the rami. The manubria are slightly shorter than the incus and have large, winglike extensions for the attachment of the adductor muscles. There are no salivary glands.

The gastric glands are small and near the dorsal side. There is no distinct separation between stomach and intestine. The ovary and bladder are normal. The foot glands are very small and pyriform.

The retrocerebral sac is small and at the end of the ganglion; the duct is very evident. The eyespots are very small and frontal, at the base of the rostrum.

Total length 240 µ; toes 40 µ; trophi 30 µ.

**Dicranophorus ponerus** is apparently rare. The material upon which this description is based was collected at the Fish Hatchery, near Madison, Wisconsin; it has not been found elsewhere. It is closely related to *D. artamus*, from which it differs in the absence of the foot vacuole, the shorter and more slender toes, and in the dentition of the inner margins of the rami.

**DICRANOPHORUS EDESTES** Harring and Myers, new species.

Plate 28, figures 10, 11.

The body is relatively short, fairly stout and gibbous dorsally; the integument is leathery and the outline nearly constant. The animal is transparent.

The head is long and separated from the abdomen by an inconspicuous neck. The corona is nearly ventral and un-
usually long. The rostrum is moderately large, rounded and slightly decurved. The abdomen is short and gibbous dorsally; the division of the integument into a dorsal and ventral plate, separated by a wide lateral cleft, is fairly distinct. The body tapers rapidly to the very small tail; the foot is short and stout. The toes are short, rather slender, slightly tapering and bluntly pointed; their length is about one fifth of the total length.

The trophi are somewhat elongate and stout. The rami are broad at the base, nearly parallel-sided and terminate in two large, incurved teeth; the alulæ are triangular and not very large. The median opening is rather small and pyriform; on the left inner margin are two large shearing teeth, the second twice as long as the first, followed by many fine teeth, and one large posterior tooth; the dition of the right margin is similar except for an additional short, anterior tooth. The shearing teeth are united by a membranous plate, continued beyond the posterior teeth. The fulcrum is short and stout. Each uncus has a single large, curved tooth with a knoblike enlargement near the middle and rests between the terminal teeth of the rami. The manubria are long and robust. No salivary glands are present.

The gastric glands are small and near the dorsal side. The stomach, ovary and bladder are normal. The foot glands are small and pyriform.

The retrocerebral sac is small and at the posterior end of the ganglion. No eyespots are present.

Total length 205μ; toes 40μ; trophi 45μ.

Dicranophorus edestes is not common, but where it does occur, it is fairly numerous. We have found it at Washington, District of Columbia, around Atlantic City, New Jersey and on Mount Desert Island, Maine. It is one of the few blind species of the genus and the only one in this group.

DICRANOPHORUS LÜTKENI (Bergendal)

Plate 29, figures 1–2.

Arthroglena lütkeni BERGENDAL, Acta Univ. Lundensis, vol. 28, 1892, sect. 2, No. 4, p. 96, pls. 5, 6, fig. 30.—STENROOS, Acta Soc. Fauna et Flora Fennica, vol. 17, No. 1, 1898, p. 138, pl. 2, fig. 16.—
The body is elongate, slender and slightly gibbous posteriorly; the ventral surface is straight. The integument is fairly rigid and the outline quite constant. The animal is only partially transparent on account of accumulated food material in the stomach and intestine.

The head is long, about two fifths of the length of the body, and separated from the abdomen by a very distinct neck. The corona is ventral and but little shorter than the head. The rostrum is fairly large, rounded anteriorly and decurved. The abdomen is elongate and nearly parallel-sided for three fourths of its length, tapering rapidly to the very small tail. The division of the integument into a dorsal and ventral plate, bounded posteriorly by a transverse fold, is fairly distinct. The foot is moderately large and oblique anteriorly. The toes are long, about one fourth of the total length, straight, broad at the base, tapering rapidly for about half their length, continuing as cylindric rods and terminating in long, slender, slightly blunted claws, which are hinged to the toes and movable, when the animal is fastened by extruded mucus, but not voluntarily.

The trophi are large and robust. The rami are parallel-sided and very broad at the base, terminating in two stout,
curved anterior teeth and armed on their inner margins with five prominent shearing teeth and a low, very thin, lamellar rib, extending nearly full length of the ramus to the base of the anterior teeth. The alulæ are large and decurved; the fulcrum is about one third as long as the rami. The unci are single-toothed and very stout; near mid-length is a slight, knoblike enlargement, resting on the rami and serving as a pivot. The manubria are longer than the incus, stout, slightly curved and broadly expanded anteriortly for attachment of the muscles; the posterior ends are knobbed. The salivary glands are very evident.

The gastric glands are small and elongate oval. There is no distinct separation between stomach and intestine. The ovary and bladder are normal. The foot glands are small and pyriform.

The retrocerebral sac is fairly large and the ducts easily traced to the front, where they terminate under the rostrum, either through, or at the base of two minute, but distinct, slender, tubular pegs. No eyespots are present.

Total length 180–210μ; toes 35–45μ; toes 30μ.

_Dicranophorus liitkeni_ is common everywhere in wet sphagnum. As it is the only jointed-toed species that is at all common, there is but little difficulty in identifying it; the two rostral pegs are unique and sufficient to distinguish it from all other species of the genus.

**DICRANOPHORUS SEMNUS HARRING and MYERS, new species.**

Plate 29, figures 5, 6.

The body is elongate, moderately slender and slightly gibbous posteriorly; the ventral surface is straight. The integument is fairly rigid and the outline reasonably constant. The animal is transparent.

The head is fairly long, about one third of the length of the body, and separated from the abdomen by a well marked neck. The corona is ventral and nearly as long as the head. The rostrum is fairly large, rounded anteriorly and decurved. The abdomen is elongate and nearly paralleled for two thirds of its length, tapering rapidly to the minute tail. The integument is divided into a dorsal and a ventral plate by longitudinal and transverse folds. The
foot is small and oblique anteriorly. The toes are long, about one third of the total length, broad at the base, tapering rapidly for about one third of their length, continuing as nearly cylindrical, very slightly decurved rods, to a long, immobile, bluntly pointed claw.

The trophi are large and robust. The rami are paralleled-sided and very broad at the base, terminating in single, very stout, curved teeth; on the inner margin are five large, triangular, slightly curved secondary teeth, decreasing in size towards the posterior end of the rami. The fulcrum is as long as the rami; the alulae are large, triangular and decurved. The unci are long and stout, ending in a large, curved tooth, at the base of which there is a knoblike enlargement, resting upon the rami and serving as a pivot. The manubria are a little shorter than the incus, very stout, with a slight, sigmoid curvature and broadly expanded anteriorly for the attachment of the muscles, knobbed and sharply curved posteriorly. No salivary glands are present.

The gastric glands are small and oval. There is no distinct separation between the stomach and intestine. The ovary and bladder are normal. The foot glands are very small and pyriform.

The retrocerebral sac is long and the ducts rudimentary. At the base of the rostrum are two very small eyespots.

Total length 250µ; toes 75µ; trophi 35µ.

Dicranophorus semnus was found in Lower Breakneck pond, Mount Desert Island, Maine, in acid water, pH—6.4; no other location is known for it. Although obviously related to, and having a decided superficial resemblance to D. lütkeni, there is no difficulty in separating them; this species has eyespots and lütkeni none; it is without the peculiar rostral pegs and the claws are not mobile.

DICRANOPHORUS ALCIMUS Harring and Myers, new species.

Plate 30, figures 1–3.

The body is stout and spindle-shaped, largest at midlength and tapering gradually to the toes; the ventral side is nearly straight. The integument is fairly rigid and the outline not especially variable. The animal is always clear; even the stomach is colorless.
The head is large and roughly triangular; it is separated from the abdomen by a well marked neck. The corona is nearly ventral and somewhat longer than usual, nearly one third of the length of the body. The rostrum is large, decurved and squarely truncate anteriorly; it is provided with lateral, fingerlike processes, similar to these appendages in related species. The abdomen is short and tapers very slightly towards the posterior end; the margins of a dorsal and a ventral plate, separated by a wide cleft, are well marked, as is also the posterior limit of this pseudolorica. The body tapers gradually to the small tail; the foot is long, stout and conical. The toes are very long, about one third of the total length, stout at the base, tapering gradually to very distinct, blunt claws, and strongly decurved.

The trophi are very large and highly specialized. The rami are very stout, especially at the base, and have knoblike enlargements at the tips, each with three terminal teeth, interlocking, as shown in figure 3. The central opening is broadly oval and unusually large; the right ramus has two small conical shearing teeth on a knoblike enlargement, and the left ramus has four slender, close-set, comb-like teeth on the inner margin. The fulcrum is short and stout and the alulæ small and triangular. The unci are simple, with a knoblike enlargement, armed with a large terminal tooth; near midlength are slight lateral expansions, pivoting on the ends of projecting ledges on the rami. The manubria are stout, as long as the incus, curved and enlarged anteriorly for the attachment of the adductor muscles. There are no salivary glands.

The gastric glands are large. The stomach and intestine are continuous, without any constriction. The ovary and bladder are normal. The foot glands are fairly large and clubshaped.

No retrocerebral sac is present. The eyespots are small and wide apart at the base of the rostrum.

Total length 425μ; toes 105μ; trophi 55μ.

*Dicranophorus alcimus* was collected at Manset and in Round Pond, on Mount Desert Island, Maine; both are soft, acid water ponds, pH = 6.0 6.2. It is readily determined by its large size, pegged rostrum, long, clawed toes and by
the very peculiar trophi, which, if only the incus were avail-
able, might be supposed to belong to an Asplanchna.

**DICRANOPHORUS ASPONDUS** Harring and Myers, new species.

Plate 31, figures 1–3.

The body is elongate, slender and nearly parallel-sided; the ventral surface is straight. The integument is moderately flexible and the outline somewhat variable. The animal is always hyaline.

The head is long and separated from the abdomen by an inconspicuous neck. The corona is ventral and about two fifths of the length of the body. The rostrum is fairly long and narrow, strongly decurved, squarely truncate anteriorly and provided with very long, lateral, fingerlike processes, as shown in figure 2. The abdomen is short and prismatic; the only trace of a loria is a faint posterior border. The body tapers rapidly to the very small tail; the foot is short and fairly stout. The toes are nearly half as long as the body, slender, very slightly decurved and tapering gradually to a slight enlargement at the base of the long, slender, blunt claws.

The trophi are large and robust. The rami are elongate, stout and nearly parallel-sided, terminating in simple, very strong, incurved points; the alulae are fairly large and triangular. The median opening is pyriform and rather narrow; on the inner margin there is on each side a long shearing tooth. The fulcrum is about half the length of the rami. The unci are fairly stout, simple and curved, with a slight knobblike enlargement in the middle resting on the rami and serving as a fulcrum. The manubria are long and slightly curved, with a prominent anterior enlargement for the attachment of the adductor muscles. Two vacuolate salivary glands are present.

The gastric glands are small and near the dorsal side. The stomach and intestine are without any distinct separation. The ovary and bladder are normal. The foot glands are small and pyriform.

The retrocerebral sac is small and at the posterior end of the ganglion; the ducts are traceable to the end of the rostrum. The eyespots are very small and wide apart.

Total length 190 µ; toes 60 µ; trophi 35 µ.
Dicranophorus aspondus was collected in weedy areas of Lake Wood, Mount Desert Island, Maine, a soft, acid water lake, pH = 6.4. It is readily recognized by the long rostral pegs, longer than in any other species of the genus and nearly equalling the width of the head, as well as by the very long, clawed toes. Its nearest relative is probably D. capucinus.

**DICRANOPHORUS CAPUCINUS** Harring and Myers, new species.

Plate 31, figures 4-6.

The body is slender and slightly gibbous; the ventral side is very slightly concave. The integument is quite flexible, but the general outline fairly constant. The animal is nearly always perfectly transparent.

The head is unusually long and separated from the abdomen by an inconspicuous neck. The corona is virtually ventral and about two fifths of the length of the body. The rostrum is long and narrow, strongly decurved, squarely truncate anteriorly and provided with long, lateral, fingerlike processes, as shown in figure 5. The abdomen is rather short and slightly curved; the margins of a dorsal and a ventral plate, separated by a wide lateral cleft, are barely traceable; this applies also to the posterior edge of the rudimentary loria. The body tapers slightly to the very small tail; the foot is short and moderately stout. The toes are long, about one third of the length of the body, straight, stout at the base and gradually tapering to a very distinct, blunt claw; there is a slight enlargement of the toe at the base of the claw.

The trophi are fairly large, but very slender. The rami are elongate and terminate in simple, incurved points; the alulae are small and triangular. The median opening is large and pyriform; on the left inner margin are six or seven minute, close-set shearing teeth; the right inner margin has a single, large shearing tooth. The fulcrum is about two thirds as long as the rami. The uncii are simple, fairly long and slender, with a slight enlargement resting on the rami and serving as a fulcrum; the manubria are somewhat shorter than the incus, slender and slightly curved. Salivary glands are not present.

The gastric glands are very small and easily overlooked.
The stomach and intestine are continuous, without any constriction. The ovary and the small bladder are normal. The foot glands are pyriform and rather small.

The retrocerebral sac is small and at the posterior end of the ganglion; the ducts are quite prominent. The eye-spots are very small and at the base of the rostrum.

Total length 210–235μ; toes 50–55μ; trophi 35μ.

Diercanophorus capucinus is widely distributed among weeds in soft, acid water ponds, pH = 7.0 and less, but it never occurs in large numbers. We have collected it in Oneida and Vilas counties, Wisconsin, around Atlantic City, New Jersey, and on Mount Desert Island, Maine. Its most distinguishing characteristic is the straight, stout, clawed toes and the pegged rostrum.

**Diercanophorus haueri** Harring and Myers, new species

Plate 30, figures 4, 5.

The body is fairly stout, slightly gibbous dorsally and flat ventrally. The integument is moderately rigid and the outline reasonably constant. The animal is semitransparent.

The head is long, about two fifths of the length of the body, and separated from the abdomen by a distinct neck. The corona is nearly ventral and about one third of the length of the body. The rostrum is small, rounded and decurved. The abdomen is moderately long and very slightly gibbous posteriorly; the division of the integument into a dorsal and a ventral plate, separated by a wide lateral sulcus, is fairly distinct. The body tapers rapidly to the small tail; the foot is short and stout, the anterior border strongly oblique. The toes are rather short, about one fourth of the length of the body, tapering and very slightly decurved, ending in stout, blunt claws.

The trophi are elongate and stout. The rami are nearly parallel-sided and terminate in double, interlocking and asymmetric teeth, short on the left and long on the right ramus. The median opening is rather small and pyriform; the right inner margin has a single, conical shearing tooth, the left two, slightly smaller teeth. The alulae are rather small and acutely triangular; the fulcrum is stout and
about half as long as the rami. The unci are long, simple, fairly stout and somewhat curved; a knoblike enlargement rests on the ramus and serves as a pivot in the opening and closing movement. The manubria are stout and straight, nearly as long as the incus and enlarged anteriorly for the attachment of the adductor muscles. No salivary glands are present.

The gastric glands are small and near the dorsal side. The stomach, ovary and bladder are normal. The foot
glands are rather small and clubshaped.

The retrocerebral sac is small and at the end of the
ganglion. The eyespots are small, fairly wide apart and
at the base of the rostrum.

Total length 380 μ; toes 70 μ; trophi 50 μ.

We are indebted to Herr J. Hauer, of Obereschach,
Baden, for the material from which this description is
taken, and we take pleasure in naming it for him. The
collections were made in the Schwarzwald; we have recently
received a sketch of this species from Dr. Fadeev, of Khar-
kov, Russia. Diercanophorus haueri has a superficial re-
semblance to the forcipatus group, but is readily distin-
guished by the clawed toes and by the trophi.

DICRANOPHORUS SAEVUS HARRING and MYERS, new species.

Plate 31, figures 7–9.

The body is moderately elongate, spindle-shaped and
rather slender, convex dorsally and nearly straight ven-
trally. The integument is leathery and the outline fairly
constant. The animal is usually transparent.

The head is long, about two fifths of the length of the
body, slightly decurved and separated from the abdomen
by a well marked neck. The corona is ventral, very little
shorter than the head and has prominent, lateral, auricle-
like tufts of long cilia. The rostrum is long, broad and
strongly decurved; at its base are two prominent, rounded
lappets, as shown in figure 8. The abdomen is relatively
short and tapers posteriorly to the minute tail. The in-
tegument is divided by very wide lateral sulci into a dorsal
and ventral plate, limited posteriorly by a well marked,
oblique transverse fold. The foot is large, stout, conical
and oblique anteriorly. The toes are very long, more than one fourth of the total length, stout at the base, tapering rapidly for one third of their length and very gradually posteriorly, faintly decurved and terminating in a well marked, blunt claw.

The trophi are very large and robust. The rami are slightly lyrate, broad at the base, elongate triangular and nearly parallel-sided externally and terminating in two large, stout, slightly curved and acutely pointed teeth; the median opening is elongate pyriform and on the inner margin of the left ramus are two large, conical teeth, close together; opposing these is a single, slightly larger tooth on the right ramus. The fulcrum is short and broad, about one third as long as the rami. The alulae are large, triangular, pointed and slightly decurved. The unci are long and very stout, ending in a single, pointed and slightly curved tooth at the base of which is a slight enlargement, resting on the rami and serving as a hinge in the movements of the trophi. The manubria are stout, as long as the incus, slightly curved, broadly expanded anteriorly and knobbed posteriorly. Salivary glands are not present.

The gastric glands are small and oval. Stomach and intestine are not distinctly separated. The ovary and bladder are normal. The foot glands are large and pyriform.

The retrocerebral sac is large and at the posterior end of the ganglion; the ducts are rudimentary. At the base of the rostrum are two fairly large eyespots.

Total length 330\(\mu\); toes 90\(\mu\); trophi 50\(\mu\).

*Dieranophorus sacetus* was collected in sphagnum growing on the bottom of a large pond at Batsto, New Jersey; the water is acid, pH = 6.6. It is one of the largest species of the genus, and is readily recognized by the long, clawed toes and the large, frontal lappets at the base of the rostrum.

**Dieranophorus corystis** Harring and Myers.

Plate 33, figures 1–3.

*Arthroglena rostrata* Von Hofsten, Arkiv Zool., vol. 6, No. 1, 1909, p. 21, fig. 3; not *Diglena rostrata* Dixon-Nuttall and Freeman.

The body is moderately elongate, slightly gibbous dorsally and flat ventrally. The integument is flexible, but the outline is fairly constant. The animal is nearly always hyaline.

The head is long, more than one third of the length of the body, and separated from the abdomen by a distinct neck. The corona is long and nearly ventral. The rostrum is large and decurved; it has two prominent, triangular, laterally projecting lappets, as shown in the ventral view of the corona in figure 2. The abdomen is moderately long and curved dorsally, tapering gradually to the very small tail; traces of the lateral margins of a dorsal and a ventral plate may be found in some individuals and the posterior edge is usually well marked. The foot is short and fairly stout. The toes are very long, more than one third of the total length, straight, broad at the base and tapering gradually to a long well marked claw with slightly blunted tip.

The trophi are large and slender and of an unusual type. The rami appear to serve only as fulcra for the very long unci and their transverse movement seems to be slight; they are somewhat asymmetric, the right ramus having a distinct angle near midlength, replaced by a broad curve in the left. The greatest width of the incus is at the anterio, rounded tips of the rami; the fulcrum is fairly long, about two thirds as long as the rami, and robust. The unci are very long, needle-like and mobile; at two thirds length from the point is a knoblike enlargement, which rests on the ramus and serves as a fulcrum in the opening and closing of the mastax. The manubria are slender, slightly enlarged anteriorly and somewhat asymmetric, the right longer and less curved than the left. Salivary glands are not present.

The gastric glands are small and elongate. The stomach and intestine are without any distinct separation. Ovary and bladder are normal. The foot glands are small and pyriform.

The retrocerebral sac is long, reaching almost to the neck. At the base of the rostrum are two small elongate eyespots and immediately in front of these two tufts of very long cilia on slight elevations of the corona.

Total length 225\(\mu\); toes 60\(\mu\); trophi 35\(\mu\).
Dicranophorus corystis is common among the vegetation of soft, acid water ponds. We have collected it in Oneida and Vilas counties, Wisconsin, Mount Desert Island, Maine and around Atlantic City, New Jersey.

**DICRANOPHORUS STRIGOSUS** Harring and Myers. new species.

Plate 32, figures 1, 2.

The body is elongate, slender and slightly gibbous posteriorly; the ventral surface is very slightly concave. The integument is moderately rigid and the outline fairly constant. The animal is hyaline.

The head is very short, about one fifth of the length of the body, and is separated from the abdomen by a distinct neck segment, somewhat shorter than the head. The corona is short and strongly oblique; the rostrum is very small, rounded anteriorly and decurved. The abdomen is long and deepest near midlength, tapering gradually to the small tail; there are traces of the margins of a dorsal and a ventral plate and a distinct posterior edge. The foot is short and oblique anteriorly. The toes are fairly long, about one sixth of the total length, stout at the base, tapering gradually to slender, blunt points, and very slightly decurved.

The trophi are fairly large and robust. The rami are very broad at the base, enclosing a small, pyriform, central opening and terminating in stout, strongly incurved points; the inner margins are without shearing teeth and the alulae are very small and acutely pointed. The fulcrum is short, about one third of the length of the rami. The unci are long, single-toothed and robust; the tips are slightly curved and there is near mid-length a slight, knoblike enlargement, resting on the rami and serving as a fulcrum. The manusoria are stout and but little longer than the incus. No salivary glands are present.

The gastric glands are small and difficult to find. The stomach and intestine are without any distinct separation. The ovary and bladder are normal. The foot glands are small and clubshaped.

The retrocerebral sac is large and nearly cylindric, about half the length of the ganglion. At the base of the rostrum are two small eyespots.

Total length 185; toes 30; trophi 30.
Dieranophorus strigosus was collected in wet sphagnum growing in an old gravel pit at Hyattsville, near Washington, District of Columbia; no other localities are known. The characteristic form of the toes separates it from other related species.

**DICRANOPHORUS FACINUS** Harring and Myers, new species.

Plate 32, figures 3, 4.

The body is elongate, slender and gibbous posteriorly; the ventral surface is flat. The integument is very flexible, but the outline is fairly constant. The animal is hyaline.

The head is moderately long, a little less than one third of the length of the body, and separated from the abdomen by a slight constriction. The corona is fairly long and nearly ventral; the rostrum is very large, rounded anteriorly and strongly decurved. The abdomen is of moderate length and distinctly gibbous posteriorly, tapering gradually to the indistinct tail; a posterior transverse fold indicates the termination of the dorsal and ventral plates, although no other trace remains. The foot is short and stout. The toes are long, about one fourth of the entire length, broad at the base and taper gradually to fairly acute points; they have a slight, sigmoid dorso-ventral curvature.

The trophi are small and remarkably narrow and elongate. The rami are very long and slender, without inner marginal teeth or alulae; their width is only one third of the length. The fulcrum is short and lamellar. The unci are very simple, pointed rods, less than half as long as the incus. The manubria are excessively long, nearly twice the length of the incus, almost straight, very slender and rodlike. Salivary glands are not present.

The gastric glands are very small and elongate oval. There is no constriction between stomach and intestine. The ovary and bladder are normal. The foot glands are small and clubshaped.

Neither retrocerebral sac, subcerebral glands nor eyespots are present.

Total length 140μ; toes 33μ; trophi 20μ.

**Dicranophorus facinus** has been collected in wet sphagnum in an old gravel pit at Hyattsville, near Washington, District of Columbia, at Tuckerton and in Corduroy creek,
near Atlantic City, New Jersey. It has never been found in large numbers and seems to be rare.

**DICRANOPHORUS COLASTES** Harring and Myers, new species.

Plate 33, figures 8–10.

The body is moderately elongate, fairly stout, slightly convex dorsally and nearly straight ventrally. The integument is very flexible, but the outline is relatively constant. The animal is always transparent.

The head is large and triangular, its length more than one third of the length of the body; it is separated from the abdomen by a well marked neck. The corona is nearly ventral and as long as the head; the cilia are unusually long, especially at the base of the rostrum, where they are developed into pseudo-auricles. The rostrum is extremely large, rounded anteriorly and strongly decurved. The abdomen is short and tapers slightly from the neck towards the minute tail; there are faint traces of a division of the integument into a dorsal and a ventral plate, with a wide lateral sulcus and a posterior transverse line. The foot is fairly long and stout. The toes are long, about one fifth of the entire length, very slightly tapering and blunt at the tips; they are shown as slightly recurved, but are somewhat variable and may be perfectly straight, but never decurved; near the tip is a transverse septum, producing the appearance of a claw.

The trophi are fairly large and robust. The rami are broad at the base, terminating in single, strongly curved teeth; their external edges are nearly parallel posteriorly and the alulæ large; the median opening is relatively small and pyriform. The fulcrum is short, less than half the length of the rami. The unci are long and end in a single, large tooth, at the base of which there is a knoblike enlargement resting on the rami and functioning as a pivot in the movements of the mallei. The manubria are stout, very nearly straight and as long as the incus. No salivary glands are present.

The gastric glands are elongate oval and very small. The stomach and intestine are without distinct separation. The ovary and bladder are normal. The foot glands are small and pyriform.
The ganglion is very long, reaching almost to the neck. The retrocerebral sac is small and indistinct; the ducts are rudimentary and do not reach the sac, as shown in the dorsal view of the head. The eyespots are at the base of the rostrum; they are fairly large and always colorless.

Total length 135μ; toes 25μ; trophi 20μ.

_Dicranophorus colastes_ is widely distributed in soft, acid water ponds, pH = 6.6 and less, but it is never numerous. We have collected it in Oneida and Vilas counties, Wisconsin, around Atlantic City, New Jersey, and in Lower Breakneck pond, on Mount Desert Island, Maine. It is readily distinguished from other small species of the genus by its colorless eyespots.

**DICRANOPHORUS BIASTIS** Harring and Myers, new species.

Plate 35, figures 3–6.

The body is spindle-shaped, fairly stout and slightly gibbous posteriorly. The integument is very flexible and the outline constantly changing. The animal is hyaline, even the stomach being without distinct color.

The head is relatively long and separated from the abdomen by a distinct neck. The corona is strongly oblique and rather short. The rostrum is prominent, rounded and strongly decurved. The abdomen is nearly parallel-sided, very slightly gibbous posteriorly and longitudinally striate; the posterior circular fold is well marked and the body tapers rapidly to the small tail. The foot is short and fairly stout. The toes are very short, about one eighth of the total length, swollen at the base and somewhat abruptly reduced to gradually tapering acute points; they are strongly incurved, as shown in the dorsal view, figure 4, and also decurved.

The trophi are small, but robust. The rami are very stout and strongly curved dorso-ventrally, as shown in the lateral view, figure 5; the alulæ are nearly right-angled, so that the posterior half of the rami is almost paralleled-sided. The median opening is small and pyriform; no teeth are present on the inner margin. The fulcrum is nearly as long as the rami and remarkable by being enlarged at mid-length. Each uncus has two very nearly equal, rather short and slender teeth, strongly curved towards the tips.
The manubria are but little longer than the incus, moderately stout and slightly curved. No salivary glands are present.

The gastric glands are very small and near the dorsal side. There is no separation between stomach and intestine. The ovary and the small bladder are normal. The foot glands are fairly large and elongate pyriform.

The retrocerebral sac is small and at the posterior end of the ganglion; the duct is rudimentary. No eyespots are present.

Total length 160μ; length of toes 20μ; trophi 20μ.

_Dicranophorus biastis_ is widely distributed in soft, acid water, pH 6.6 and less, but always in small numbers. We have found it in ponds and pools in Vilas county, Wisconsin, around Atlantic City, New Jersey and in Witch Hole, on Mount Desert Island, Maine. It is readily recognized by the peculiar, incurved toes, which resemble the toes of _Resticula melanodus._

**Dichranophorus Myriophylli** (Harring).

Plate 34, figures 5, 6.


The body is fairly slender and slightly gibbous dorsally; the integument is flexible and the outline somewhat variable. The animal is moderately transparent.

The head is long, about one third of the length of the body, and separated from the abdomen by a well marked neck. The corona is nearly ventral and almost as long as the head. The rostrum is large, rounded anteriorly and decurved. The abdomen is somewhat longer than usual, slightly gibbous and tapers gradually to the small tail; the only trace of a division of the integument into plates is a faint posterior, transverse line, a short distance in front of the tail. The foot is short and stout. The toes are relatively short, about one eighth of the total length, stout, gradually tapering to acute points and slightly decurved.

The trophi are simple and not very powerful. The rami are lyrate, broad posteriorly, without alulæ or shearing teeth on the inner margin; the fulcrum is short, about half
as long as the rami. The single-toothed unci are long and slender, resting on the tips of the rami; the manubria are considerably longer than the incus, very slender and nearly straight. No salivary glands are present.

The gastric glands are small and near the mid-line. The stomach and intestine are without distinct separation. The ovary, bladder and foot glands are normal.

The retrocerebral sac is long and nearly cylindric. The small eyespots are at the base of the rostrum.

Total length 190μ; toes 25μ; trophi 25μ.

*Dicranophorus myriophylli* was collected in weedy ponds at Kenilworth, near Washington, District of Columbia. It was originally referred to *Ecentrum*, but its proper place is really in *Dicranophorus*; the mallei have sufficient freedom of motion to make the transfer necessary.

**DICRANOPHORUS SCOTIUS** Harring and Myers, new species.

Plate 34, figures 3, 4.

The body is elongate, very slender, almost cylindric, but very slightly gibbous posteriorly; the integument is very flexible and the outline variable according to the state of contraction. The animal is very transparent.

The head is long, about one third of the length of the body, and separated from the abdomen by a distinct neck. The corona is nearly ventral and almost as long as the head. The rostrum is small, rounded anteriorly and strongly decurved. The abdomen is elongate, very slightly gibbous and tapers rapidly to the very small tail; there is no trace of a longitudinal division of the integument into plates, but a transverse line near the foot indicates their posterior termination. The foot is very short. The toes are straight, conical, and acutely pointed; their length is about one twelfth of the length of the body.

The trophi are small and feeble, but remarkable on account of the development of the manubria. The rami are lyrate, terminating in simple, incurved points; neither alulæ nor inner marginal teeth are present. The fulcrum is about three fourths of the length of the rami and fairly robust. The single-toothed unci are long, slender and slightly curved at the tips. The manubria are extremely
long, about twice the length of the incus, very slender, almost straight and slightly enlarged at the posterior ends. No salivary glands are present.

The gastric glands are small and near the mid-line. The stomach and intestine are without distinct separation. The ovary and bladder are normal. The foot glands are fairly large and clubshaped.

The retrocerebral sac is elongate and tubular, about half as long as the head. No eyespots are present.

Total length 220μ; toes 18μ; trophi 22μ.

**Dicranophorus scotius** was collected in Long Pond, a soft, acid water lake on Mount Desert Island, Maine; pH = 6.0. Its most striking characteristic is the length of the trophi; it is one of the few blind species in this genus.

**DICRANOPHORUS PERMOLLIS** (Gosse).

Plate 34, figures 1, 2.


The body is elongate, spindle-shaped and slightly curved; the integument is very flexible and the outline highly variable. The animal is hyaline.

The head is relatively short, about one fourth of the length of the body, nearly cylindric and separated from the abdomen by a well marked neck. The corona is small and but slightly oblique. The rostrum is very small and decurved. The abdomen is long and deepest near the middle, tapering gradually to the small tail. There is no trace of a longitudinal division of the integument into plates, but a distinct circular line at two thirds length is undoubtedly a vestigial posterior termination of the plates. The foot is very short. The toes are short, about one twelfth of the total length, straight, lancet-shaped and acutely pointed.

The trophi are large, but rather feeble. The rami are lyrate, terminating in simple, robust, incurved points. The central opening is large and ovoid; neither alulae nor inner
marginal teeth are present. The fulcrum is well developed and as long as the rami. The unci are single-toothed and curved at the tips; at midlength there is a knobby enlargement, which rests on the rami and serves as a fulcrum in the movements of the mastax. The manubria are somewhat longer than the incus, slender and slightly curved. The external ends of the unci do not rest directly upon the manubria, but are loosely joined to them by a small, elongate-elliptic, intercalary element; in this species it appears to form an integral part of the malleus, but its origin is evidently, as pointed out by De Beauchamp (see description of Diglena hojstani, Bull. Soc. Zool. France, vol. 38, 1913, p. 330) a sinus of the pharyngeal cuticle, interposed between the uncus and manubrium. Salivary glands are not present.

The gastric glands are pyriform and long-stalked. The stomach and intestine are without distinct separation. The ovary and bladder are normal. The foot glands are very small and pyriform.

The retrocerebral sac is cylindric and as long as the ganglion. No eyespots are present.
Total length 240 μ; toes 18 μ; trophi 35 μ.

The original description of Dicranophorus permollis by Gosse is so vague and unsatisfactory as to be useless; the late Mr. Rousselet supplied us with the material from which this description is taken and assured us that according to tradition this is Gosse's animal. It was collected in moss from Epping Forest; we have found it at Washington, District of Columbia. No other records are known.

**DICRANOPHORUS DIFFLUGIARUM** (Penard)

Plate 35, figures 7, 8.


The body is relatively short, fairly stout and slightly gibbous dorsally; the integument is flexible and the outline variable. The animal is very transparent.

The head is large and extremely long, almost half the length of the entire body; it is separated from the abdomen
by a distinct neck. The rostrum is small, rounded anteriorly and strongly decurved. The abdomen is short and gibbous, tapering rapidly to the fairly prominent tail; there is no trace of any lirica or its outlines. The foot is long, about one eighth of the length of the body, and distinctly wrinkled. The toes are short, as long as the foot, straight, lancet-shaped and acutely pointed.

The trophi are large and rather feeble. The rami are arrow-shaped, with a very narrow, elongate median opening without shearing teeth; their points are slender and slightly incurved; the alulae are very large and pointed. The single-toothed unci are short, acutely pointed and slightly curved. The manubria are as long as the incus and slightly curved. The fulcrum is somewhat longer than the rami and very slightly expanded posteriorly. No salivary glands are present.

The gastric glands are very small and near the mid-line. The stomach, ovary and bladder are normal. The foot glands are long and clubshaped.

The retrocerebral sac is small and at the posterior end of the ganglion. The eyespots are small and at the base of the rostrum.

Total length 135μ; toes 15μ; trophi 20μ.

Dicranophorus difflugiarum is parasitic in Difflugia acuminata in Lake Geneva, at times occurring in such numbers that it almost exterminates its host. We are indebted to its discoverer, Dr. E. Penard, for the material from which this description is taken.

**DICRANOPHORUS PENNATUS** Harring and Myers, new species.

Plate 33, figures 4–7.

The body is elongate, fairly slender and gibbous dorsally; the ventral surface is very slightly convex. The integument is very flexible and the outline somewhat variable. The animal is usually transparent.

The head is fairly long, about one third of the length of the body, and separated from the abdomen by a well marked neck. The corona is strongly oblique and somewhat shorter than the head. The rostrum is rather small, rounded anteriorly and decurved. The abdomen increases
slightly in width for about two thirds of its length and tapers gradually to the fairly prominent tail. The integument is without longitudinal divisions, but has a transverse fold in front of the tail. The foot is rather large and oblique anteriorly. The toes are short, about one eighth of the total length, conical in lateral view, flattened dorso-ventrally, parallel-sided and obtusely pointed, as shown in figure 7.

The trophi are small, but robust. The rami are narrow at the base and strongly curved anteriorly, enclosing an almost circular opening and terminating in stout, pointed, single teeth; the posterior portion of the inner edge is armed with a very thin, lamellar ridge. The lateral view of the rami, figure 6, shows their peculiar, sigmoid curvature, which is not found in any other known species. The fulcrum is short, stout and broad. The unci are long and robust, with a stout, conical, terminal tooth, at the base of which there is a prominent, knoblike enlargement, resting on the rami and serving as a pivot. The manubria are slightly longer than the incus, stout, slightly curved and expanded anteriorly for the attachment of the muscles. No salivary glands are present.

The gastric glands are small, elongate oval and oblique with reference to the axis of the body. There is no distinct separation between the stomach and intestine. The ovary and bladder are normal. The foot glands are small and pyriform.

The retrocerebral sac is very small and the ducts not traceable. No eyespots are present.

Total length 155–170μ; toes 15–18μ; trophi 24μ.

*Dicranophorus pennatus* is rare; we have found only a few specimens in acid water ponds, pH = 6.6 and less, at Bargaintown, near Atlantic City, New Jersey, and in Round Pond, on Mount Desert Island, Maine. It is readily recognizable by the unusual structure of the trophi and externally by the remarkable form of the toes.

**DICRANOPHORUS SEBASTUS** Harring and Myers, new species.

Plate 35, figures 1, 2.

The body is elongate and very slender, parallel-sided anteriorly and slightly gibbous posteriorly. The integument
is very flexible and the outline variable. The animal is hyaline.

The head is short and narrow; its length is less than one third of the length of the body. The corona is small and oblique. The rostrum is prominent, rather narrow, rounded in front and strongly decurved. The abdomen is very long and slender; there is no trace of a division of the integument into a dorsal and a ventral plate. The body tapers rapidly to the minute tail; the foot is very small and conical. The toes are short, about one sixth of the length of the body, very slender, slightly decurved and taper gradually to acute points.

The trophi are rather small and slightly elongate. The rami are nearly parallel-sided; each ramus forms an elongate triangle, ending in a blunt knob, armed with a stout, curved tooth, projecting obliquely forwards and concave on the anterior edge; no shearing teeth are present. The fulcrum is stout and somewhat more than half the length of the rami; the alulae are small, acutely triangular and incurved. The uni are simple, fairly long and strongly curved at the tips; near midlength there is a knoblike enlargement, resting on the ramus and serving as a hinge in the opening and closing of the trophi. The manubria are somewhat shorter than the incus, slender and incurved; the anterior lamella for the attachment of the adductor muscles is small. The salivary glands are huge, almost as long as the mastax, clubshaped and pendent; the median dividing line is indistinct.

The gastric glands are very small and elongate oval. The stomach, ovary and bladder are normal. The foot glands are very small and clubshaped.

The ganglion is very large and as long as the head; no retrocerebral sac is present and no eye spots.

*Dicranophorus sebastianus* was collected at Bargaintown, near Atlantic City, New Jersey, in slightly acid water, pH variable from 6.0 to 6.4. The form of the body, the small corona and the huge salivary glands are so characteristic that it is one of the most easily recognizable species in this genus.
DICRANOPHORUS CERNUUS Harring and Myers, new species.

Plate 37, figures 1–3

The body is elongate, slender, slightly gibbous dorsally and straight ventrally; the integument is very flexible, but the outline is fairly constant. The animal is always hyaline.

The head is large, more than one third of the length of the body, and curved dorsally; it is separated from the abdomen by a slight constriction or neck. The corona is ventral and as long as the head. The rostrum is large and strongly decurved; it has at its anterior margin two triangular, laterally projecting lappets as shown in figure 3. The abdomen is elongate, deepest near mid-length and tapers gradually to the very small tail; the integument is without longitudinal dividing lines, but there is a faint transverse line posteriorly. The foot is fairly long and stout. The toes are very long, one fourth of the total length, slightly decurved, broad at the base and taper gradually to obtuse points.

The trophi are large and very slender. The rami are very long, broadly triangular at the base, S-curved and taper gradually to needlelike terminal teeth; the median opening is very large, pyriform and without any marginal teeth. The alulae are large and triangular; on the curved, posterior two thirds of the rami is an external, fin-like, lamellar extension, the outer edges nearly parallel. The fulcrum is about one third as long as the rami. The unci have each two long, equal, very slender teeth, the tips of the rami protruding through the space between them. The manubria are very long, slender and slightly curved posteriorly. There are no salivary glands.

The gastric glands are very small and near the dorsal side. The stomach and ovary are without any distinct separation. The ovary and bladder are normal. The foot glands are small and clubshaped.

The retrocerebral sac is moderately large and the ducts are traceable to the anterior margin of the rostrum. The eyespots are small discs at the base of the rostrum, their edges only showing in a dorsal view.

Total length 200\(\mu\); toes 45\(\mu\); trophi 30\(\mu\).
Dicranophorus cernus is widely distributed in very small numbers and only in soft, acid water ponds, pH = 6.8 and less. It occurs in Oneida and Vilas counties, Wisconsin, around Atlantic City, New Jersey and on Mount Desert Island, Maine. *D. rostratus* Dixon-Nuttall and Freeman appears to be closely related to this species, but is figured without the rostral pegs and the trophi are shown with peculiarly elongate, triangular rami.

**DICRANOPHORUS GRYPS Harring and Myers, new species.**

Plate 37, figures 7–9.

The body is elongate, very slender and slightly gibbous posteriorly; the integument is very flexible, but the outline is fairly constant. The animal is always hyaline.

The head is long, more than one third of the length of the body, triangular, curved dorsally, and separated from the abdomen by a well marked neck. The corona is ventral and as long as the head. The rostrum is very large, rounded anteriorly and strongly decurved. The abdomen increases gradually in width for about two thirds of its length, then tapers rapidly to the very small tail; the integument is without longitudinal dividing lines, but there is a faint, posterior transverse fold. The foot is fairly long and stout. The toes are very long, more than one fourth of the total length, very slightly decurved and flattened dorso-ventrally; the basal third is broad and parallel-sided, then follows an abrupt reduction to a little less than one half the width of the basal portion, and from this point the toe tapers gradually to a slightly obtuse tip and curves slightly outwards.

The trophi are large and very slender. The rami are broad at the base and abruptly reduced to very long and slender rods, curving into a semicircle and meeting in needle-like teeth; the median opening is extremely large and pyriform; no marginal teeth are present. The fulcrum is fairly long, about one half the length of the rami. The unci have each two long, very slender, equal teeth, the rami protruding in the space between them. The manubria are a little shorter than the incus, slender, slightly curved anteriorly and straight posteriorly. Salivary glands are not present.
The gastric glands are elongate oval and very small. There is no distinct separation between the stomach and intestine. The ovary and bladder are normal. The foot glands are rather small and pyriform.

The retrocerebral sac is small and the ducts rudimentary. The eyespots are very small and at the base of the rostrum.

Total length 210μ; toes 60μ trophi 25μ.

_Dicranophorus grypus_ is apparently rare; we have collected it only at Bargaintown, near Atlantic City, New Jersey, in acid water, pH = 6.6; it never occurs in numbers but a single specimen is found now and then. It is readily recognized by the very peculiar toes, as well as by the trophi.

**DICRANOPHORUS CAUDATUS Ehrenberg**

Plate 30, figures 6, 7.


? _Trichoda bitumis_ MÜLLER, Animalcula Infusoria, 1786, p. 204, pl. 29, fig. 4.


The body is elongate, very slender, almost cylindric, but very slightly gibbous posteriorly; the integument is fairly rigid and the outline nearly constant.

The head is short, about one fourth of the length of the body, cylindric, oblique anteriorly and separated from the abdomen by a distinct neck. The corona is slightly oblique and no rostrum is present. The abdomen is elongate, nearly cylindric, and deepest at about two thirds length, tapering gradually to the prominent tail. Longitudinal lines indicate the boundaries of a rudimentary dorsal and ventral plate, terminating in a distinct transverse line. The foot is very large and oblique. The toes are extremely long, about two fifths of the entire length, very slender, and parallel-sided for about three fourths of their length; from there the ventral edge begins to curve gradually towards the straight dorsal edge, forming acute points.

The trophi are large and not very robust. The rami are
rather narrow, abruptly bent a little below mid-length, and terminate in a knoblike enlargement with two small, pointed teeth, directed obliquely inwards and forward. Each ramus has a broad, lamellar alula, extending nearly full length. The fulcrum is short, about one third as long as the rami, and rather stout. The unci have each a single, very slender tooth, resting on the enlarged ends of the rami. The manubria are as long as the incus, slender and slightly curved. No salivary glands are present.

There is no distinct separation between stomach and intestine. The walls of the stomach are filled with symbiotic zoochlorellae and, as in several other rotifers with this relationship, no gastric glands are present, but the stomach extends forward, above and below the mastax, as blind caeca. The ovary and bladder are normal. The foot glands are very small and pyriform.

The eyespots are large and frontal. No retrocerebral sac is present.

Total length 260μ; toes 70μ; trophi 35μ.

*Dicranophorus caudatus* is a sapropelic animal, living in the decaying organic mud on the bottom of ponds and pools with abundant vegetation and alkaline water, pH = 7.0 and higher; in such conditions it is fairly common and usually occurs in large numbers.

How Gosse could fail to see the identity of his *D. biraphis* with Ehrenberg's animal and then substitute an entirely different species as *D. caudatus*, is so far inexplicable. The synonymy since the publication of the Rotifera no doubt refers to some animal resembling Gosse's figure, and not to Ehrenberg's species.

**DICRANOPHORUS TORVITUS** Harring and Myers, new species.

Plate 36, figures 3, 4.

The body is moderately elongate, rather slender and slightly gibbous dorsally; the ventral surface is nearly straight. The integument is flexible, but the outline is fairly constant. The animal is transparent.

The head is long, about two fifths of the length of the body, and separated from the abdomen by a rather indistinct neck. The corona is almost ventral and nearly as
long as the head. The rostrum is large, rounded anteriorly and decurved. The abdomen is relatively short, gibbous posteriorly and tapers rapidly to the very small tail; the only indication of a stiffening of the integument is an obscure posterior transverse fold. The foot joint is short and fairly stout. The toes are extremely long, one third of the total length, broad at the base, tapering gradually to slightly blunted tips, and distinctly decurved.

The trophi are small, but fairly stout. The rami are lyrate, without alulae or inner marginal teeth, and terminate in two small, unequal, divergent teeth. The fulcrum is very short, less than one fourth of the length of the rami. The unci are long, ending in a stout, curved tooth, resting between the terminal teeth of the rami; the outer ends are not hinged directly to the manubria, but through an intervening "sclerite", an indurated sinus of the pharyngeal cuticle. The manubria are fairly stout, sharply outcurved anteriorly and nearly straight posteriorly. Salivary glands are not present.

The gastric glands are oval and rather small. There is no distinct separation between the stomach and intestine. The ovary and bladder are normal. The foot glands are small and pyriform.

The retrocerebral sac is small and the ducts rudimentary. No eyespots are present.

Total length 250µ; toes 85µ; trophi 20µ.

**Dicranophorus torvitus** is apparently rare; we have found it in small numbers at Gravelly Run, near Atlantic City, New Jersey, and in a small stream in the woods, near the Bureau of Standards, in Washington, District of Columbia. It has a superficial resemblance to *D. uncinatus*, but differs considerably in the form and size of the trophi.

**DICRANOPHORUS UNCINATUS (Milne)**

Plate 36, figures 1, 2.

The body is moderately elongate, rather slender and slightly gibbous dorsally; the ventral surface is nearly flat. The integument is slightly stiffened, and the outline is fairly constant. The animal is moderately transparent.

The head is long, about two fifths of the length of the body, and separated from the abdomen by a somewhat indistinct neck. The corona is ventral and almost as long as the head. The rostrum is large, rounded anteriorly and strongly decurved; on small, sharply marked, circular areas at its base are two tufts of a few very long cilia, movable independently of the corona somewhat like the flagellum of the Mastigophora. The abdomen is rather short and gibbous posteriorly, tapering rapidly to the very small tail; in front of this is an obscure transverse fold. The foot is short, stout and oblique anteriorly. The toes are extremely long, about three fourths as long as the body, broad at the base,
tapering rapidly for one third of their length, and continuing as nearly cylindric rods, very slightly decurved and terminating in blunted tips.

The trophi are large and robust. The rami are broadly pyriform and very narrow posteriorly; at their widest point they are abruptly narrowed and continue as a long, strongly curved main tooth; at its base is a very long, slender, needle-like secondary tooth, which forms a right angle with the axis of the trophi and is long enough to engage with its mate on the opposite side. The fulcrum is short and robust. The unci are long, acutely pointed, and have somewhat beyond half length a knob-like enlargement, which rests on the rami and serves as a pivot; their outer ends are joined to the manubria through a small “sclerite”, produced into a very thin, broad, incurved lamella, originating, as pointed out by De Beauchamp, as a sinus of the pharyngeal cuticle. The manubria are long and stout, nearly straight, enlarged anteriorly and slightly outcurved posteriorly. Salivary glands are not present.

The gastric glands are oval and very small. The stomach and intestine are separated by an indistinct construction. The ovary and bladder are normal. The foot glands are small and pyriform.

The retrocerebral sac is small and the ducts rudimentary. No eyespots are present.

Total length 225μ; toes 90μ; trophi 30μ.

*Dicranophorus uncinatus* is apparently rare. We have found it only in acid water, pH 4.0–6.4, at “Paradise Ditch”, near Egg Harbor, New Jersey, and in Lake Wood, Mount Desert Island, Maine. Milne’s material probably came from the neighborhood of Glasgow, Gossé’s and Hood’s from Ireland. Bilfinger found it at Heilbronn, Esslingen and Bieberach, and De Beauchamp in the “gours” of the Garonne, near Toulouse.

**DICHANOPHorus SP.**

Plate 36, figures 5, 6.

Some of the characteristic features of this species are still in doubt and can not be determined until more material becomes available. We have therefore decided not to name it until a complete description is possible.
Genus STREPTOGNATHA Harring and Myers, new genus.

Dicranophorine rotifers with elongate, fusiform, illoricate body, a head segment, separated from the abdomen by a distinct neck; the abdomen is nearly cylindric, tapering posteriorly to a small tail; the foot is large and conical, the toes long.

The corona is obliquely frontal with two lateral, auricle-like tufts of long cilia; the rostrum is short and broad.

The trophi are forcipate, but somewhat aberrant; the incus is Y-shaped and formed of long, slender rods; the unci are pivoted with their posterior ends on the tips of the rami; the manubria are long, slender rods, attached at the mid-point of the unci; to the tips of the unci are attached elongate, naviculoid sclerites, specializations of the pharyngeal wall.

The retrocerebral sac is well developed; two pairs of colorless eyespots are present.

Symbiotic zoochlorellae are present in the walls of the stomach and in the body cavity.

Type of the genus.—Streptognatha lepta, new species.

STREPTOGNATHA LEPTA Harring and Myers, new species.

Plate 37, figures 4–6.

The body is elongate, subcylindric, very slender, convex dorsally and concave ventrally. The integument is very flexible and the outline constantly changing. The full grown animal is colored green by symbiotic zoochlorellae.

The head is short, less than one fourth of the length of the body, slightly deflexed and separated from the abdomen by a well marked neck. The corona is oblique and occupies less than half the length of the head; it has prominent, lateral, auricle-like tufts of long cilia. The rostrum is short, broad, truncate anteriorly and decurved. The abdomen is long, cylindric and slightly curved, tapering posteriorly to the minute tail. The integument is without longitudinal divisions or circular folds; at the base of the tail there is a strongly oblique circular fold, limiting the abdomen posteriorly. The foot is large, conical and two-jointed, the basal joint much larger than the posterior. The toes are long, about one seventh of the total length,
slender, tapering, acutely pointed, decurved and with a bulbous enlargement at the base, appearing on the sides and the ventral edge, but not on the dorsal edge.

The trophi are large, but the component pieces very slender. The incus is Y-shaped; fulcrum and rami are long, straight, very slender, round rods. The unci are rod-shaped, pointed anteriorly and resting with their external ends on the rami. The manubria are very long, slender, slightly curved, round rods, pointed posteriorly and attached with their anterior ends to the mid-point of the unci. At the tip of each uncus is attached an elongate, naviculoid sclerite, which follows the movements of the unci. This element, not found in any other type of mastax, is undoubtedly a simple indurated or sclerified invagination of the pharyngeal wall, which are found in several instances among the Notommatidae, but nothing resembling this. Its function is unknown; the action of the trophi has been studied carefully for a possible hint, but none was found. The trophi are not especially formidable; they are frequently and vigorously protruded, but their movements are limited to simple opening and closing, the unci pivoting outwards on the tips of the rami; in the seizure of prey the naviculoid sclerites would appear to nullify the effectiveness of the unci. It should be noted that the manubria are on the ventral side of the incus and the pharyngeal invaginations on the dorsal side.

The oesophagus is fairly long and slender. The gastric glands are very small and elongate. Symbiotic zoohlorella are present in the walls of the stomach and free in the body cavity in the full grown animal. The ovary and bladder are normal. The foot glands are large and pyriform.

The ganglion is large and saccate; the retrocerebral sac is large and projects beyond the neck fold; the duct is well marked and functional. At the base of the rostrum are two pairs of colorless eyespots, as shown in figure 5, the anterior pair largest and farthest apart. No subcerebral glands are present.

Total length 185–240\(\mu\); toes 25–30\(\mu\); trophi 30–35\(\mu\).

*Streptognatha lepta* is common in soft, acid water ponds in Vilas and Oneida counties, Wisconsin, on Mount Desert
Island, Maine, and around Atlantic City, New Jersey. It is very restless and almost impossible to narcotize satisfactorily.

Genus ERIGNATHA Harring and Myers.

Dicranophorine rotifers with subcylindric or fusiform, illoricate body; a head segment separated from the abdomen by a distinct neck; the abdomen tapers posteriorly to a minute tail; the foot is conical and rather short; the toes are relatively short and decurved.

The corona is oblique, with two lateral, auricle-like tufts of long cilia; the rostrum is short and broad.

The trophi are modified forcipate; the rami are bent at a nearly right angle at mid-length and terminate in long, slender, single teeth; unci and manubria are both jointed on the external angles of the rami, the unci being very long and slender.

No retrocerebral sac is present; some species have subcerebral glands; eyespots may be frontal, cervical or absent.

Type of the genus—Erignatha clastopis (Gosse) = Diglena clastopis Gosse.

ERIGNATHA CLASTOPIS (Gosse).

Plate 38, figures 1, 2.


The body is elongate, spindle-shaped, slender, convex dorsally and slightly concave ventrally. The integument is very flexible, but the outline is fairly constant. The animal is usually colored brownish by ingested food material.
The head is fairly long, about one fourth of the length of the body, slightly deflexed and separated from the abdomen by a well marked neck. The corona is oblique and occupies less than half the length of the head; it has prominent, lateral, auricle-like tufts of long cilia. The rostrum is short, rather narrow, truncate anteriorly and decurved. The abdomen is long, slightly gibbous dorsally, deepest near mid-length, and tapers gradually to the minute tail. The integument is without longitudinal divisions, but the oblique circular fold, which usually limits the plates posteriorly, is well marked. The foot is small, conical and oblique anteriorly. The toes are long, about one seventh of the total length, slender, tapering, acutely pointed and decurved.

The trophi are rather small, but robust. The rami are bent at a nearly right angle at mid-length, the basal sections parallel and meeting at a very obtuse angle, the terminal being a long, slender, slightly curved and acutely pointed tooth. The fulcrum is very short. The unci are pivoted on the external angles of the rami; they are slightly crutched at the joint, very long, stout, curved and acutely pointed. The manubria are very short, slender, slightly S-curved and jointed to rami and unci at the external angle of the rami; as far as may be judged from their development, they play only a subordinate role in the function of the mastax. A pair of slender, L-shaped rods are imbedded in the dorsal wall of the mastax and apparently attached with their posterior ends to the “triple” joint at the external angles of the rami. Salivary glands are not present.

The oesophagus is short. The gastric glands are very small and oval. Stomach and intestine are not distinctly separated. The ovary and bladder are normal. The foot glands are large and pyriform.

The ganglion is large and saccate. No retrocerebral sac is present and in material from some localities there are no subcerebral glands, while in other specimens two long-stalked glands are found, reaching beyond the mastax and each enclosing a clear globule. At the base of the rostrum are two eyespots, composed of red pigment granules without any enclosing capsule.

Total length 175μ; toes 24μ; trophi 30μ.
Erignatha clastopis is fairly common in weedy ponds everywhere. In the United States the form without subcerebral glands is found nearly everywhere; the specimens figured were originally described from France by De Beauchamp. Except for the presence or absence of the glands, there is no other discoverable difference in the two forms; the trophi are identical. For the present it seems therefore advisable to consider them local races of the same species.

ERIGNATHA SAGITTA Harring and Myers, new species.

Plate 38, figures 5, 6.

The body is rather short, spindle-shaped, fairly stout, convex dorsally and slightly concave ventrally. The integument is flexible, but the outline is fairly constant. The animal is fairly transparent.

The head is long, about one third of the length of the body, slightly deflexed and separated from the abdomen by a strongly marked neck. The corona is but slightly oblique; it has prominent, lateral, auricle-like tufts of long cilia. The rostrum is very short, broad at the base, truncate anteriorly and decurved. The abdomen is fairly long, curved, deepest at about one third length, and tapers gradually to a rudimentary tail. The integument is without longitudinal divisions, but the oblique circular fold, which usually limits the plates posteriorly, is well marked. The foot is conical, fairly large and has two joints of nearly equal length. The toes are short, about one eighth of the total length, very stout, acutely pointed, decurved and wide apart at the base.

The trophi are small and slender. The rami are rhomboid, the basal sections nearly parallel and forming a nearly right angle with the very long, slender, terminal teeth, which are slightly incurved at the tips. The fulcrum is as long as the rami and somewhat thickened near the base. The unci and manubria are both jointed on the external angles of the rami; the unci are long, very slender, slightly incurved at the tips and knobbed posteriorly. The manubria are nearly as long as the incus, very slightly curved, clubbed anteriorly and knobbed posteriorly. Salivary glands are not present.
The oesophagus is long and slender. The gastric glands are large and elongate oval. Stomach and intestine are not distinctly separated. The ovary and bladder are normal. The foot glands are minute and pyriform.

The ganglion is large and saccate; at its posterior end are two large, purplish-red eyespots. A retrocerebral sac is not present, but the subcerebral glands are well developed and nearly as long as the ganglion.

Total length 155μ; toes 18μ; trophi 20μ.

*Erignatha sagitta* was collected in a brackish pond at Margate, near Atlantic City, New Jersey. It has considerable external resemblance to the marine *Encentrum*—species, but is readily recognized by the two large cervical eyespots and the trophi.

**ERIGNATHA BELODON** Harring and Myers, new species.

Plate 39, figures 3–5.

The body is elongate, subcylindric, slender, very slightly gibbous dorsally and nearly straight ventrally. The integument is very flexible and the outline is somewhat variable. The animal is very transparent.

The head is rather short, about one fourth of the length of the body, and separated from the abdomen by a well marked neck. The corona is oblique and occupies about half the length of the head; it has fairly prominent, lateral, auricle-like tufts of long cilia. The rostrum is short, broad, rounded anteriorly and abruptly decurved. The abdomen is very nearly cylindric, faintly gibbous at about two thirds length, and tapers slightly to the minute tail. The integument is without longitudinal divisions, but the oblique circular fold, which usually limits the plates posteriorly, is well marked. The foot is fairly long, conical and oblique anteriorly. The toes are short, about one tenth of the total length, stout, conical, acutely pointed and decurved.

The trophi are fairly large, elongate and slender. The rami are oblong-rhomboïd, the basal section lobate and stout, the terminal tooth long, slender, tapering, acutely pointed and abruptly incurved at the tips; at the external angles is a short posterior projection at the ends of which is a joint, uniting the unci and manubria to the rami. The
fulcrum is about two thirds as long as the rami. The unci are long, extremely slender, acutely pointed and meet below the middle of the rami. The manubria are fairly short, only half the length of the incus, slender, slightly curved, rodlike, with a slight, lamellar, anterior expansion, incurved and faintly knobbed posteriorly. Salivary glands are not present.

The oesophagus is short. The gastric glands are very small and oval. Stomach and intestine are not distinctly separated. The ovary and bladder are normal. The foot glands are small and pyriform.

The ganglion is fairly long and saccate, the posterior portion probably constituting a rudimentary retrocerebral sac; it does not stain and can not be definitely separated from the ganglion, but there are remnants of the ducts. Subcerebral glands are not present. At the base of the rostrum are two pairs of colorless eyespots, the anterior pair very small and close together.

Total length 150 μ; toes 15 μ; trophi 22 μ.

*Erignatha belodon* has been collected in Lower Breakneck pond and Aunt Betties pond, on Mount Desert Island, Maine, in acid water, pH = 6.2–6.4. It does not appear to be closely related to other species of the group and is easily distinguished by the form of the trophi and the four eyespots.

**ERIGNATHA CAPULA** Harring and Myers, new species.

Plate 38, figures 3, 4.

The body is elongate, subcylindric, very slender and nearly straight dorsally and ventrally. The integument is very flexible and the outline is somewhat variable. The animal is always hyaline.

The head is very long, about one third of the length of the body, and separated from the abdomen by a well marked neck. The corona is strongly oblique and occupies about half the length of the head; it has prominent, lateral, auricle-like tufts of long cilia. The rostrum is long, broad at the base, rounded anteriorly and decurved. The abdomen is long, very slightly gibbous posteriorly and tapers gradually to the very small tail. The integument is without longi-
tudinal divisions, but the oblique circular fold, which usually limits the plates posteriorly, is well marked. The foot is fairly long, conical and oblique anteriorly. The toes are short, about one tenth of the total length, stout, conical, acutely pointed and very faintly S-curved.

The trophi are relatively large, greatly elongate and very slender. The rami are rhomboid, the basal sections fairly stout and slightly tapering; the terminal tooth is long, very slender and acutely pointed. The fulcrum is short, about half as long as the rami. At the external angles of the rami there is a "triple" joint, muscular ligaments connecting together the lower ends of the unci, anterior ends of the manubria and the angles of the rami. The unci are long, extremely slender, largest at the base and tapering gradually to acute, needle-like points. The manubria are excessively long, more than twice the length of the incus, clubbed at the base, rapidly attenuating to very slender, nearly straight rods, slightly incurved posteriorly. Salivary glands are not present.

The oesophagus is long and slender. The gastric glands are very small and oval. Stomach and intestine are not distinctly separated. The ovary and bladder are normal. The foot glands are very small and pyriform.

The ganglion is long and saccate; its posterior portion appears to be a rudimentary retrocerebral sac, but does not stain and is very imperfectly separated from the ganglion. Neither subcerebral glands nor eyespots are present.

Total length 160μ; toes 15μ; trophi 24μ.

*Erignatha capuia* was collected in Lower Breakneck pond, on Mount Desert Island, Maine, in acid water, pH = 6.4. It is evidently very closely related to *Diglana tenuidens* De Beauchamp, but this is distinguished by the presence of a distinct circumapical band, encircling the rostrum dorsally, and by having the unci strongly curved at the base.

**Genus ENCENTRUM Ehrenberg**

Dieranophorine rotifers with subcylindric or fusiform, illoricate or partially loricate body; a head segment separated from the abdomen by a distinct neck; the abdomen
tapers posteriorly to a minute tail; the foot is short and conical; the toes are short and curved.

The corona is oblique, rarely ventral with two lateral, auricle-like tufts of long cilia; the rostrum is well developed.

The trophi are modified forcipate; the weak, needle-like unci are rigidly fastened to the rami and connected to the manubria by a specialized, sclerified invagination of the pharyngeal wall; the manubria are jointed to the rami.

A retrocerebral sac or subcerebral glands are usually, but not always present, eyespots rarely.

Type of the genus—Encentrum marinum (Dujardin) = Furcularia marina Dujardin.

ENCENTRUM MARINUM (Dujardin)

Plate 40, figures 1–3.


The body is elongate, spindle-shaped, fairly slender, convex dorsally and slightly concave ventrally. The integument is leathery and the outline is fairly constant. The animal is moderately transparent.

The head is fairly long, about one fourth of the length of the body, slightly deflexed and separated from the abdomen by a well marked neck. The corona is very slightly oblique, with two minute, tubular, sensory palpi under the rostrum, which is very short, broad and rounded anteriorly. The abdomen is elongate and deepest near mid-length, tapering gradually to the minute tail. The integument is divided longitudinally by wide lateral sulci into a dorsal and a ventral plate, limited posteriorly by a well marked, circular fold. The foot is short, very stout and conical. The toes are short, about one seventh of the total length, stout, very slightly decurved, blade-shaped and wide apart at the base.

The trophi are moderately elongate and stout. The rami are lyrate, broad at the base and bifid at the tips; the median opening is pyriform and the inner margin without teeth. No alulae are present. The fulcrum is somewhat longer than the rami, stout and slightly expanded posteriorly. The unci are short and slightly curved, resting on the rami between the tips; they are connected to the manubria through large sclerites, the ramus, uncus and sclerite connected by muscular ligaments so that they are virtually immovable. The manubria are long, stout, strongly curved and knobbed posteriorly. Salivary glands are not present.

The gastric glands are large and oval. There is a slight constriction between stomach and intestine. The ovary and bladder are normal. The foot glands are small and pyriform.

The ganglion is large, reaching almost to the neck. No retrocerebral sac is present, but the subcerebral glands are large and well developed, including near the posterior end a highly refractive, colorless, globular body. No eyespots are present.

Total length 150–175\(\mu\); toes 20–25\(\mu\); trophi 25\(\mu\).

*Encentrum marinum* is cosmopolitan in brackish and salt water. We have collected it at Atlantic City, New Jersey, and in Salisbury Cove, Mount Desert Island, Maine, a bay of the Atlantic Ocean without any inflow of fresh water and
consequently of normal oceanic salinity. Mr. F. E. Cocks has forwarded us specimens collected by him in the Royal Botanic Gardens, Regent’s Park, London; both the male and female were present and evidently are able to live in fresh water. The synonymy of this species is mainly taken from Von Hofsten's revision; although there are a number of closely related and externally very similar species, this is much more common and it is reasonable to infer that this is really the animal studied by the various authors cited, at any rate there is nothing to connect their notes and descriptions with other species.

**ENCENTRUM CRUENTUM** Harring and Myers, new species

Plate 40, figures 6–8.

The body is elongate, spindle-shaped, slender, very slightly convex dorsally and concave ventrally. The integument is flexible and the outline somewhat variable. The animal is transparent.

The head is short, about one fifth of the length of the body, and separated from the abdomen by an indistinct neck. The corona is very slightly oblique and the rostrum very short, broad and rounded anteriorly. The abdomen is elongate and deepest near mid-length, tapering very gradually to the minute tail. The integument is divided longitudinally by wide, but indistinct lateral sulci into a dorsal and a ventral plate, limited posteriorly by a faint transverse fold; there is an additional transverse fold between this and the tail, and another on the anterior portion of the abdomen, behind the neck. The foot is very small, short and conical. The toes are very short, about one tenth of the total length, conical, acutely pointed, very slightly curved and wide apart at the base.

The trophi are somewhat elongate and fairly stout. The rami are lyrate, fairly slender and bifid at the tips; the median opening is broadly pyriform and the inner margin without teeth. No alulæ are present. The fulcrum is as long as the rami, rather slender and slightly expanded posteriorly. The unci are fairly long and slightly curved, resting with a slight enlargement on the rami between the tips; they are linked to the manubria through small, pyriform sclerites, the ramus, uncus and sclerite connected by muscu-
lar ligaments so as to be virtually immovable. The manubria are long, slender, strongly curved and crutched posteriorly and clubbed anteriorly. Two large, oval salivary glands are attached to the mastax through a long neck, so that they reach down over the gastric glands; they have the usual vacuolate structure.

The gastric glands are large and oval. The stomach and intestine are not separated by any constriction. The foot glands are small and pyriform.

The ganglion is large and saccate, reaching to the neck. No retrocerebral sac is present, but the subcerebral glands are well developed and contain near mid-length a highly refractive, colorless, globular body. No eyespots are present.

Total length 165µ; toes 15µ; trophi 24µ.

*Encentrum cruentum* was collected in salt pools on the Longport Boulevard, near Atlantic City, New Jersey. It is evidently closely related to *E. marinum*, but is readily distinguishable by the shorter toes and the long-stalked salivary glands.

**ENCENTRUM LACIDUM** Harring and Myers, new species
Plate 41, figures 1–3.

The body is elongate, spindle-shaped, rather slender, gibbous dorsally and the entire body somewhat curved. The integument is flexible and the outline somewhat variable. The animal is usually hyaline.

The head is long, about two fifths of the length of the body, slightly deflexed, and separated from the abdomen by a distinct neck. The corona is very slightly oblique and the rostrum short, broad and rounded anteriorly. The abdomen is elongate and strongly gibbous near mid-length, tapering gradually to a minute tail. No lateral sulci are present; there is a posterior, transverse, oblique, circular fold in front of the tail. The foot is small, stout and conical. The toes are short, about one tenth of the total length, stout, tapering, reduced at mid-length, acutely pointed, slightly decurved, and wide apart at the base.

The trophi are elongate and slender. The rami are lyrate, broad at the base and bifid at the tips; the median
opening is pyriform and the inner margin without teeth. No alulae are present. The fulcrum is as long as the rami. The unci are long, slender and slightly curved, resting on the rami between the long terminal teeth; they are linked to the manubria through small sclerites, the ramus, uncus and sclerite connected by muscular ligaments so as to be virtually immovable. The manubria are long, slender, incurved and crutched posteriorly and clubbed anteriorly.

The gastric glands are extremely large and oval. There is no distinct separation between stomach and intestine. The ovary and bladder are normal. The foot glands are large and pyriform.

The ganglion is elongate and saccate; near the posterior end are two highly refractive, colorless, globular bodies. No retrocerebral sac is present and apparently no subcerebral glands. Eyespots are lacking.

Total length 200 μ; toes 20 μ; trophi 27 μ.

Encentrum lacidum was collected in brackish water at Margate, near Atlantic City, New Jersey. It belongs to the marinum—group, but is readily recognized by the huge gastric glands and the slender, elongate trophi with very long terminal teeth on the rami.

**Encentrum Nesites** Harring and Myers, new species

Plate 40, figures 4, 5.

The body is elongate, slender and nearly cylindric. The integument is flexible, but the outline is fairly constant. The animal is very transparent.

The head is fairly long, about one fourth of the length of the body, and separated from the abdomen by a distinct neck. The corona is small and but slightly oblique; the rostrum is short, broad and rounded. The abdomen is cylindric for two thirds of its length, tapering gradually to the very small tail. The integument is divided longitudinally by fairly wide lateral sulci into a dorsal and a ventral plate, limited posteriorly by a well marked circular fold. The foot is very small and conical. The toes are short, about one eighth of the total length, stout at the base, acutely pointed, decurved, and close together at the base.

The trophi are small and slender. The rami are broadly lyrate, parallel-sided externally, broadly triangular at the
base and terminate in bifid tips; the inner opening is pyri-form and without teeth. No alulæ are present. The fulcrum is longer than the rami, very stout at the base and abruptly reduced at mid-length. The unci are long and slightly curved, resting on the rami between the tips; they are linked to the manubria through a fairly large sclerite, the ramus, uncus and sclerite connected by muscular ligaments so as to be virtually immovable. The manubria are long, slender, incurved and crutched posteriorly and clubbed anteriorly. Salivary glands are not present.

The gastric glands are small and oval. The stomach and intestine are not distinctly separated. The ovary and bladder are normal. The foot glands are very small and pyri-form.

The ganglion is large and saccate. No retrocerebral sac is present, but the subcerebral glands are well developed and contain near mid-length a highly refractive, colorless, globular body. No eyespots are present.

Total length 125 μ; toes 14 μ; trophi 18 μ.

Encentrum nesites was collected among Fucus growing on rocks in Salisbury Cove, Mount Desert Island, Maine, in ocean water of normal salinity. It belongs to the marinum-group, but is easily recognizable by the peculiar form of the fulcrum; it is the only species of this group with the toes close together at the base.

ENCENTRUM ERISTES Harring and Myers, new species

Plate 41, figures 4–6.

The body is elongate, fairly slender, subcylindric and nearly straight dorsally and ventrally. The integument is flexible, but the outline is fairly constant. The animal is very transparent.

The head is fairly long, about one fourth of the length of the body, and separated from the abdomen by a very distinct neck. The corona is fairly large and oblique. The rostrum is short, broad, rounded anteriorly and decurved. The abdomen is elongate, nearly cylindric for three fourths of its length and tapers gradually to the prominent tail. The integument is divided longitudinally by two wide lateral sulci into a dorsal and a ventral plate, limited posteriorly by
a transverse fold. The foot is short, very stout and conical. The toes are short, about one ninth of the total length, and, seen laterally, broad at the base, decurved and acutely pointed; in dorsal view, figure 5, they are broadly blade-shaped, and somewhat obtuse.

The trophi are large and fairly slender. The rami are large, lyrate and slender, terminating in long, needle-like, incurved tips, with a secondary tooth pointing horizontally inwards. No alulae are present. The fulcrum is a little shorter than the rami. The unci are very long, slender and strongly curved, resting on the rami near the tips; they are joined to the manubria through small, oval sclerites, the ramus, uncus and sclerite connected by muscular ligaments so as to be nearly immovable. The manubria are very long, slender, incurved and crutched posteriorly, clubbed and very slightly outcurved anteriorly. Salivary glands are not present.

The ganglion is large and saccate. No retrocerebral sac is present, but a remnant of the duct, including the anterior bifurcate portion, remains. The subcerebral glands are cylindric and somewhat longer than the ganglion. No eye-spots are present.

Total length 155μ; toes 18μ; trophi 30μ.

*Encentrum eristes* was collected among *Fucus* growing on rocks in Salisbury Cove, Mount Desert Island, Maine, in ocean water of normal salinity. Its nearest relatives are the species centering around *E. marinum*; it is easily distinguished by the very peculiar toes and the quite different form of the trophi.

**ENCEMTRUM ALGENT* Harring**

Plate 42, figures 1–3.


The body is elongate, spindle-shaped, very slender, convex dorsally and concave ventrally. The integument is flexible, but the outline is fairly constant. The animal is usually transparent.

The head is long, almost one third of the length of the body, and nearly cylindric; it is separated from the abdo-
men by a well marked neck. The corona is somewhat oblique, with fairly prominent, lateral, auricle-like tufts of long cilia. The rostrum is very short, broad and rounded anteriorly. The abdomen is very long and slender, deepest near mid-length and tapers very gradually to a minute tail. The integument is without any traces of longitudinal divisions. The foot is unusually large, conical, two-jointed and oblique anteriorly. The toes are short, about one sixteenth of the total length, broad at the base, reduced near mid-length, tapering to acute points, somewhat decurved and fairly wide apart.

The trophi are large and robust. The rami are broadly triangular at the base and terminate in large, pointed, incurved teeth; the median opening is pyriform and on the inner margins near mid-length are two large, triangular shearing teeth. No alulæ are present, but the rami are somewhat angular posteriorly. The fulcrum is nearly as long as the rami. The unci are short, strongly curved and very stout; at mid-length is a knob-like enlargement which rests on the rami near the tips. Between the uncus and manubrium is a large sclerite, as long as the uncus itself, and the ramus, uncus and sclerite are connected by muscular ligaments so that they move as a unit. The manubria are long, very stout at the base, tapering gradually to the crutched posterior ends, and curved into almost circular arcs. The salivary glands are large and saccate.

The oesophagus is very long and slender. The gastric glands are of unusual form, very elongate and spindleshaped, their anterior ends being suspended from the head by strands of connective tissue. There is no constriction between stomach and intestine. The ovary and bladder are normal. The foot glands are large and pyriform.

The ganglion is long and saccate. At its posterior end is a well developed retrocerebral sac with functional duct, traceable to the front. Neither subcerebral glands nor eye-spots are present.

Total length 360µ; toes 22µ; trophi 42µ.

En centrum algente was described from material collected by Mr. Frits Johansen, of the Canadian Arctic Expedition, in a brackish lagoon at Martin Point, on the arctic shore of Alaska; we have since found it in numbers in salt pools on
the Longport Boulevard, near Atlantic City, New Jersey, and have been able to correct some errors in the original description, based on preserved, alcoholic material.

**ENCETRUM OCULATUM** Harring and Myers, new species

Plate 41, figures 7–9.

The body is elongate, spindle-shaped and rather slender, convex dorsally and nearly straight ventrally. The integument is flexible, but the outline is fairly constant. The animal is usually hyaline.

The head is rather short, less than one fourth of the length of the body, and separated from the abdomen by a distinct neck. The corona is oblique, with prominent, lateral, auricle-like tufts of cilia. The rostrum is very short, broad and rounded anteriorly. The abdomen is deepest at two thirds length, tapering gradually to the minute tail. The integument is divided longitudinally by moderately wide lateral sulci into a dorsal and a ventral plate, limited posteriorly by a very distinct circular fold. The foot is extremely short and hemispherical. The toes are short, about one eighth of the total length, stout, decurved, pointed and wide apart at the base.

The trophi are very long and slender. The rami are broadly lyrate and terminate in single, incurved teeth; the median opening is large and pyriform, without teeth on the inner margin. No alulae are present. The fulcrum is short, about two thirds as long as the rami. The unci are short, straight, slender, pointed rods resting on the tips of the rami; they are joined to the manubria through a slender sclerite, almost as long as the uncus itself, the three elements connected by muscular ligaments so that they are virtually immovable. The manubria are extremely long, nearly straight and slightly clubbed anteriorly. Salivary glands are not present.

The gastric glands are large and oval. The stomach and intestine are not distinctly separated. The ovary and bladder are normal. The foot glands are large and pyriform.

The ganglion is large and saccate, reaching to the neck fold. At the posterior end is a highly refractive, colorless globule; it is possible that the posterior portion of the ganglion may be a rudimentary sac, although there is
no evidence for this, and the globular body an eyespot. No subcerbral glands are present.

Total length 125μ; toes 15μ; trophi 27μ.

*Encentrum oculatum* was collected in salt pools on the meadows near Atlantic City, New Jersey. It belongs to the *marinum*-group, but is easily distinguished by the single refractive body at the posterior end of the ganglion.

**ENCENTRUM BELLUINIUM** Harring and Myers, new species

Plate 43, figures 5, 6.

The body is elongate, subcylindric, very slender, slightly convex dorsally and straight ventrally. The integument is very flexible and the outline variable. The animal is always hyaline.

The head is long, more than one fourth of the length of the body, slightly deflexed and separated from the abdomen by a distinct neck. The corona is strongly oblique, with fairly prominent, lateral, auricle-like tufts of long cilia. The rotulum is short, broad and rounded anteriorly and slightly deflexed. The abdomen is elongate, very slender, largest immediately behind the neck and tapers gradually to the small tail. The integument is without any trace of longitudinal divisions; there is an obscure transverse fold at about two thirds length. The foot is small, conical and two-jointed. The toes are very short, about one tenth of the total length, compressed laterally, blade-shaped and acutely pointed.

The trophi are elongate and very slender. The rami are broad at the base, nearly parallel-sided externally and terminate in two stout, single, incurved teeth; the median opening is lyrate and the inner margins are without teeth. The fulcrum is nearly as long as the rami and knobbed posteriorly. No alulæ are present. The unci are long, slender and slightly curved; they are joined to the manubria by a small sclerite, the ramus, uncus and sclerite being connected by muscular ligaments and acting virtually as a unit. The manubria are very long and slender, slightly clubbed anteriorly, strongly curved and with a minute crutch posteriorly. Salivary glands are not present.
The oesophagus is long and slender. The gastric glands are very small and nearly spherical. There is no distinct separation between the stomach and intestine. The ovary and bladder are normal. The foot glands are very small and pyriform.

The ganglion is small and saccate; at its posterior end is a small retrocerebral sac. Neither eyespots nor subcerebral glands are present.

Total length 115\(\mu\); toes 10\(\mu\); trophi 18\(\mu\).

*Encentrum belluvianum* was found in mosses and hepatics growing in the drain from the Coypu-pond in the Zoological Park, at Washington, District of Columbia. It should be readily recognized by the slender body and the short, blade-shaped toes.

**ENCENTRUM PARIME** Harring and Myers, new species

Plate 42, figures 4, 5.

The body is elongate spindle-shaped, fairly stout, strongly convex dorsally and concave ventrally. The integument is flexible and the outline somewhat variable. The animal is usually very transparent.

The head is long, nearly one third of the length of the body, deflexed and separated from the abdomen by a well marked neck. The corona is strongly oblique, with fairly prominent, lateral, auricle-like tufts of long cilia. The rostrum is very short, broad and rounded anteriorly. The abdomen is elongate and spindle-shaped, deepest at about one third length, and tapers very gradually to an obtuse tail. The integument is without longitudinal divisions, but the posterior circular fold, which usually limits the plates, is present, with a rudimentary additional fold in front of it. The foot is small and conical. The toes are very short, less than one sixteenth of the total length, slender, acutely pointed and decurved.

The trophi are elongate and very slender. The rami are bluntly angular posteriorly, parallel-sided externally and terminate in simple, stout, single teeth; the median opening follows the external contour and the inner margins are without teeth. No alulae are present. The fulcrum is
about two thirds as long as the rami. The unci are short, slender rods, which, with a sclerite of nearly equal length, are firmly joined to the rami, moving with them and playing only an unimportant part in the action of the trophi. The manubria are very long and slender, slightly clubbed at the base and very slightly out curved posteriorly. Salivary glands are not present.

The oesophagus is long and slender. The gastric glands are large and almost spherical. There is no distinct separation between the stomach and intestine. The ovary and bladder are normal. The foot glands are extremely small and pyriform.

The ganglion is large and saccate. The retrocerebral sac is unusually large, almost equaling the ganglion in size. Neither subcerebral glands nor eyespots are present.

Total length 180μ; toes 10μ; trophi 20μ.

Encentrum parime was collected in wet sphagnum at Kenilworth, near Washington, District of Columbia. It does not seem to be very closely related to any other species; the form of the body, minute toes and the trophi should be sufficient for identification.

**ENCENTRUM BOREALE Harring and Myers, new species**

Plate 42, figures 6, 7.

The body is elongate, spindle-shaped, slender, somewhat convex dorsally and slightly concave ventrally. The integument is flexible and the outline variable. The animal is usually hyaline.

The head is long, nearly one third of the length of the body, very slightly deflexed and separated from the abdomen by a well marked neck. The corona is oblique, with rather prominent, lateral, auricle-like tufts of long cilia. The rostrum is very short, broad and rounded anteriorly. The abdomen is elongate and spindle-shaped, deepest near mid-length and tapers gradually to the very small tail. The integument is without longitudinal division, but the posterior circular fold, which usually limits the plates, is well marked. The foot is small, stout and conical. The toes are short, about one tenth of the total length, stout at the base, reduced near mid-length, tapering to acute points and slightly decurved.
The trophi are large and robust. The rami are lyrate, broadly triangular at the base and taper to stout terminal teeth, two in the right ramus and one in the left. The median opening is pyriform and the inner margins are without teeth. No alulae are present. The fulcrum is as long as the rami and knobbled posteriorly. The unci are long, stout and curved; the outer ends resting on a large sclerite, the posterior ends of which overlap the rami, the uncus, ramus and sclerite being effectively connected by muscular ligaments and acting substantially as a unit. The manubria are long, stout, tapering, strongly curved, clubbed anteriorly and slightly crutched posteriorly; the anterior ends do not rest on the rami, but on the sclerite. No salivary glands are present.

The oesophagus is long and slender. The gastric glands are large and oval. The stomach and intestine are not distinctly separated. The ovary and bladder are normal. The foot glands are fairly large and pyriform.

The ganglion is large, short and saccate; at its posterior end is a fairly large retrocerebral sac without duct and without actual separation from the ganglion. Neither subcerebral glands nor eyespots are present.

Total length 210μ; toes 21μ; trophi 38μ.

Encentrum boreale was obtained by soaking a sample of moss from Mr. Elton’s Spitsbergen collections forwarded to us by Mr. David Bryce. The material was sent to give us an opportunity to see his Encentrum murrayi; we did not succeed in finding this, but found several specimens of the species described above, which is evidently quite distinct, being much smaller and having different toes and trophi.

**ENCENTRUM GRANDE (Western)**

Plate 39, figures 1, 2.

_Pleurotrocha grandis_ Western, Journ. Quekett Micr. Club, ser. 2, vol. 4, 1891, p. 320, pl. 21, fig. 3; (1892) p. 418.—Murray, British Antarct. Exp. 1907–9, vol. 1, p. 56, pl. 13, fig. 14?


The body is elongate, spindle-shaped, fairly slender, gibbous dorsally and nearly straight ventrally. The integument is flexible, but the outline is fairly constant. The animal is usually colored by ingested food material.

The head is short, less than one fourth of the length of the body, cylindric, slightly deflexed and separated from the abdomen by a distinct neck. The corona is oblique and occupies less than half the length of the head; it has prominent, lateral, auricle-like tufts of long cilia. The rostrum is rudimentary, rather narrow and squarely truncate anteriorly. The abdomen is elongate and deepest near three fourths length, tapering abruptly to a fairly prominent tail. The foot is very long, tapering and four-jointed. The toes are short, about one twentieth of the length of the body, conical, obtusely pointed and slightly excavate dorsally near the tips.

The trophi are elongate and robust. The rami are lyrate, parallel-sided for half their length and terminate in stout, pointed, single teeth. No alulae are present. The fulcra are about two thirds as long as the rami. The unci are long, slender and acutely pointed; they are joined to the manubria by small triangular sclerites and united to the rami by muscular ligaments so as to be but slightly movable. The manubria are as long as the incus, stout, nearly parallel-sided, incurve and knobbed posteriorly. The salivary glands are small, but distinct.

The oesophagus is long and wide posteriorly. The gastric glands are large, elongate oval and stalked. Stomach and intestine are not distinctly separated. The ovary is large, in the living animal reaching as far as the gastric glands. The bladder is normal. The foot glands are extremely long and pyriform, terminating in a small mucus reservoir at the base of the toes.

The ganglion is large and saccate; a separate retro-
cerebral organ appears not to be present, nor are there any eyespots.
Total length 450μ; toes 22μ; trophi 45–50μ.

Encentrum grande was described by Western from free swimming individuals collected at Wandsworth, near London. At a later date he mentioned incidentally (see proceedings, p. 418) that it was parasitic on Asellus. With this clue, discovered by accident, it seemed to us that this might be the form described as Diglena hofsteni; Dr. de Beauchamp examined the citation and agreed with us that it was without doubt the same species. As there is no grandis in Encentrum, the original name may be restored.

ENCENTRUM FELIS (Müller)

Plate 43, figures 1, 2.

Vorticella felis MÜLLER, Verm. Terr. Fluv., vol. 1, pt. 1, 1773, p. 108; Animalcula Infusoria, 1786, p. 301, pl. 43, figs. 1–5.—
ibid. (for 1831), 1832, p. 133; ibid. (for 1833), 1834, p. 220;
Infusionsthierechen, 1838, p. 431, pl. 52, fig. 7.—DUJARDIN, Hist.
Theoræa felis EYFERTH, Einf. Lebensformen, 1878, p. 83; ed. 2, 1885,
p. 108.

Proales felis HUDSON and GOSSE, Rotifera, 1886, vol. 2, p. 36, pl. 18,
fig. 17.—HOOD, Scottish Natural., vol. 11, 1891, p. 73.—GLASS-
—JENNINGS, Bull. Michigan Fish Comm., No. 3, 1894, p. 17;
Bull. U. S. Fish Comm., vol. 19 (for 1899), 1900, p. 85.—DADAY,
Zoologica, pt. 44, 1905, p. 96.—VOIGT, Süßwasserfauna Deutsch-


Proales mirabilis STENOOS, Acta Soc. Fauna et Flora Fenjica,
vol. 17, No. 1, 1898, p. 181, pl. 1, figs. 26–28.

The body is short, stout, spindle-shaped, convex dorsally and nearly straight ventrally. The integument is flexible, but the form of the body is fairly constant. The full grown animal is always infected with symbiotic zoochlorella and has the characteristic bluish-green color of the symbiont.

The head is long, almost one third of the length of the body, somewhat deflexed and separated from the abdomen by a distinct neck. The corona is strongly oblique, almost ventral, considerably shorter than the head and has fairly prominent, lateral, auricle-like tufts of long cilia. The rostrum is long, broad, rounded anteriorly and decurved. The abdomen is deepest near mid-length, tapering gradually to the very small tail. The integument is without longitudinal divisions, but the circular fold which usually limits the plates posteriorly, is well marked. The foot is very short, stout and oblique anteriorly. The toes are short, about one eighth of the length of the body, stout, broad at the base, slightly decurved and taper to acute points.

The trophi are elongate and rather small. The rami are broad at the base and taper gradually to slender, slightly incurved points; the median opening is elongate pyriform and the inner margin is without teeth. No alulæ are present. The fulcrum is very short and broad. The unci are short and slender and do not reach the tips of the rami; with the small sclerites they are held to the external edges of the rami by muscular fibres and move with them. The manubria are relatively stout and very long, incurved and crutched posteriorly and slightly expanded anteriorly. Salivary glands are not present.

The oesophagus is short. The gastric glands are small and oval. Stomach and intestine are not distinctly separated. The ovary and bladder are normal. The foot glands are large and very broadly pyriform.

The ganglion is large and elongate saccate; at its posterior end is a small, hemispherical, ductless retrocerebral sac, filled with dark red pigment granules and enclosing an
eyespot. Neither frontal eyespots nor subcerebral glands are present.

Total length 135µ; toes 15µ; trophi 15–18µ.

*Encentrum felis* is common everywhere in weedy ponds. The pre-Ehrenbergian names have been listed in the synonymy, although it is questionable whether they actually refer to this animal; however, as Ehrenberg retained Müller's specific name and no stringent necessity for a change seems to exist, it is necessary to cite these old names here.

*ENCENTRUM VILLOSUM* Harring and Myers, new species

Plate 43, figures 3, 4.

The body is elongate, stout, spindle-shaped, slightly gibbous dorsally and nearly straight ventrally. The integument is flexible, but the outline is fairly constant. The full grown animal is always infected with symbiotic zoochlorellae and has the characteristic bluish-green color of the symbiont.

The head is fairly long, about one fourth of the length of the body, very slightly deflexed and separated from the abdomen by a well marked neck. The corona is strongly oblique, considerably shorter than the head and has fairly prominent, lateral, auricle-like tufts of long cilia. The rostrum is long, broad, rounded anteriorly and strongly decurved. The abdomen is spindle-shaped, deepest at two thirds length, tapering gradually to the small tail. The integument is without longitudinal divisions, but the circular fold, which usually limits the plates posteriorly, is well marked. The foot is very short, stout, oblique anteriorly and posteriorly. The toes are short, less than one twelfth of the length of the body, very stout, broad at the base, tapering, acutely pointed and slightly decurved.

The trophi are very long and slender. The rami are sickle-shaped, broad at the base and acutely pointed anteriorly; the median opening is elongate oval and without teeth on the inner margin. No alulæ are present. The fulcrum is nearly as long as the rami, stout at the base, abruptly reduced in width at mid-length and continuing as a thin lamella. The short, slender, pointed unci and a small sclerite are united to the rami by muscular ligaments.
and move with them as a unit. The manubria are extremely long, slender, nearly straight rods, slightly enlarged anteriorly and very slightly outcurved posteriorly. Salivary glands are not present.

The oesophagus is short. The gastric glands are fairly large and oval. The stomach and intestine are without distinct separation. The ovary and bladder are normal. The foot glands are large and pyriform.

The ganglion is very large, elongate and saccate; at its posterior end is a hemispherical ductless retrocerebral sac, filled with dark red pigment granules and enclosing an eyespot. Neither frontal eyespots nor subcerebral glands are present.

Total length 215μ; toes 15μ; trophi 30μ.

*Encentrum villosum* was collected in salt pools along the Longport Boulevard, near Atlantic City, New Jersey. Externally it resembles *E. felis*, but the trophi are very different. As it is also very much larger and a true salt water form, there should be no confusion between the two species.

**ENCENTRUM OTOIIS** Harring and Myers, new species

Plate 44, figures 5, 6.

The body is elongate, slender, spindle-shaped, slightly gibbous dorsally and nearly straight ventrally. The integument is very flexible and the outline variable. The animal is very transparent.

The head is very long and narrow, more than one third of the length of the body, slightly deflexed and separated from the abdomen by a distinct neck. The corona is strongly oblique, nearly ventral, about two thirds as long as the head, and has prominent, lateral, auricle-like tufts of long cilia. The rostrum is very short, broad, rounded anteriorly and decurved. The abdomen is deepest near mid-length, tapering gradually to the very small tail. The integument is without longitudinal divisions, but the oblique circular fold, which usually limits the plates posteriorly, is well marked. The foot is short, conical and oblique anteriorly. The toes are fairly short, about one seventh of the total length, slender, tapering, acutely pointed and have a slight, sigmoid curvature.
The trophi are large and robust. The rami are lyrate, fairly broad at the base and taper gradually to the stout, anterior, bifid tips; the median opening is pyriform and without teeth on the inner margin. No alulae are present. The fulcrum is as long as the rami and slightly knobbed posteriorly. The long, slender, acutely pointed unci and the sclerites are firmly united to the rami and move with them as a unit, so that the rami are in effect three-toothed. The manubria are very long and stout, tapering gradually to the knobbed posterior ends. No salivary glands are present.

The oesophagus is very short. The gastric glands are small and oval. The stomach and intestine are not distinctly separated. The ovary and bladder are normal. The foot glands are rather small, slender and pyriform.

The ganglion is large and saccate; at its posterior end is a small retrocerebral sac with a well marked duct. Neither subcerebral glands nor eyespots are present.

Total length 175μ; toes 25μ; trophi 40μ.

*Encentrum otois* was collected in Round Pond, a soft, acid water lake on Mount Desert Island, Maine, pH = 5.8 — 6.2. It is recognizable by the form of the body, toes and trophi, and the absence of eyespots.

**ENCENTRUM ELONGATUM** Harring and Myers, new species

Plate 44, figures 3, 4.

The body is elongate, spindle-shaped, very slender, slightly gibbous dorsally and nearly straight ventrally. The integument is very flexible, but the outline is fairly constant. The animal is hyaline.

The head is very long and narrow, almost one third of the length of the body, and separated from the abdomen by a well marked neck. The corona is very nearly ventral, about three fourths as long as the head, and has fairly prominent, lateral, auricle-like tufts of long cilia. The rostrum is fairly long, broad at the base, rounded anteriorly and decurved. The abdomen is deepest at two thirds length, tapering gradually to the rudimentary tail. The integument is without longitudinal divisions, but the oblique circular fold, which usually limits the plates pos-
teriorly, is well marked. The foot is small and conical. The toes are short, about one fifteenth of the total length, very slender, tapering, acutely pointed and slightly de-curved.

The trophi are elongate and fairly large. The rami are short, very stout, broadly triangular at the base and terminate in a single, stout tooth; the median opening is almost circular and on the inner margins are two triangular, lamellar teeth. No alulae are present, but the broad, posterior ends of the rami provide for the attachment of the abductor muscles. The fulcrum is as long as the rami and slightly knobbed posteriorly. The unci are fairly robust and have a curved terminal tooth; with the very small, oval sclerite they are joined to the rami by muscular ligaments and act as a pair of supplementary teeth. The manubria are long, curved, fairly large anteriorly and taper gradually to the crutched posterior ends. No salivary glands are present.

The oesophagus is short. The gastric glands are small and oval. The stomach and intestine are not distinctly separated. The ovary and bladder are normal. The foot glands are slender and pyriform.

The ganglion is long and saccate; at its posterior end is a large, elongate retrocerebral sac with well marked ducts opening on the corona. No subcerebral glands are present. At the base of the rostrum are two small eyespots. Total length 180µ; toes 12µ; trophi 25µ.

Encentrum elongatum is a typical wet sphagnum form; we have collected it at Kenilworth, near Washington, District of Columbia; Mr. F. E. Cocks, of the Quexett Microscopical Club, informs us that he has found it in sphagnum sent to him from Sydney, Australia, and Mr. Bryce has found it in England. The slender toes and the trophi are its principal characteristics.

**ENCETRUM ZETETUM** Harring and Myers, new species

Plate 44, figures 1, 2.

The body is elongate, very slender, slightly gibbous dorsally and straight ventrally. The integument is very flexible and the outline somewhat variable. The animal is always hyaline.
The head is very long and narrow, almost one third of the length of the body, and separated from the abdomen by a well marked neck. The corona is strongly oblique, almost ventral, about three fourths as long as the head, and has fairly prominent, lateral, auricle-like tufts of long cilia. The rostrum is very short, broad, rounded anteriorly and decurved. The abdomen is nearly cylindric, very slightly gibbous posteriorly and tapers gradually to the small tail. The integument is without longitudinal divisions, but the oblique circular fold, which usually limits the plates posteriorly, is well marked. The foot is long, conical, rather slender and oblique anteriorly. The toes are short, about one twelfth of the total length, parallel-sided, very slender, slightly decurved, and terminate in blunt, rounded tips.

The trophi are fairly large and very slender. The rami are of somewhat irregular, triangular form and blunt anteriorly, with a long, slender tooth at right angles to the axis; the median opening is V-shaped, without teeth on the inner margin. No true alulæ are present, but the rami are somewhat angular externally. The fulcrum is nearly as long as the rami. The fairly long and slender unci and relatively long sclerites are united to the rami by muscular ligaments, so that they act as a second pair of teeth in the rami. The manubria are very long, slender, slightly curved, clubbed anteriorly and knobbed posteriorly. Salivary glands are not present.

The oesophagus is long and slender. The gastric glands are very small and oval. The stomach and intestines are without any distinct separation. The ovary and bladder are normal. The foot glands are rather small, slender and pyriform.

The ganglion is long and saccate; at its posterior end is a small retrocerebral sac with well marked ducts. Neither subcerebral glands nor eyespots are present.

Total length 240μ; toes 20μ; trophi 28μ.

*Encentrum zetetum* was collected in *Fontinalis* growing on rocks in the bottom of Duck Brook, Mount Desert Island, Maine. The current in the brook is quite rapid and at times almost torrential, but the animal seems able
to maintain itself in spite of this. The form of the body, toes and trophi are sufficiently distinctive to separate this species from related forms.

**ENCENTRUM RICCIAE** Harring

*Plate 39, figures 6, 7.*


The body is elongate, spindle-shaped and slender, convex dorsally and slightly concave ventrally. The integument is very flexible and the outline variable. The animal is always hyaline.

The head is short, about one fifth of the total length, deflexed and separated from the abdomen by a distinct neck. The corona is strongly oblique, but little more than half the length of the head and has prominent, lateral, auricle-like tufts of long cilia. The rostrum is short, rather narrow, rounded anteriorly and deflexed. The abdomen is almost cylindric, slightly smaller at the neck, and tapers posteriorly to the tail. The integument is without either longitudinal or transverse folds. The foot is unusually long and composed of four joints, decreasing gradually in size towards the toes; the last joint is normally telescoped within the third, so that the foot appears to have only three joints. The toes are tubular, curved posteriorly and the tips rounded; they are “hinged” at the base and movable when the animal is fixed by extruded mucus, but not voluntarily and not controlled by muscles.

The trophi are large and of somewhat exceptional form. The rami are very broadly triangular at the base and terminate in long, very slender, acutely pointed, sickle-shaped teeth. The median opening is circular and without teeth on the inner margin. The unci and sclerites are firmly united to the rami by muscular ligaments; the uncus proper is a very slender, acutely pointed and slightly curved rod, fastened to the rami below the principal tooth. The fulcrum is longer than the rami and knobbed posteriorly. The manubria are long, slender and curved; their anterior ends are bifurcate and grasp the external angles of the alulae, to which they are jointed. Salivary glands are not present.
The oesophagus is relatively short. The gastric glands are small and oval. The stomach and intestine are not distinctly separated. The ovary and bladder are normal. The foot glands are extremely long and slender.

The ganglion is fairly large and saccate; at its posterior end is a small retrocerebral sac; the duct is rudimentary. Neither eyespots nor subcerebral glands are present.

Total length 210µ; foot 50µ; toes 10µ; trophi 35µ.

Enceptrum ricciae is common in decaying Riccia at Kenilworth, near Washington, District of Columbia, and at Oceanville, near Atlantic City, New Jersey; we have found it among sphagnum in Toad Hole and Fawn Pond, on Mount Desert Island, Maine, and Mr. David Bryce has sent us specimens from England. It is now evident that the original description was based on partly contracted, pathological specimens.

ENCEPTRUM SAUNDERSIAE Hudson

Plate 45, figures 3–5.


The body is elongate, slender, slightly curved and gibbous dorsally. The integument is fairly rigid and strongly plicate posteriorly and the outline is fairly constant. The animal is colored green by symbiotic zoochlorellae.

The head is very short, about one fifth of the length of the body, broad, strongly decurved and separated from the abdomen by a deeply constricted neck. The corona is small and very oblique, with fairly prominent, lateral, auricle-like tufts of long cilia. The rostrum is short, obtusely triangular and decurved. The abdomen is nearly parallel-sided in
the anterior third of its length and increases gradually in
width towards the posterior third, which is deeply plicate
and terminates in a large, pendant tail. The integument
is without longitudinal divisions. The foot is very short
and oblique anteriorly and posteriorly. The toes are short,
about one twelfth of the total length, straight, conical and
acutely pointed.

The trophi are large and robust. The rami are lyrate,
nearly parallel-sided and terminate in strong, pointed
teeth, which do not meet. The fulcrum is slender and
about half as long as the rami. The unci are very large
and robust, thickened anteriorly to form a stout tooth,
which is the effective part of the trophi; the rami are fitted
in the space behind the tooth, both elements, as well as a
small, oval sclerite linking uncus and manubrium, being im-
movably connected by muscular ligaments. The manubria
are long, stout, very slightly tapering and curved, clubbed
anteriorly and knobbed posteriorly. Salivary glands are
not present.

The oesophagus is long and slender. The gastric glands
are small and rounded. Stomach and intestine are not dis-
stinctly separated. The ovary and bladder are normal.
The foot glands are minute and pyriform.

The ganglion is very large and saccate; a distinct retro-
cerebral sac is not present, but it is possible that the pos-
terior portion of the ganglion may actually be an atrophied
sac. Subcerebral glands are not present. At the base of
the rostrum are two colorless eyespots, fairly wide apart.

Total length 185μ; toes 14μ; trophi 35μ.

*Encentrum saundersiae* as here described has been found
at Washington, District of Columbia, and material was sent
from England by the late Mr. Charles F. Rousselet, col-
lected at Wellington; Dr. Fadeev has sent us a drawing
from material collected at Kharkov, Russia, and Leissling
has recorded it from Zeitz, Germany. This form was arbi-
trarily selected to bear the old name, as it is impossible to
tell from the original description which one of these three
very similar forms may have been studied by Hudson; the
reasons influencing the selection were its wide distribu-
tion and the possession of material proving its presence in
England. The position of these three species is somewhat uncertain; judging from external appearances they are very closely related, but the trophi are very dissimilar. Until a more detailed study can be made or possibly related forms found, it seems advisable to leave all three in the present genus.

**ENCENTRUM PPLICATUM (Eyferth)**

Plate 45, figures 1, 2.


*Theorus plicatus* Voigt, Süßwasserfauna Deutschlands, pt. 14, 1912, p. 87, fig. 151.

The body is moderately elongate, slender, spindle-shaped, convex dorsally and concave ventrally. The integument is fairly rigid and plicate and the outline is nearly constant. The animal is usually colored by ingested food material, but is not infected by symbiotic zoochlorellae.

The head is very short, about one fifth of the length of the body, fairly broad, decurved and separated from the abdomen by a very indistinct, slightly constricted neck. The corona is rather short and oblique, with fairly prominent, lateral, auricle-like tufts of long cilia. The rostrum is short, obtusely triangular and decurved.

The abdomen is elongate and spindle-shaped, deepest near mid-length and terminates in a large, broad, pendent tail. The integument is without longitudinal divisions or circular folds, but has shallow, permanent annulations, less marked than in *E. lutetiae*. The foot is fairly long, conical and separated from the abdomen by an oblique anterior fold. The toes are short, about one twelfth of the total length, slender, straight, conical and pointed.

The trophi are small, robust and fairly simple. The rami are broadly rhomboid, bent at a right angle at mid-length, the basal portion very stout and parallel-sided, the terminal tooth very large, stout, slightly curved and acutely pointed. The fulcrum is short and broad. The unci are long, slender, acutely pointed and apparently fused to the angles of the rami. The manubria are jointed to the ex-
ternal angles of the rami, long, stout, slightly bent near mid-length and clubbed anteriorly; the posterior ends are faintly outcurved. Salivary glands are not present.

The oesophagus is long and slender. The gastric glands are small, oval and near the ventral surface. The stomach and intestine are not distinctly separated. The ovary and bladder are normal. The foot glands are very small and pyriform.

The ganglion is elongate and saccate; at the posterior end is a small, rounded retrocerebral sac with apparently functional duct, no subcerebral glands are present. The two colorless eyespots are closer together and nearer the front than in E. lutetiae and saundersiae.

Total length 210μ; toes 15μ; trophi 27μ.

*Encentrum plicatum* was first called to our attention by Dr. de Beauchamp, who found this species at Strasbourg and identified it with Eyferth's animal. The material on which the present description is based was collected by Mr. F. E. Cocks, of the Quexett Microscopical Club, in the Royal Botanical Gardens, Regents Park, London, and kindly forwarded to us.

**ENCENTRUM LUTETIAE** Harring and Myers, new species.

Plate 45, figures 6, 7.


The body is moderately elongate, slender, slightly curved and gibbous dorsally. The integument is fairly rigid and strongly plicate and the outline is relatively constant. The animal is colored green by symbiotic zoochlorellae.

The head is very short, about one fifth of the length of the body, broad, decurved and separated from the abdomen by a strongly constricted neck. The corona is fairly short and strongly oblique, with fairly prominent, lateral, auricle-like tufts of long cilia. The rostrum is short, obtusely triangular and decurved.

The abdomen is roughly parallel-sided, deepest near mid-length and terminates in a large, pendant tail. The integument is without longitudinal divisions or circular folds, but
has strongly marked, permanent, rather shallow annulations. The foot is fairly large, conical and slightly decurved. The toes are short, about one sixteenth of the total length, conical, pointed and slightly decurved.

The trophi are very simple, small and robust. The rami are rhomboid, bent nearly at a right angle at mid-length, the basal portion very stout and nearly parallel-sided, the terminal tooth very large, curved and acutely pointed. The fulcrum is short and broad. The unci are minute scales, fused to the angles of the rami. The manubria are long, slightly clubbed anteriorly, incurved and crutched posteriorly. The salivary glands are well developed.

The oesophagus is long and slender. The gastric glands are small and spherical, and apparently nearest the ventral surface. Stomach and intestine are not distinctly separated. The foot glands are small and pyriform.

The ganglion is large and saccate; at its posterior end is a nearly spherical, retrocerebral sac with evident duct, opening frontally at the base of the rostrum, inside of the two frontal, colorless eyespots. Subcerebral glands are not present.

Total length 160\(\mu\); toes 10\(\mu\); trophi 27\(\mu\).

*Encentrum lutetiae* is described from material collected at Arcueil, near Paris, by Dr. De Beauchamp, and kindly forwarded to us.

Genus *ASPELTA* Harring and Myers, new genus.

*Dicranophorine* rotifers with elongate, slender, illoricate or semiloricate body; a head segment separated from the abdomen by a distinct neck; the abdomen tapers posteriorly to a minute tail; the foot is short and conical; the toes are fairly short and slightly decurved.

The corona is ventral, rarely oblique, with two lateral, auricle-like tufts of long cilia; the rostrum is broad and fairly prominent.

The trophi are modified forcipate and usually strongly asymmetric; the rami are very stout and without inner marginal teeth; the right ramus has usually a prominent alula, the left a rudiment or none; the fulcrum is large; the manubria are long and usually clubbed anteriorly; the
unci are of very irregular form and firmly united to the external edges of the rami, serving only to transmit the pull of the adductor muscles from the manubria to the rami.

A well developed retrocerebral sac is present, but no subcerebral glands; eyespots are usually absent, frontal when present.

**Type of the genus.**—*Aspelta circinator* (Gosse) = *Diglena circinator* Gosse.

**ASPELTA CIRCINATOR (Gosse)**

*Plate 45, figures 6-8.*


*Dicranophorus giraffa* Harring, Bull. 81 U. S. Nat. Mus., 1913, p. 36.


The body is elongate, very slender, slightly gibbous dorsally and very nearly straight ventrally. The integument
is flexible, but the outline is fairly constant. The animal is always hyaline.

The head is long, about one third of the length of the body, slightly decurved and separated from the abdomen by a well marked neck. The corona is nearly ventral, about two thirds as long as the head, and has prominent, lateral, auricle-like tufts of long cilia. The rostrum is short, broad at the base, rounded anteriorly and decurved. The abdomen is elongate, gibbous dorsally, deepest near mid-length, and tapers gradually to the minute tail. The integument is divided longitudinally by wide, well marked lateral sulci, terminated posteriorly by an oblique circular fold. The foot is fairly large, conical and oblique anteriorly. The toes are fairly long, about one seventh of the total length, very slender, tapering gradually to acute points, nearly straight in lateral view, incurved and forceps-shaped in dorsal view.

The trophi are elongate and fairly robust. The rami are parallel-sided for the greater part of their length and terminate in two very stout, incurved teeth; the right ramus is considerably broader than the left. The fulcrum is somewhat shorter than the rami. The unci are rudimentary and asymmetric, the right small and irregularly conchoid, the left somewhat larger and T-shaped, the longest branch resting on the manubrium, the two shorter against the ramus. The manubria are long, slightly clubbed anteriorly, tapering gradually towards the posterior ends and strongly incurved. Salivary glands are not present.

The oesophagus is short. The gastric glands are minute and spherical. Stomach and intestine are not distinctly separated. The ovary and bladder are normal. The foot glands are fairly long and pyriform.

The ganglion is elongate and saccate; at its posterior end is a small retrocerebral sac with functional duct. No subcerebral glands are present. At the base of the rostrum are two minute, globular, colorless vesicles, which may be eyespots.

Total length 230μ; toes 30μ; trophi 27μ.

Aspetla circinator is common in wet sphagnum and in acid water ponds it occurs as a free swimming form. We
have found it in the United States wherever collections have been made. It is readily recognized by the forceps-shaped toes.

**ASPELTA APER (Harring)**

Plate 46, figures 3–5.


The body is elongate, slender, slightly gibbous posteriorly and nearly straight ventrally. The integument is flexible, but the outline is fairly constant. The animal is usually transparent.

The head is long, almost one third as long as the body, slightly decurved and separated from the abdomen by a distinct neck. The corona is ventral and considerably shorter than the head, with fairly prominent, lateral, auricle-like tufts of long cilia. The rostrum is fairly long, broad at the base, rounded anteriorly and decurved. The abdomen is moderately elongate, deepest at two thirds length, and tapers rapidly to the very small tail. The integument is without longitudinal divisions, but the posterior circular fold, which usually limits the plates, is well marked. The foot is fairly large, conical and oblique anteriorly. The toes are moderately long, about one seventh of the total length, slender, slightly tapering, acutely pointed, decurved, broad at the base and decreasing rapidly in width.

The trophi are large and robust. The rami are broad and sickle-shaped, terminating in rather blunt points; the median opening is elongate oval and the inner margin is without teeth. The alulae are prominent and obtusely angular. The fulcrum is about half the length of the rami. The rudimentary unci are asymmetric and of irregular form; the right uncus is roughly V-shaped, the two branches straddling the ramus; the left uncus is T-shaped, one branch resting on the manubrium and the other two on the ramus. Their original function is evidently completely lost and their only service is as a rather superfluous connecting link between manubria and rami, as far as may be judged from their form and position. The manubria are long, somewhat asymmetric, abruptly bent and much enlarged anteriorly, straight, slender and slightly tapering.
beyond the angle and very slightly incurved posteriorly. Salivary glands are not present.

The oesophagus is short. The gastric glands are rather small and oval. Stomach and intestine are without distinct separation. The ovary and bladder are normal. The foot glands are fairly large and pyriform.

The ganglion is long and saccate; at its posterior end is a small retrocerebral sac with well marked ducts. Neither subcerebral glands nor eyespots are present. At the base of the rostrum there is on the margin of the corona two small, bluntly conical “tusks,” toothlike projections of high refractive index, close to the external openings of the ducts of the retrocerebral sac and possibly in some functional relationship to them.

Total length 250μ; toes 35μ; trophi 38μ.

Aspelta aper is fairly common and very widely distributed in weedy ponds with neutral or slightly acid water; we have found it in northern and central Wisconsin, around Atlantic City, New Jersey, central Florida, Mount Desert Island, Maine, and around Washington, District of Columbia.

Aspelta labri Harring and Myers, new species

Plate 46, figures 1, 2.

The body is elongate, fairly slender, gibbous dorsally and nearly straight ventrally. The integument is flexible and the outline somewhat variable. The animal is usually transparent.

The head is long, almost one third of the length of the body, slightly decurved and separated from the abdomen by a well marked neck. The corona is ventral and very little shorter than the head, with prominent, lateral, auricle-like tufts of long cilia. The rostrum is fairly long, broad at the base, rounded anteriorly and strongly decurved. The abdomen is gibbous dorsally, deepest at half length, and tapers gradually to the distinct tail. The integument is without longitudinal divisions, but the oblique circular fold, which usually limits the plates posteriorly, is well marked. The foot is large, conical and oblique anteriorly. The toes are long, about one sixth of the total length, broad
at the base, tapering gradually to acute points, and have a slight sigmoid curvature.

The trophi are greatly elongate and fairly slender. The rami are parallel-sided externally and internally for two thirds of their length, enclosing anteriorly a small, circular, median opening and terminating in stout anterior teeth. No alulae are present. The fulcrum is about two thirds as long as the rami. The rudimentary unci are somewhat asymmetric, T-shaped and pointed anteriorly and firmly joined to the rami. The manubria are much enlarged anteriorly, abruptly reduced, straight and tapering for the greater part of their length, incurved and knobbed posteriorly. Salivary glands are not present.

The oesophagus is short. The gastric glands are small and spherical. Stomach and intestine are without distinct separation. The ovary and bladder are normal. The foot glands are large and pyriform.

The ganglion is rather small and saccate; the presence of a retrocerebral sac has not been positively made out. No subcerebral glands are present. At the base of the rostrum are two very small eyespots.

Total length 225μ; toes 35μ; trophi 30μ.

_Aspelta labri_ has been collected in a bog at Oceanville, near Atlantic City, New Jersey, and in Lower Breakneck pond, Mount Desert Island, Maine, in acid water, pH = 6.4 and less. It is related to _A. oper_ and _circinator_ but is distinguished by the elongate trophi, frontal eyespots and sigmoid toes.

**ASPELTA ANGUSTA** Harring and Myers, new species

Plate 48, figures 3, 4.

The body is very elongate, extremely slender, spindle-shaped, slightly convex dorsally and concave ventrally. The integument is very flexible, but the outline is fairly constant. The animal is always hyaline.

The head is very long, about one third of the length of the body, slightly decurved and separated from the abdomen by a well marked neck. The corona is very nearly ventral, about three fourths as long as the head, with prominent, lateral, auricle-like tufts of long cilia. The
rostrum is short, broad at the base, rounded anteriorly and strongly decurved. The abdomen is nearly cylindric, tapering posteriorly to the rudimentary tail. The integument is without longitudinal divisions, but the slightly oblique circular fold, which usually limits the plates posteriorly, is well marked. The foot is fairly large, conical and oblique anteriorly. The toes are rather short, one eighth of the total length, straight, broad at the base, tapering rapidly to long, slender, acute points.

The trophi are very large, elongate and highly asymmetric. The rami are narrow at the base, elongate and terminate in stout, hooklike teeth; the right ramus is very broad and has a very large alula of complicated form, and the left is rather narrow, parallel-sided and without trace of any alula. The fulcrum is very long, slender, rodshaped and slightly expanded posteriorly. The unci are rudimentary and serve only as connecting links between the manubria and rami; the right uncus is tripod-shaped, the branches straddling the edge of the ramus, while the left uncus is T-shaped, with one branch resting on the manubrium and two on the rami. The manubria are extremely long, straight, slender, slightly tapering, clubbed anteriorly, sharply recurved and knobbled posteriorly. Salivary glands are not present.

The oesophagus is long and slender. The gastric glands are fairly large and oval. Stomach and intestine are without distinct separation. The ovary and bladder are normal. The foot glands are rather small and pyriform.

The ganglion is large and saccate; at its posterior end is a small retrocerebral sac with functional duct. Neither subcerebral glands nor eyespots are present.

Total length 275μ; toes 30μ; trophi 45μ.

*Aspeleta angusta* was collected in a boggy area on Corduroy Creek, near Atlantic City, New Jersey, in acid water, pH = 5.3. It is probably related to *A. circinator*, but is readily distinguished by the large, asymmetric trophi.

**ASPELETA BELTISTA** Harring and Myers, new species

Plate 49, figures 3–5.

The body is moderately elongate, spindle-shaped, gibbous posteriorly, convex dorsally and straight ventrally. The
integument is fairly rigid and the outline nearly constant. The animal is usually very transparent.

The head is long, almost one third the length of the body, slightly decurved and separated from the abdomen by a well marked neck. The corona is ventral and as long as the head, with prominent lateral, auricle-like tufts of long cilia. The rostrum is short, broad at the base, rounded anteriorly and decurved. The abdomen is moderately long, gibbous dorsally, deepest just beyond mid-length and tapers gradually to the small bifid tail. The integument is divided longitudinally by wide lateral sulci into a dorsal and a ventral plate, limited posteriorly by a well marked, slightly oblique, circular fold. The foot is fairly large and very slightly conical. The toes are moderately long, about one seventh of the total length, broad at the base, tapering gradually to acute points, S-curved in lateral view and slightly incurved in dorsal view.

The trophi are small, somewhat elongate and highly asymmetric. The rami are narrow at the base, becoming gradually parallel-sided and terminating in a stout, hook-shaped, anterior tooth; the left ramus is without any alula, while the right has a very large, triangular alula, slightly decurved at the tip; the median opening is quite small, pyriform and without teeth on the inner margin. The fulcrum is very long, slender, rodshaped, slightly tapering and knobbed posteriorly. The unci are rudimentary, serving only as connecting links between the manubria and rami; the left uncus is T-shaped, with one branch resting on the manubrium and two on the ramus, while the right is tripod-shaped and straddles the ramus. The manubria are very long, stout and clubbed at the base, tapering gradually to the strongly incurved, knobbed posterior ends. Salivary glands are not present.

The oesophagus is short. The gastric glands are small and elongate oval. Stomach and intestine are not distinctly separated. The ovary and bladder are normal. The foot glands are elongate and slightly pyriform.

The ganglion is large and saccate; at its posterior end is a large retrocerebral sac with functional duct. Subcere-
bral glands are not present. At the base of the rostrum are two minute eyespots.

Total length 265–325μ; toes 35–45μ; trophi 27μ.

Aspetta beltista is widely distributed in acid water ponds, pH = 6.8 and less. We have collected it in many places around Atlantic City, New Jersey, and on Mount Desert Island, Maine, usually in small numbers. It belongs to the A. circinator group, but is distinguished by the form of the toes, frontal eyespots, highly asymmetric trophi and the bifid tail, which is not found in any other species of this genus.

ASPELTA PSITTA Harring and Myers, new species
Plate 49, figures 1, 2.

The body is elongate, spindle-shaped, rather slender, convex dorsally and slightly concave ventrally. The integument is flexible, but the outline is fairly constant. The animal is usually opaque owing to ingested chlorophyll.

The head is long, nearly one third of the length of the body, decurved and separated from the abdomen by a well marked neck. The corona is ventral and nearly as long as the head, with fairly prominent, lateral, auricle-like tufts of long cilia. The rostrum is short, broad at the base, rounded anteriorly and decurved. The abdomen is moderately elongate, deepest at two-thirds length, and tapers gradually to the minute tail. The integument is without longitudinal divisions, but the oblique circular fold, which usually limits the plates posteriorly, is well marked. The foot is large, conical, oblique anteriorly and rounded posteriorly. The toes are fairly long, about one seventh of the total length, stout at the base, tapering gradually to acute points and very slightly decurved.

The trophi are large, but not very robust, and strongly asymmetric. The rami are asymmetric, expanded near the base into broad, bluntly angular alulae and terminate in blunt anterior teeth, the right ramus overlapping the left, somewhat like the beak of a parrot; the median opening is narrow and the inner margin without teeth. The fulcrum is short, about half the length of the rami. The unci are very long and slender; the right uncus has two teeth, the ventral one apparently broken at one third length and rest-
ing on a slight, oblique projection on the ramus some distance from the anterior tooth; the left uncus is single-toothed, slightly clubbed and rests against the external edge of the ramus. The manubria are unequal, slender and slightly S-curved, the right somewhat shorter and stouter than the left. Salivary glands are not present.

The oesophagus is short. The gastric glands are small and oval. Stomach and intestine are not distinctly separated. The ovary and bladder are normal. The foot glands are small and pyriform.

The ganglion is large and saccate; at its posterior end is a small retrocerebral sac with rudimentary duct. Neither subcerebral glands nor eyespots are present.

Total length 175μ; toes 25μ; trophi 25μ.

Aspelta psitta was collected in large numbers among decaying Riccia at Kenilworth, near Washington, District of Columbia. Judging from the aberrant trophi it is not closely related to any other species of the genus.

Aspelta Lestes Harring and Myers, new species

Plate 47, figures 1, 2.

The body is moderately elongate, fairly slender, gibbous posteriorly, curved dorsally and nearly straight ventrally. The integument is very flexible and the outline somewhat variable. The animal is usually hyaline.

The head is long, nearly one third of the length of the body, slightly decurved and separated from the abdomen by a well marked neck. The corona is ventral and nearly as long as the head, with prominent, lateral, auricle-like tufts of long cilia. The rostrum is very short, broad at the base, rounded anteriorly and decurved. The abdomen is moderately elongate, deepest at mid-length, and tapers rapidly to the minute tail. The integument is without longitudinal divisions, but the oblique circular fold, which usually limits the plates posteriorly, is well marked. The foot is fairly large, slightly conical and oblique anteriorly. The toes are long, about one seventh of the total length, stout at the base, somewhat abruptly reduced to long, slender, tapering, acute points and very slightly decurved.

The trophi are large, but not very robust. The rami are
broad at the base and terminate in long, pointed, curved teeth; the right ramus is stouter than the left, less curved and has a small alula. The unci are highly asymmetric, the right much larger than the left and tripod-shaped; the left uncus is approximately T-shaped, one branch on the manubrium and two on the ramus. It is evident that the unci have lost their original function and serve only as connecting links between the manubria and rami, transmitting the pull of the adductor muscles. The manubria are very long and slender, slightly clubbed and outcurved anteriorly, gradually incurved and crutchcd posteriorly. Salivary glands are not present.

The oesophagus is short. The gastric glands are small and oval, and are always attached at the ventral side of the stomach, as shown in the lateral view. Stomach and intestine are not distinctly separated. The ovary and bladder are normal. The foot glands are large and pyriform.

The ganglion is large and saccate; at its posterior end is a small retrocerebral sac with functional duct. Neither subcerebral glands nor eyespots are present.

Total length 215μ; toes 30μ; trophi 34μ.

Aspelta lestes was collected among Fontinalis growing along the shores of Kathan and Starvation lakes in Oneida county, Wisconsin. It is distinguished by the form of the toes and the trophi.

Aspelta Imbuta Harring and Myers, new species
Plate 47, figures 5, 6.

The body is elongate, fairly slender, slightly gibbous posteriorly and nearly straight ventrally. The integument is flexible, but the outline is fairly constant. The animal is always hyaline.

The head is long, nearly one third of the length of the body, deflected and separated from the abdomen by a well marked neck. The corona is ventral and somewhat shorter than the head, with prominent, lateral, auricle-like areas of long cilia. The rostrum is very short, broad at the base, rounded anteriorly and decurved. The abdomen is moderately elongate, gibbous dorsally, deepest at two thirds length and tapers gradually to the very small tail. The
integument is without longitudinal divisions, but the oblique
circular fold, which usually limits the plates posteriorly, is
well marked. The foot is fairly large, slightly conical and
oblique anteriorly. The toes are long, about one seventh
of the total length, very slightly decurved, and taper rapidly
to long, slender, acute points.

The trophi are large, but not very robust. The rami are
strongly asymmetric, the right much broader and stouter
than the left, with a large alula near mid-length and a
blunt projection opposite on the inner margin; the left
ramus is nearly parallel-sided and both terminate in stout,
incurved anterior teeth. The unci are also highly asym-
metric, with two long, slender, pointed teeth and a pendant
lamella resting on the ramus; the left uncus is small and
T-shaped, with one branch on the manubrium and two on
the edge of the ramus. The manubria are very long, slen-
der, slightly curved and taper gradually towards the poste-
rior ends. The median opening of the rami is irregularly
pyriform. The fulcrum is about two thirds as long as the
rami. Salivary glands are not present.

The oesophagus is short. The gastric glands are very
small and oval. Stomach and intestine are not distinctly
separated. The ovary and bladder are normal. The foot
glands are fairly large and pyriform.

The ganglion is rather small and saccate; at its posterior
end is a small retrocerebral sac with rudimentary duct.
Neither eyespots nor subcerebral glands are present.

Total length 140μ; toes 20μ; trophi 25μ.

*Aspelta imbula* was collected in Town Line Lake, Oneida
county, Wisconsin. It is distinguished mainly by its small
size and the form of the toes and trophi.

**ASPELTA ALASTOR** Harrington and Myers, new species

Plate 47, figures 3, 4.

The body is rather short and stout, gibbous posteriorly,
convex dorsally and nearly straight ventrally. The integu-
ment is flexible but the outline is fairly constant. The ani-
mal is usually opaque owing to ingested chlorophyll.

The head is long, fully one third of the length of the
body, slightly deflexed and separated from the abdomen by
a well marked neck. The corona is ventral and almost as long as the head, with prominent, lateral, auricle-like tufts of long cilia. The rostrum is very short, broad at the base, rounded anteriorly and strongly decurved. The abdomen is short and fairly stout, gibbous dorsally, deepest near mid-length and tapers gradually to the minute tail. The integument is without longitudinal divisions, but the oblique circular fold, which usually limits the plates posteriorly, is well marked. The foot is large, slightly conical and oblique anteriorly. The toes are short, about one eighth of the total length, stout, tapering, acutely pointed and very slightly S-curved.

The trophi are large, but not very robust. The rami are nearly semicircular, the right much broader than the left and with a prominent alula near mid-length; the terminal teeth are stout and incurved and the median opening irregularly pyriform, with a projection on the inner margin opposite the alula on the right ramus. The fulcrum is little more than half the length of the rami. The unci are T-shaped and asymmetric, the right larger and more complex than the left; both rest against the rami and with a branch on the manubrium, serving only as connecting links for transmission of the pull of the adductor muscles. The manubria are rather short, about the same length as the incus, and taper gradually towards the posterior end; both are curved anteriorly, the right more than the left. Salivary glands are not present.

The oesophagus is very short. The gastric glands are very small and oval. Stomach and intestine are without distinct separation. The ovary and bladder are normal. The foot glands are fairly large and pyriform.

The ganglion is large and saccate; at its posterior end is a small retrocerebral sac with rudimentary duct. Neither subcerebral glands nor eyespots are present.

Total length 155μ; toes 20μ; trophi 25μ.

Aspelta alastor is common in sphagnum growing in an old gravel pit at Hyattsville, near Washington, District of Columbia. It is distinguished by the short, stout toes and the peculiar trophi.
ASPELTA CLYDONA Harring and Myers, new species

Plate 48, figures 1, 2.

The body is short and very stout, strongly convex dorsally and concave ventrally. The integument is very rigid and forms a true lorica. The animal is usually opaque owing to ingested colored food material.

The head is short, about one fifth of the length of the body, strongly deflexed and separated from the abdomen by a very distinct neck; it is encased in a plicate head-sheath, as in the genus Diurella, forming six distinct folds when the head is retracted. The corona is but very slightly oblique and has prominent, lateral, auricle-like tufts of long cilia. The rostrum is huge, broadly triangular at the base, narrowed and rounded in front and strongly deflexed. The abdomen is rather short and strongly curved, tapering posteriorly to the prominent tail. The lorica is divided longitudinally by wide lateral sulci into a dorsal and a ventral plate, limited posteriorly by a well marked, oblique circular fold. The tail is short, stout and conical, but not separated from the abdomen by any circular fold. The toes are long, about one sixth of the total length, very stout, acutely pointed and strongly decurved.

The trophi are extremely asymmetric. The left ramus is virtually straight, parallel-sided and very blunt anteriorly; at the base is a minute, triangular alula; the right ramus is bent anteriorly into a huge hook, forming a nearly right angle with the main stem and overlapping the end of the left ramus; near mid-length is a very large, strongly decurved, and broadly triangular alula. The fulcrum is short, little more than half the length of the rami. The left uncus is irregularly conchoidal, resting with a broad lobe on the manubrium and a crescent-shaped anterior section on the ramus. The right uncus has two long and stout teeth, united by a thin lamella, the anterior tooth on the angle of the ramus and the posterior on the alula. The manubria are long, fairly stout, clubbed anteriorly, tapering gradually towards the posterior end and have a "triple" curvature, as shown in figure 2. Salivary glands are not present.

The oesophagus is long and slender. The gastric glands
are very small and oval, and are placed well towards the ventral side. Stomach and intestine are not distinctly separated. The ovary and bladder are normal. The foot glands are very large and pyriform.

The ganglion is large and saccate; at its posterior end is a fairly large retrocerebral sac with functional duct. Neither subcerebral glands nor eyespots are present.

Total length 275μ; toes 45μ; trophi 38μ.

Aspeltha clydona was obtained by washing Fucus growing on rocks in Salisbury Cove, Mount Desert Island, Maine, in ocean water of normal salinity; the algae were allowed to drain into a bucket, vigorously stirred in order to separate the animals from them, and continuing until the bucket was full, when it was allowed to settle, the water poured off and the sediment transferred to very large crystallization dishes. In the course of an hour the rotifers gradually worked up to the top and by carefully skimming with a pipette they were obtained in large numbers. The animal is recognized at once by the Diurella-headsheath, in fact it looks much more like a Diurella than an Aspeltha; the trophi appear to represent the possible extreme in asymmetry.

ASPELTA MACRA Harring and Myers, new species

Plate 48, figures 5, 6.

The body is elongate, very slender, slightly gibbous posteriorly, convex dorsally and nearly straight ventrally. The integument is very flexible and the outline is somewhat variable. The animal is hyaline.

The head is long, about one third of the length of the body, very slightly deflexed and separated from the abdomen by a well marked neck. The corona is ventral and as long as the head, with prominent, lateral, auricle-like tufts of long cilia. The rostrum is short, broad at the base, rounded anteriorly and decurved. The abdomen is elongate, gibbous dorsally, deepest near mid-length and tapers gradually to the minute tail. The integument is without longitudinal divisions, but the oblique circular fold, which usually limits the plates posteriorly, is very distinct. The foot is fairly large, conical, oblique anteriorly and rounded posteriorly. The toes are short, less than one eighth of the
total length, extremely slender, decurved, acutely pointed and with a triangular enlargement at the base.

The trophi are large, robust and highly asymmetric, the right side much more developed than the left. The rami are very broad, the inner edges in contact for two thirds of their length, leaving a relatively small, heartshaped median opening below the powerful, hook-shaped terminal teeth; the left tooth is broader than the right. On the right ramus there is a huge, triangular alula, originating just below the median opening and projecting with half its length beyond the edge of the ramus. The fulcrum is longer than the rami. The right uncus is very large and tripod-shaped, the apex resting on the manubrium and the three branches on the outer edge of the ramus. The left uncus is much smaller and T-shaped, one branch resting on the manubrium and two against the ramus. The manubria are very long, slender, slightly clubbed anteriorly and taper gradually towards the posterior end; the left manubrium is abruptly bent near its junction with the uncus. Salivary glands are not present.

The oesophagus is long and slender. The gastric glands are small and ovate. Stomach and intestine are not distinctly separated. The ovary and bladder are normal. The foot glands are elongate and pyriform.

The ganglion is long and saccate; at its posterior end is a large retrocerebral sac with functional duct. Neither subcerebral glands nor eyespots are present.

Total length 280μ; toes, 30μ; trophi 42μ.

Aspelta macra was collected in Witch Hole, an acid water pond, pH = 6.4, on Mount Desert Island, Maine, and also in the outlet, Duck Brook. It is distinguished by the elongate slender body, the toes and the highly asymmetric trophi.

Genus ALBERTIA Dujardin

Dicranophorine rotifers with elongate, cylindric or vermiform, illoricate body; integument flexible; head small and neck indistinct; the abdomen is cylindric; the foot is large, in some species swollen or with lateral projections; the toes are minute and fused or wanting.
The corona is small and oblique, the cilia uniformly short; rostrum minute.

The trophi are forcipate and very small; the rami are oval or lyrate, without inner marginal teeth, fulcrum short; unci single-toothed and hinged on tips of rami; manubria long and slender; salivary glands are present in some species.

Retrocerebral organ and eyespots are not present. Many, if not all, species are ecto- or endoparasitic in oligochaete worms.

_Type of the genus._—*Albertia vermiculus* Dujardin.

*ALBERTIA TYPHLLINA* Harring and Myers, new species

Plate 49, figures 6-9.

The body is elongate, very slender, vermiform and distinctly curved; its greatest diameter is just below the neck. The integument is very flexible and the outline variable. The animal is always hyaline.

The head is small and short, less than one fifth of the length of the body, slightly decurved and not distinctly separated from the abdomen. The corona is oblique and somewhat heart-shaped, the minute rostrum forming the apex; the marginal cilia are short and apparently feeble, but the animal is a very fair swimmer in spite of this. The abdomen is largest anteriorly and tapers slightly towards the posterior end; no tail is present. The foot is very large and conical. The minute toes are fused into an acutely pointed cone.

The trophi are minute and very slender. The rami are lyrate, fairly broad at the base and terminate in needle-like, slightly incurved, single teeth. The median opening is elongate oval and without teeth on the inner margins. The fulcrum is about half the length of the rami. The unci are short, slender, very slightly curved at the tips, and hinged on the rami. The manubria are very long, formed of two straight, slender, rodlike sections, making a very abrupt, but obtuse-angled bend at mid-length; the posterior ends are slightly outcurved. Two enormous, ribbon-like salivary glands are attached to the posterior end of the mastax.
The oesophagus is very long and slender. Gastric glands are not present. Stomach and intestine are not distinctly separated. The ovary is very large and nearly cylindric, reaching forward almost to the mastax. The bladder is small and nearly spherical. The foot glands are very small, compressed laterally and almost circular; they open into a common mucus reservoir at the base of the fused toes. The ganglion is very long and saccate; the posterior portion may represent the retrocerebral sac, but there is no positive evidence for this. Eyespots are not present. Total length 150μ; toes 7μ; trophi 18μ.

*Albertia typhlina* has been collected in “Paradise Ditch,” near Egg Harbor, and in Lenape Lake, near Mays Landing, New Jersey. Although it may possibly be parasitic, it has never been found attached to *Stylaria* or other Oligochaetes, but always free swimming. However, as it has all the morphological characteristics of this genus, we have referred it to *Albertia*.

**NOTES ON FLUID MOUNTING OF ROTIFERS.**

When part I of this series was written, no really permanent mount for entire animals in watery media was known. The best method available was the one worked out by the late Mr. Rousselet and known under his name; various resinous media were used for sealing, a high grade copal varnish giving better results than anything else tried. It is, however, fairly well known that neither resins nor gums will withstand the action of water indefinitely; anyone anxious to settle this for himself has only to leave a slide in a jar of water for a week or two. The “D. R. P.” method originated by Mr. E. D. Evens, published in the Journal of the Quekett Microscopical Club, No. 87, pp. 221–224, was therefore a most welcome contribution and we immediately put it into practice. His cement is composed of 1 pt. rubber, 2 pts. dammar and 8 pts. paraffin (50 deg. m. p.). This has proved itself in every way satisfactory, especially after leaving out the rubber, which does not add anything to the formula, except an element of uncertainty and a good deal of trouble, both in the preparation
and subsequent use. The simple mixture of 1 pt. dammar and 4 pts. paraffin has all the virtues of the original and none of its drawbacks. This should not be interpreted as an attempt to belittle Mr. Evens's achievement; every microscopist who has occasion to use watery media for mounting owes him a debt of gratitude for solving a problem that had previously baffled all others. A simple method for using this cement is described below.

A 3 in. × 1 in. slide, or if the Cobb slides are used, a 1 in. square cover, is provided with four supports, made by cutting out pieces of gummed paper and pasting them on as shown in figure 1; the material known as picture binding or passepartout paper is very convenient and about the right thickness for average rotifer mounts, the purpose being, of course, to prevent crushing of the animals when the coverglass is lowered into place. If glycerin is to be used as mounting medium no further preparation is necessary; for a watery mount a small ring of the cement must be put on the slide to prevent the drop from displacement. The animal is now placed on the slide with just enough of the fluid to make a drop very slightly higher than the sup-
ports, as shown in figure 2. The cover glass is next lowered into place very carefully, see figure 3. Some of the cement is now melted in a small metal cup on a warming table and the slide placed close to it; when the slide has reached the temperature of the melted cement, a small quantity of the latter is picked up with a pointed camel's-hair brush and applied to the edge of the cover glass, holding the brush at the same point and allowing capillarity to draw in the cement until a complete circle is formed around the little cell; neither cement nor slide should be allowed to become too hot, as bubbles will then form, which are hard to get rid of. When the cement has reached the edge of the cover glass all around, the slide should be dropped in cold water to prevent crystallization of the paraffin. The excess cement is next removed from the edge of the cover, and a ring of alcoholic cement, such as shellac, applied.

When this is dry, any of the oil cements, asphaltum, Brunswick Black etc., may be used for finishing; they should never be used for the first coat, as the oil will dissolve the paraffin. A finished slide is shown in figure 4.
Slides made according to this method and kept for 5 years are apparently as good as when first put up, and there is every reason to think that the Evens cement has at last provided a permanent cure for leaky slides.
EXPLANATION OF PLATES

All figures are highly magnified. For actual measurements see text.

PLATE 23

Fig. 1. *Itura aurita*, dorsal view; page 685.
Fig. 2. *Itura aurita*, trophi, ventral view.
Fig. 3. *Itura aurita*, trophi, left lateral view.
Fig. 4. *Itura aurita*, pectinate sclerite, left lateral view.
Fig. 5. *Itura cayuga*, lateral view; page 688.
Fig. 6. *Itura proterva*, dorsal view, page 690.
Fig. 7. *Itura proterva*, foot and toes, lateral view.

PLATE 24

Fig. 1. *Itura viridis*, dorsal view; page 692.
Fig. 2. *Itura viridis*, trophi, ventral view.
Fig. 3. *Itura chamadis*, dorsal view; page 694.
Fig. 4. *Itura chamadis*, foot and toes, lateral view.
Fig. 5. *Itura chamadis*, trophi, ventral view.

PLATE 25

Fig. 1. *Dicranophorus epicharis*, lateral view; page 705.
Fig. 2. *Dicranophorus epicharis*, trophi, ventral view.
Fig. 3. *Dicranophorus forcipatus*, lateral view; page 697.
Fig. 4. *Dicranophorus forcipatus*, trophi, ventral view.
Fig. 5. *Dicranophorus prionacis*, lateral view; page 702.
Fig. 6. *Dicranophorus prionacis*, trophi, ventral view.

PLATE 26

Fig. 1. *Dicranophorus dolerus*, lateral view; page 707.
Fig. 2. *Dicranophorus dolerus*, trophi, ventral view.
Fig. 3. *Dicranophorus tegillus*, lateral view, page 703.
Fig. 4. *Dicranophorus tegillus*, trophi, ventral view.
Fig. 5. *Dicranophorus mesotis*, lateral view; page 704.
Fig. 6. *Dicranophorus mesotis*, trophi, ventral view.

PLATE 27

Fig. 1. *Dicranophorus thysanus*, lateral view; page 710.
Fig. 2. *Dicranophorus thysanus*, trophi, ventral view.
Fig. 3. *Dicranophorus thysanus*, rostrum, dorsal view.
Fig. 4. *Dicranophorus stultus*, lateral view; page 712.
Fig. 5. *Dicranophorus stultus*, trophi, ventral view.
Fig. 6. *Dicranophorus isothes*, lateral view; page 708.
Fig. 7. *Dicranophorus isothes*, trophi, ventral view.
Fig. 8. *Dicranophorus isothes*, rostrum, dorsal view.
Fig. 9. *Dicranophorus isothes*, crutched manubrium.
PLATE 28

Fig. 1. Dicranophorus ponerus, lateral view; page 716.
Fig. 2. Dicranophorus ponerus, trophi, ventral view.
Fig. 3. Dicranophorus artamus, lateral view; page 715.
Fig. 4. Dicranophorus artamus, trophi, ventral view.
Fig. 5. Dicranophorus artamus, foot and toes, dorsal view.
Fig. 6. Dicranophorus artamus, toe, lateral view; Starvation Lake.
Fig. 7. Dicranophorus artamus, toe, lateral view; Lenape Lake.
Fig. 8. Dicranophorus artamus, toe, lateral view; Oceanville.
Fig. 9. Dicranophorus artamus, toe, lateral view; Witch Hole.
Fig. 10. Dicranophorus edestes, lateral view; page 717.
Fig. 11. Dicranophorus edestes, trophi, ventral view.

PLATE 29

Fig. 1. Dicranophorus lüthemi, lateral view; page 718.
Fig. 2. Dicranophorus lüthemi, trophi, ventral view.
Fig. 3. Dicranophorus robustus, lateral view; page 711.
Fig. 4. Dicranophorus robustus, trophi, ventral view.
Fig. 5. Dicranophorus semnus, lateral view; page 720.
Fig. 6. Dicranophorus semnus, trophi, ventral view.

PLATE 30

Fig. 1. Dicranophorus alcimus, lateral view; page 721.
Fig. 2. Dicranophorus alcimus, trophi, ventral view.
Fig. 3. Dicranophorus alcimus, tips of rami, frontal view.
Fig. 4. Dicranophorus haueri, lateral view; page 725.
Fig. 5. Dicranophorus haueri, trophi, ventral view.
Fig. 6. Dicranophorus caudatus, lateral view; page 742.
Fig. 7. Dicranophorus caudatus, trophi, ventral view.

PLATE 31

Fig. 1. Dicranophorus aspondus, lateral view; page 723.
Fig. 2. Dicranophorus aspondus, rostrum, dorsal view.
Fig. 3. Dicranophorus aspondus, trophi, ventral view.
Fig. 4. Dicranophorus capucinus, lateral view; page 724.
Fig. 5. Dicranophorus capucinus, rostrum, dorsal view.
Fig. 6. Dicranophorus capucinus, trophi, ventral view.
Fig. 7. Dicranophorus saevus, lateral view; page 726.
Fig. 8. Dicranophorus saevus, rostrum, dorsal view.
Fig. 9. Dicranophorus saevus, trophi, ventral view.
PLATE 32

Fig. 1. Dieranophorus strigosus, lateral view; page 729.
Fig. 2. Dieranophorus strigosus, trophi, ventral view.
Fig. 3. Dieranophorus facinus, lateral view; page 730.
Fig. 4. Dieranophorus facinus, trophi, ventral view.
Fig. 5. Dieranophorus proclestes, lateral view; page 714.
Fig. 6. Dieranophorus proclestes, trophi, ventral view.

PLATE 33

Fig. 1. Dieranophorus corystis, lateral view; page 727.
Fig. 2. Dieranophorus corystis, head, ventral view.
Fig. 3. Dieranophorus corystis, trophi, ventral view.
Fig. 4. Dieranophorus pennatus, lateral view; page 737.
Fig. 5. Dieranophorus pennatus, trophi, ventral view.
Fig. 6. Dieranophorus pennatus, incus, lateral view.
Fig. 7. Dieranophorus pennatus, foot and toes, dorsal view.
Fig. 8. Dieranophorus colastes, lateral view; page 731.
Fig. 9. Dieranophorus colastes, rostrum, dorsal view.
Fig. 10. Dieranophorus colastes, trophi, ventral view.

PLATE 34

Fig. 1. Dieranophorus permollis, lateral view; page 735.
Fig. 2. Dieranophorus permollis, trophi, ventral view.
Fig. 3. Dieranophorus scotius, lateral view; page 734.
Fig. 4. Dieranophorus scotius, trophi, ventral view.
Fig. 5. Dieranophorus myriophylli, lateral view; page 733.
Fig. 6. Dieranophorus myriophylli, trophi, ventral view.

PLATE 35

Fig. 1. Dieranophorus sebastus, lateral view; page 738.
Fig. 2. Dieranophorus sebastus, trophi, ventral view.
Fig. 3. Dieranophorus biastis, lateral view; page 732.
Fig. 4. Dieranophorus biastis, toes, dorsal view.
Fig. 5. Dieranophorus biastis, incus, lateral view.
Fig. 6. Dieranophorus biastis, trophi, ventral view.
Fig. 7. Dieranophorus diffugiarium, lateral view; page 736.
Fig. 8. Dieranophorus diffugiarium, trophi, ventral view.

PLATE 36

Fig. 1. Dieranophorus uncinatus, lateral view; page 745.
Fig. 2. Dieranophorus uncinatus, trophi, ventral view.
Fig. 3. Dieranophorus torvitus, lateral view; page 744.
Fig. 4. Dieranophorus torvitus, trophi, ventral view.
Fig. 5. Dieranophorus sp. lateral view; page 747.
Fig. 6. Dieranophorus sp. trophi, ventral view.
PLATE 37

Fig. 1. *Dicranophorus cernus*, lateral view; page 740.
Fig. 2. *Dicranophorus cernus*, trophi, ventral view.
Fig. 3. *Dicranophorus cernus*, rostrum, dorsal view.
Fig. 4. *Streptognatha lepta*, lateral view; page 748.
Fig. 5. *Streptognatha lepta*, head, dorsal view.
Fig. 6. *Streptognatha lepta*, trophi, ventral view.
Fig. 7. *Dicranophorus grypus*, lateral view; page 741.
Fig. 8. *Dicranophorus grypus*, toes, dorsal view.
Fig. 9. *Dicranophorus grypus*, trophi, ventral view.

PLATE 38

Fig. 1. *Eriognatha elastopsis*, lateral view; page 750.
Fig. 2. *Eriognatha elastopsis*, trophi, ventral view.
Fig. 3. *Eriognatha capula*, lateral view; page 754.
Fig. 4. *Eriognatha capula*, trophi, ventral view.
Fig. 5. *Eriognatha sagitta*, lateral view; page 752.
Fig. 6. *Eriognatha sagitta*, trophi, ventral view.

PLATE 39

Fig. 1. *Encentrum grande*, lateral view; page 768.
Fig. 2. *Encentrum grande*, trophi, ventral view.
Fig. 3. *Eriognatha belodon*, lateral view; page 753.
Fig. 4. *Eriognatha belodon*, head, dorsal view.
Fig. 5. *Eriognatha belodon*, trophi, ventral view.
Fig. 6. *Encentrum riecciae*, lateral view; page 777.
Fig. 7. *Encentrum riecciae*, trophi, ventral view.

PLATE 40

Fig. 1. *Encentrum marinum*, lateral view; page 756.
Fig. 2. *Encentrum marinum*, foot and toes, dorsal view.
Fig. 3. *Encentrum marinum*, trophi, ventral view.
Fig. 4. *Encentrum nesites*, lateral view; page 760.
Fig. 5. *Encentrum nesites*, trophi, ventral view.
Fig. 6. *Encentrum cruentum*, lateral view; page 758.
Fig. 7. *Encentrum cruentum*, trophi, ventral view.
Fig. 8. *Encentrum cruentum*, foot and toes, dorsal view.
PLATE 41
Fig. 1. Encentrum lacidum, lateral view; page 759.
Fig. 2. Encentrum lacidum, foot and toes, dorsal view.
Fig. 3. Encentrum lacidum, trophi, ventral view.
Fig. 4. Encentrum eristes, lateral view; page 761.
Fig. 5. Encentrum eristes, toes, dorsal view.
Fig. 6. Encentrum eristes, trophi, ventral view.
Fig. 7. Encentrum oculatum, lateral view; page 764.
Fig. 8. Encentrum oculatum, foot and toes, dorsal view.
Fig. 9. Encentrum oculatum, trophi, ventral view.

PLATE 42
Fig. 1. Encentrum algente, lateral view; page 762.
Fig. 2. Encentrum algente, gastric glands, dorsal view.
Fig. 3. Encentrum algente, trophi, ventral view.
Fig. 4. Encentrum parime, lateral view; page 766.
Fig. 5. Encentrum parime, trophi, ventral view.
Fig. 6. Encentrum boreale, lateral view; page 767.
Fig. 7. Encentrum boreale, trophi, ventral view.

PLATE 43
Fig. 1. Encentrum felis, lateral view; page 770.
Fig. 2. Encentrum felis, trophi, ventral view.
Fig. 3. Encentrum villosum, lateral view; page 772.
Fig. 4. Encentrum villosum, trophi, ventral view.
Fig. 5. Encentrum bellvinum, lateral view; page 765.
Fig. 6. Encentrum bellvinum, trophi, ventral view.

PLATE 44
Fig. 1. Encentrum zetetum, lateral view; page 775.
Fig. 2. Encentrum zetetum, trophi, ventral view.
Fig. 3. Encentrum elongatum, lateral view; page 774.
Fig. 4. Encentrum elongatum, trophi, ventral view.
Fig. 5. Encentrum otois, lateral view; page 773.
Fig. 6. Encentrum otois, trophi, ventral view.

PLATE 45
Fig. 1. Encentrum plicatum, lateral view; page 780.
Fig. 2. Encentrum plicatum, trophi, ventral view.
Fig. 3. Encentrum saundersiae, lateral view; page 778.
Fig. 4. Encentrum saundersiae, trophi, ventral view.
Fig. 5. Encentrum saundersiae, manubrium, lateral view.
Fig. 6. Encentrum lutetiae, lateral view; page 781.
Fig. 7. Encentrum lutetiae, trophi, ventral view.
PLATE 46

Fig. 1. Aspetta labri, lateral view; page 786.
Fig. 2. Aspetta labri, trophi, ventral view.
Fig. 3. Aspetta aper, lateral view; page 785.
Fig. 4. Aspetta aper, trophi, ventral view.
Fig. 5. Aspetta aper, head, ventral view.
Fig. 6. Aspetta circinator, lateral view; page 783.
Fig. 7. Aspetta circinator, trophi, ventral view.
Fig. 8. Aspetta circinator, toes, dorsal view.

PLATE 47

Fig. 1. Aspetta lestes, lateral view; page 791.
Fig. 2. Aspetta lestes, trophi, ventral view.
Fig. 3. Aspetta alastor, lateral view; page 793.
Fig. 4. Aspetta alastor, trophi, ventral view.
Fig. 5. Aspetta imbota, lateral view; page 792.
Fig. 6. Aspetta imbota, trophi, ventral view.

PLATE 48

Fig. 1. Aspetta clydona, lateral view; page 795.
Fig. 2. Aspetta clydona, trophi, ventral view.
Fig. 3. Aspetta angusta, lateral view; page 787.
Fig. 4. Aspetta angusta, trophi, ventral view.
Fig. 5. Aspetta macra, lateral view; page 796.
Fig. 6. Aspetta macra, trophi, ventral view.

PLATE 49

Fig. 1. Aspetta psitta, lateral view; page 790.
Fig. 2. Aspetta psitta, trophi, ventral view.
Fig. 3. Aspetta belista, lateral view; page 788.
Fig. 4. Aspetta belista, dorsal view.
Fig. 5. Aspetta belista, trophi, ventral view.
Fig. 6. Albertia typhlina, lateral view; page 798.
Fig. 7. Albertia typhlina, head, ventral view.
Fig. 8. Albertia typhlina, foot and toes, dorsal view.
Fig. 9. Albertia typhlina, trophi, ventral view.