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Inhalt:

I. Wissenschaftliche Mitteilungen.

1. **Henderson**, Notes on the Infusoria of Freiburg in Breisgau. (With 6 figs.) S. 1.
2. **Studer**, Über einen Hund aus der paläolithischen Zeit Rußlands. *Canis Pontiatini*. (Mit 2 Tafeln.) S. 24.

3. **Gadzikiewicz**, Zur Phylogenie des Blutgefäßsystems bei Arthropoden. S. 36.

Literatur S. 1–16.

I. Wissenschaftliche Mitteilungen.

1. Notes on the Infusoria of Freiburg in Breisgau.

By W. D. Henderson, M.-A., B. Sc., Carnegie Research Scholar,
Aberdeen University.

From the Zoological Institute Freiburg in Breisgau.

(With 6 figs.)

eingeg. 11. März 1905.

The notes described in the following pages are the results of work undertaken during the present winter at the suggestion of Professor Weismann.

I wish here to record my best thanks to Professor Weismann for valuable advice, and to Professor Gruber for placing at my disposal his valuable collection of works on Infusoria.

Methods of Research.

The samples were obtained by means of a silk net, and the contents were placed in aquaria in the Laboratory. The aquaria were examined daily for a fortnight, and in some cases the examination was carried on for a longer period. It seems better not to continue the exa-

mination for more than a fortnight as the dangers of contamination from outside sources become so great that the result does not hold true for the original contents of the pool.

In making the collections great care was taken to keep them uncontaminated by using separate nets for the different pools visited on one day, and by subjecting the nets to prolonged treatment with boiling water before every excursion. The aquaria and the collecting vessels were sterilised by treatment with concentrated Corrosive Sublimate and afterwards rinsed with boiling water.

The reagents commonly used were; 1) for fixing, concentrated Corrosive Sublimate, hot or cold, vom Rath and Osmic acid one per cent solution all of which gave good results; 2) for staining, Osmo-acetic methyl Green, Picrocarmine, Haematoxylin and Eosin, and Picrokernschwarz. In addition to the above I have used Absolute Alcohol and a dilute solution of Formaldehyde for fixing, and for staining Alumcarmine which gave beautiful results when used in a solution of one part Alumcarmine to two parts water.

In order to slow down the movements of the more rapid members of the group and make their study possible a drop of a very dilute aqueous solution of gelatine was used.

It seems advisable to briefly indicate the orientation of the animal that I have followed. The ventral face is that which carries the mouth, and the dorsal face is the face opposite to this. If the mouth is situated on one of the lateral margins, the terms used are ventral margin, dorsal margin. If the Infusorian be placed mouth downwards, then the anterior part is that which is directed forwards in ordinary progression, and the posterior part that which is directed backwards. The sides of the body are then named, the right lateral margin, left lateral margin, or when necessary the right lateral face and the left lateral face.

The division of the Ciliata into five orders has been adopted as it is the most convenient, and the division into families is that of Schewiakoff for the Holotricha and of Bütschli for the other orders.

To give more concrete value to the terms, very small, small of medium size, large and very large which are found in the descriptions, I have adopted Schewiakoff's figures which are as follows:

Very small,	Infusoria whose body length does not exceed							0,04 mm.
Small	-	-	-	-	-	-	-	0,07 -
Of medium size	-	-	-	-	-	-	-	0,12 -
Large	-	-	-	-	-	-	-	0,25 -
Very large	-	-	-	-	exceeds			0,25 -

The measurements of the species are taken chiefly from Roux and

Schewiakoff and only where they differ markedly are my own measurements given. The majority of the pools were small, some being only a few centimetres deep.

Holotricha.

Holophrya Ehrbg.

Two species of this genus were found, *Holophrya simplex* and *Holophrya orum*.

Holophrya simplex Schew.

Body very small, length 34 μ , breadth 18 μ .

The specimens found were typical.

Habitat: Altwasser Breisach (Dec.), Zoological Garden (Jan.).

Holophrya orum Ehrbg.

Body of medium size, length 120 μ , breadth 90 μ .

All the specimens found were deep green in colour due to the presence of abundant Zoochlorellae. Many of the specimens were encysted in a smooth, gelatinous, globular cyst.

Habitat: Lehen (Nov.), Zoological Garden (Jan.).

Urotricha Cl. et L.

Only one species of this genus was found, *Urotricha farcta*.

Urotricha farcta Cl. et L.

Body very small, length 24 μ , breadth 18 μ .

The lip-like band of cilia at the opening of the pharynx was especially prominent in many of the specimens, and in many the posterior end was blunter than in those figured by Roux and Bütschli.

Habitat: Lehen (Nov.), Lochmatten (Dec.), Ziegelei Merzhausen (Dec.), Waldsee Upper (Nov., Dec.).

Enchelys Hill.

Of this genus only one species was found, *Enchelys farcimen*.

Enchelys farcimen O. F. Müll.

Body very small, length 20—30 μ , breadth 14—20 μ .

The specimens were remarkable for their transparency, but were otherwise quite typical.

Habitat: Lehen (Nov.), Ziegelei Merzhausen (Dec.).

Trachellophyllum Cl. et L.

Of this genus only one species was found, *Trachellophyllum apiculatum*.

Trachellophyllum apiculatum Perty.

Body large, length 150—200 μ , breadth 15—20 μ .

The specimens were typical, but in many bundles of trichites were quite apparent distributed throughout the plasma.

Habitat: Lehen (Oct.), Kandel (Nov.). In both cases it was found in very small numbers.

Lacrymaria Ehrbg.

Two species of this genus were found, *Lacrymaria olor* and *Lacrymaria coronata*, var., *aqua dulcis*.

Lacrymaria olor O. F. Müll.

Body medium or large, length 100—400 μ .

The length of this species depends so much on the state of extension of the neck that it is difficult to give exact figures. The neck was measured in several specimens and it varied from 80—140 μ in length. The largest specimen measured was 350 μ in length, but Schewiakoff records a length of 500 μ .

Habitat: Universitätswiese (Nov.), Kandel (Nov.), Lehen (Oct.), Altwasser Breisach (Dec.).

Lacrymaria coronata Cl. et L., var. *aqua dulcis* Roux.

Body medium, length 64—90 μ , breadth 20—25 μ .

The specimens agree very closely with the description given by Roux except that several of them fall below Roux's minimum of 10 μ , and that the cilia appear not so regularly arranged as in the description given by Roux. The body was rendered opaque by the presence of greyish black corpuscles.

Habitat: Altwasser Breisach (Dec.). Only two specimens of this species were found.

Prorodon Ehrbg.

Two species of this genus were found, *Prorodon niveus* and *Prorodon teres*.

Prorodon niveus Ehrbg.

Body very large, length 280—500 μ , breadth 120—200 μ .

The specimens were typical, and I am able to corroborate Schewiakoff's assertion that the pharynx is present, but very small and flattened. The specimens measured varied in length from 295—380 μ .

Habitat: Kandel (Nov.), Elsässer Breisach (Dec.).

Prorodon teres Ehrbg.

Body of medium size or large, length 80—250 μ , breadth 50—170 μ .

The specimens were typical, and were remarkable for the small size of the *Macronucleus*.

Habitat: Waldsee Upper (Dec.), Waldsee Lower (Dec.).

Coleps Nitzsch.

Two species of this genus were found, *Coleps hirtus* and *Coleps uncinatus*.

Coleps hirtus O. F. Müll.

Body small, length 38—46 μ , breadth 18—38 μ .

The specimens were typical, having an ovate, barrel-shaped body with a truncated anterior portion and a rounded posterior portion. The anterior margin is denticulate, and the posterior possesses three spines. The body is light-brown to white in colour. The division is transversal and during division they present a curiously abnormal appearance. The middle portion on which the constriction is seen, is smooth, and even when the two halves become separated; one half of each of them remains smooth and transparent while the other half is marked by the reticulations.

Habitat: Lehen (Oct., Nov.), Altwasser Breisach (Dec.), Lochmatten (Dec.), Ziegelei Merzhausen (Dec.). Zoological Garden (Nov., Dec., Jan.).

Coleps uncinatus Cl. et L.

Body small, length 60—70 μ , breadth 28—34 μ .

This species is marked by the two anterior uncini placed near one another on the flattened side, and by the four cusps developed posteriorly. Several of the specimens were slightly broader than those found by Roux. This species is very rare.

Habitat: Altwasser Breisach (Dec.)

Dinophrya Bütschli.

This genus appears to be very scarce as only one specimen was found.

Dinophrya Lieberkühni Bütschli.

Body small or medium sized, length 60—100 μ , breadth 30—45 μ .

The specimen found differed from that figured by Bütschli in being more top-shaped, and thus agreeing more with that figured by Roux. The anterior cone is replaced by a rounded portion on which no cilia are found. The specimen measured 80 μ in length and 38 μ in breadth. It was found in clear limpid water.

Habitat: Waldsee Upper (Dec.).

Amphileptus Ehrbg.

Of this genus the two species, *Amphileptus Claparedei*, and *Amphileptus carchesi*, were found.

Amphileptus Claparedei St.

Body large, length 120—159 μ , breadth 32—40 μ .

The specimens did not differ from the typical *Amphileptus Claparedi*, except that several were slightly broader.

Habitat: Lehen (Nov.), Ziegelei Merzhausen (Nov.), Universitäts-wiese (Dec.), Brunnen Herdern (Dec.), Elsässer Breisach (Dec.).

Amphileptus carchesi St.

Body large, length 150—160 μ , breadth 29—33 μ .

This species is distinguished from the former by its shape and by the presence of trichocysts. The specimens were slightly smaller than those of Roux, the largest measuring only 156 μ in length.

Habitat: Altwasser Breisach (Dec.).

Lionotus Wrzesn.

Of this genus the following species were found: *Lionotus fasciola*, *Lionotus lamella*, *Lionotus vesiculosus*, *Lionotus diaphanus* and *Lionotus folium*, the last comprising the *Lionotus anser* of Bütschli and the *Lionotus Wrzesniewski* of Kent.

Lionotus fasciola Ehrbg.

Body of medium size, length 80—100 μ , breadth 17—25 μ .

The specimens were typical and were marked by furrows and trichocysts on the ventral side and trichocysts along the left border of the buccal furrow. In several specimens the macronucleus was formed of two oval masses joined together by their ends and not by a rod-like portion as is usual. The species is very common both in fresh and in putrid water. It was especially abundant in December.

Habitat: Lehen (Oct., Nov., Dec.), Hugstettin Freiburg No. 4 (Oct.), Universitätswiese (Nov.), Waldsee Upper (Dec.), Waldsee Lower (Dec.), Altwasser Breisach (Dec.), Elsässer Breisach (Dec.), Brunnen Herdern (Dec.).

Lionotus lamella Ehrbg.

Body small or of medium size, length 60—92 μ , breadth 10—20 μ .

The specimens were typical, but reached a greater length than that given by Roux and Schewiakoff. The breadth agreed more with the limits given by Roux 12—15 μ , and none reached the maximum limit of 20 μ as given by Schewiakoff.

Habitat: Lehen (Dec.), Universitätswiese (Dec.), Ziegelei Merzhausen (Nov., Dec.), Zoological Garden (Jan.).

Lionotus folium Duj.

Synon. *L. anser* Bütschli.

- *L. filum* Gruber.

- *L. wrzesniewskii* Sav. Kent.

Body very large, length 400—1020 μ , breadth very variable.

The neck is very long and flexible, being often 10—14 times as long as the body.

I have followed Schewiakoff in placing together *L. anser* and *L. wrzesniowskii*.

Habitat: Universitätswiese (Nov., Dec.), Brunnen Herdern (Dec.), Altwasser Breisach (Dec.), Elsässer Breisach (Dec., Jan.).

Lionotus resiculosus Stokes.

Body very large, length 580—595 μ , breadth 30—32 μ .

This species is distinguished by its thread-like form and the abundant contractile vacuoles which are spread throughout the plasma, by its trichocysts and its rapid movements. This species is very rare, one specimen only being found.

Habitat: Elsässer Breisach (Dec.).

Lionotus diaphanus Wrzesn.

Body very large, length 300 μ , breadth 53—57 μ .

The specimens were typical, being distinguished by the number and the arrangement of the contractile vacuoles.

This species is not common.

Habitat: Universitätswiese (Dec.), Altwasser Breisach (Dec.), Elsässer Breisach (Dec.).

Lorophyllum Duj.

Of this genus only one species was found, *Lorophyllum meleagris*.

Loxophyllum meleagris O. F. Müll.

Body very large, length 270—370 μ , breadth 100—140 μ .

The specimens did not differ in any way from the typical *Lox. meleagris*. The hyaline layer is very marked. The trichocysts are arranged in groups on the dorsal surface, but evenly distributed on the ventral. In all the specimens the macronucleus was moniliform. The contractile vacuole is posteroterminal in position, cylindrical in shape, with a long canal shaped prolongation that runs along the dorsal side almost to the anterior end.

Habitat: Kandel (Nov.), Brunnen Herdern (Dec.), Ziegelei Merzhausen (Dec.).

Trachelius Schrank.

The species *Trachelius ovum* was found.

Trachelius ovum Ehrbg.

Body very large, length 300—600 μ , breadth 150—160 μ .

The specimens found were typical, but none exceeded 304 μ in length. The breadth varied from 150—160 μ . The trunk was shorter

than expected, being about one half the width of the body in length. The macronucleus was usually band-like, but several specimens had an ovoid nucleus.

Habitat: Kandel (Nov.), Universitätswiese (Nov.), Ziegelei Merzhausen (Dec.).

Dileptus Duj.

Of this genus, the single species *Dileptus anser* was found.

Dileptus anser O. F. Müll.

Body very large, length 400—720 μ , breadth 47—65 μ .

The specimens were typical or differed very slightly from the type. In the largest specimen the proboscis measured 185 μ in length.

Habitat: Universitätswiese (Dec.), Altwasser Breisach (Dec.).

Nassula Ehrbg.

Of this genus, three species were found, *Nassula aurea*, *Nassula elegans* and *Nassula ornata*.

Nassula aurea Ehrbg.

Body of medium size or large, length 120—240 μ , breadth 100—140 μ .

Only one specimen which gave the following measurements, length 150 μ , breadth 110 μ , was found. Owing to its smaller size and its more elongated form and the intensely yellow colour of the body. I place it under this species, and not along with *Nassula ornata*.

Habitat: Brunnen Herdern (Dec.).

Nassula elegans Ehrbg.

Body of medium size or large, length 100—140 μ , breadth 60—90 μ .

The specimens were typical and seem confined to one place where they are fairly abundant.

Habitat: Universitätswiese (Dec.).

Nassula ornata Ehrbg.

Body large or very large, length 210—260 μ , breadth 140—210 μ .

The specimens agreed closely with the descriptions of Roux and Ehrenberg, and differs from the *Nassula aurea* described above in its more regular form.

Habitat: Universitätswiese (Nov.), Kandel (Nov.).

Chilodon Ehrbg.

Of this genus only one species, *Chilodon cucullulus*, was found.

Chilodon cucullulus O. F. Müll.

Body small, medium or large, length 50—300 μ , breadth 30—200 μ .

The specimens were typical.

Habitat: Lehen (Oct., Nov.), Universitätswiese (Dec.), Brunnen Herdern (Dec.), Elsässer Breisach (Dec.).

Cryptochilum Maup.

Of this genus one species, *Cryptochilum nigricans*, was found.

Cryptochilum nigricans O. F. Müll.

Body very small or small, length 16—50 μ , breadth 4—20 μ .

The body is elongated, oval and laterally compressed. The dorsal face is convex, and the ventral face is flat and slightly concave. The specimens were not quite typical, both faces being slightly convex, but did not differ in any other feature.

Habitat: Zoological Garden (Jan., Febr.).

Leucophrydium Roux.

The single species that forms the genus, *Leucophrydium putrinum* was found.

Leucophrydium putrinum Roux.

Body large, length 120—130 μ , breadth 70—75 μ .

The specimens did not differ from the type except in having fewer secondary contractile vacuoles. The species is very rare.

Habitat: Tank near railway Station (Nov.), Zoological Garden (Oct.).

Glaucoma Ehrbg.

Of this genus *Glaucoma scintillans* and *Glaucoma pyriformis* were found.

Glaucoma scintillans Ehrbg.

Body small or of medium size, length 60—86 μ , breadth 36—56 μ .

The specimens were typical, and possessed a very large undulating membrane which was always in motion. The species is very common.

Habitat: Kandel (Nov.), Lehen (Nov., Dec.), Waldsee Upper (Dec.), Waldsee Lower (Nov.), Universitätswiese (Nov.), Zoological Garden (Oct., Dec., Jan.), Brunnen Herdern (Dec.).

Glaucoma pyriformis Ehrbg.

Body small or of medium size, length 38—75 μ , breadth 24—47 μ .

The specimens were typical. They are distinguished from the former species by the general shape, and by the difference in the size of the undulating membrane. Several specimens were found which agreed with *Gl. scintillans* in general shape, but in the position and shape of the undulating membrane came nearest to the present species and so are included.

Habitat: Lehen (Nov.), Lochmatten (Dec.), Zoological Garden (Dec., Jan.).

Frontonia Ehrbg.

Of this genus only one species *Frontonia acuminata* was found.

Frontonia acuminata Ehrbg.

Body of medium size, large, or very large, length 100—350 μ , breadth 70—120 μ .

The specimens agreed very closely with the figure and description of Bütschli, and were much more pointed posteriorly than that figured by Roux. The trichocysts were abundant, and the anterior portion had a black pigment spot above the buccal orifice.

Habitat: Universitätswiese (Nov.), Kandel (Nov.), Altwasser Breisach (Dec.).

Ophryoglena Ehrbg.

Of this genus one species, *Ophryoglena flava*, was found.

Ophryoglena flava Ehrbg.

Body large or very large, length 200—560 μ , breadth 70—230 μ .

The specimens agreed more closely with the measurements of Schewiakoff, length 200—300 μ , breadth 70—100 μ , as they varied from 200—225 μ in length and from 88—96 μ in breadth. In other respects they were quite normal. The two contractile vacuoles are placed, one in the anterior, the other in the posterior portion, and each has 6 afferent canals. The contraction and disappearance of the vacuoles were carefully watched, and it was found that they contracted and disappeared every 15 seconds, the anterior alternating with the posterior, so that one was always present.

Habitat: Lehen (Nov.).

Paramoecium Hill.

Of this genus, the four species, *Paramoecium aurelia*, *Paramoecium caudatum*, *Paramoecium bursaria* and *Paramoecium putrinum* were found.

Paramoecium aurelia O. F. Müll.

Body of medium size or very large, length 75—295 μ , breadth 15—50 μ .

The specimens were typical. Several specimens were found in division, and conjugation was common in one instance among the specimens found in the debris at the bottom of an aquarium.

Habitat: Lehen (Nov.), Hugstettin Freiburg (Nov.), Waldsee Upper (Dec.), Deichelweir (Nov.).

Paramoecium caudatum Ehrbg.

Body large or very large, length 120—325 μ , breadth 20—60 μ .

The specimens were typical, and were abundant in October and November, but were found only once later in December.

Habitat: Lehen (Oct.), Lochmatten (Nov.), Waldsee Upper (Dec.).

Paramoecium bursaria Ehrbg.

Body of medium size or large, length 110—140 μ , breadth 60—110 μ .

The species were typical. One small specimen was found, but it is not of sufficient importance to warrant the changing of the measure-limits, it measured 85 μ in length and 55 μ in breadth.

Habitat: Lehen (Oct., Nov.), Hugstettin Freiburg (Nov.), Kandel (Nov.), Zoological Garden (Oct., Jan.).

Paramoecium putrinum Cl. et L.

Body of medium size or large, length 120—140 μ , breadth 50—70 μ .

This species was found on two occasions only. I am able to corroborate Claparède et Lachmann as to the presence of a single contractile vacuole. They say, «En outre, nous n'avons observé chez cette espèce qu'une seule vésicule contractile, placée dans la moitié antérieure de l'animal», and not, «dans la moitié postérieure» as quoted by Roux. The presence of one contractile vacuole held good for about 50 per cent of the specimens found by me.

Habitat: Universitätswiese (Nov.), Brunnen Herdern (Dec.).

Urocentrum Nitzsch.

Of this genus, the species *Urocentrum turbo* was found.

Urocentrum turbo O. F. Müll.

Body of medium size, length 80—110 μ , breadth 64—90 μ .

The specimens did not differ from the type. They were abundant.

Habitat: Lehen (Oct., Dec.), Lochmatten (Dec.), Waldsee Upper (Dec.).

Pleuronema Duj.

Of this genus, the single species *Pleuronema chrysalis* was found.

Pleuronema chrysalis O. F. Müll.

Body small or of medium size, length 64—83 μ , breadth 32—42 μ .

The specimens were typical. I agree with Bütschli and Roux who say that the contractile vacuole is posterior and dorsal, and is not anteriorly located as stated by Saville Kent.

Habitat: Lochmatten (Dec.).

Lembadion Perty.

Of this genus, the single species *Lembadion bullinum* was found.

Lembadion bullinum O. F. Müll.

Body small or of medium size, length 58—110 μ , breadth 36—65 μ .

The specimens were typical, the largest measuring 83 μ in length and having a maximum diameter of 52 μ . Two aquaria in which this species was abundant were kept for a considerable time in order to see

if the putrid water had any effect on the species. It was found that they all disappeared when the water became putrid, no trace was found although the aquaria were examined daily.

Habitat: Lehen (Oct., Dec.), Kandel (Nov., Dec.), Waldsee Upper (Dec.), Ziegelei Merzhausen (Dec.).

Cyclidium Hill.

Of this genus, two species *Cyclidium heptatrichum*, *Cyclidium glaucoma* were found.

Cyclidium heptatrichum Schew.

Body very small, length 20—30 μ , breadth 10—16 μ .

The specimens were typical, and had an oval-shaped nucleus. No cilia were present on the posterior portion, and those on the anterior were arranged in rows.

Habitat: Kandel (Dec.), Altwasser Breisach (Dec.).

Cyclidium glaucoma O. F. Müll.

Body very small, length 16—24 μ , breadth 9—12 μ .

The specimens were typical, several were found that agreed with the description of *Cycl. glaucoma*, var. *elongata* in every way except for the absence of trichocysts.

Habitat: Ziegelei Merzhausen (Dec.), Altwasser Breisach (Dec.). Zoological Garden (Jan., Febr.).

Balantiophorus Schew.

Of this genus, one species *Balantiophorus minutus* was found.

Balantiophorus minutus Schew.

Body very small, length 24—28 μ , breadth 9—14 μ .

The specimens were typical, but reached a greater maximum breadth.

Habitat: Lehen (Nov.), Ziegelei Merzhausen (Nov., Dec.), Altwasser Breisach (Dec.).

Heterotricha.

This order is represented by species characteristic of the four families, Plagiostomina, Bursarina, Stentorina, Gyrocorina.

Blepharisma Perty.

Of this genus, only one species *Blepharisma musculus* was found.

Blepharisma musculus Bütschli.

Body of medium size or large, length 88—180 μ , breadth 32—64 μ .

The specimens placed here agreed very well with the figure and description given by Bütschli, but do not agree with the figures of

Uroleptes musculus of Ehrenberg, which Bütschli identifies with his *Blepharisma musculus*. Other specimens were found which were undoubtedly the *Uroleptes musculus* of Ehrenberg, but they were different. The specimens placed here were flat and greatly compressed with the anterior end bluntly rounded and the posterior produced into a pointed tail-like portion. The undulating membrane was well developed. The macronucleus was moniliform and consisted of from 6—8 nodes. The contractile vacuole single and posterior. The colour is a beautiful faint pink. It is fairly metabolic and is very rare being found only in one locality.

Habitat: Kandel (Nov.).

Spirostomum Ehrbg.

Of this genus, only one species *Spirostomum ambiguum* was found.

Spirostomum ambiguum Ehrbg.

Body very variable, the length may vary from 2—4 mm.

The specimens were typical. The body is thread-like and may be slightly flattened. The macronucleus is moniliform. The micronucleus, I have failed to find, although I have examined many specimens and also studied many sections, which I have treated with several different stains e. g., Picro-carmin, Alum-carmin, Haematoxylin and Eosin, and Borax-carmin.

Habitat: Lehen (Oct., Nov.). Zoological Garden. In the tank in the Zoological Garden it is found in great abundance all the year round.

Bursaria O. F. Müll.

Of this genus, the single species *Bursaria truncatella* was found.

Bursaria truncatella O. F. Müll.

Body very large, length 700 μ —1.5 mm.

The specimens were typical or differed little from the type. This species is purse shaped, with the anterior end truncated and the posterior end rounded. The macronucleus is band-like and flexuose. The contractile vacuoles are very minute and distributed throughout the plasma.

The species is very rare, being found only twice.

Habitat: Lehen (Nov.), Zoological Garden (Jan.).

Thylakidium Schew.

Of this genus, the species *Thylakidium truncatum* was found.

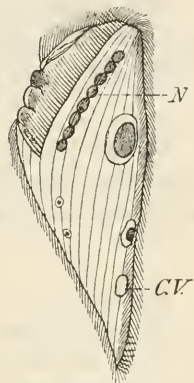


Fig. 1. *Blepharisma musculus* (Bütschli).
C.V., Contractile Vacuole;
N, Nucleus; ph, Pharynx.

Thylakidium truncatum Schew.

Body of medium size, length 70—110 μ , breadth 40—60 μ .

The specimens were typical, and contained numerous Zoochlorellae. The species is very rare.

Habitat: Lehen (Nov.).

Stentor Oken.

Of this genus, the following species were found, *Stentor polymorphus*, *Stentor coeruleus*, *Stentor Roselii*, *Stentor igneus*, *Stentor niger* and *Stentor multiformis*.

Stentor polymorphus Ehrbg.

Body very large, length 900 μ —1,2 mm.

The specimens did not differ from the typical, but in every case they were coloured green by Zoochlorellae. It seems to be the best suited for aquaria as it lives equally well in fresh or in putrid water. It was found in great numbers in an aquarium that was kept for three month in the laboratory, and during this time no fresh water was added to the aquarium.

Habitat: Lehen (Oct., Nov., Dec.), Universitätswiese (Dec.), Deichelweir (Nov.), Zoological Garden (Oct., Jan., Febr.).

Stentor coeruleus Ehrbg.

Body very large, length 800 μ —2 mm.

The length of this species is very variable, Johnson found specimens which measured in extreme extension 4 mm, but he states that the usual length was 2 mm. The largest specimen measured by me gave only a length of 1,36 mm.

The shape of the body is also very variable and often appears as an anterior globular part with a long thin posterior portion. The macronucleus is moniliform and the nodes may be either spindle shaped or oval, the latter shape is more frequently met with. It may be noted here that Johnson found this species in abundance at a point in Alewife Brook where the escape water from the pumping-station warms the water to such a degree that it freezes over only in the coldest weather. He found them here in every month from October to June, but in July and in August, in spite of making numerous collections, he failed to find any examples.

Habitat: Lehen (Oct., Nov.), Hugstettin (Nov.), Zoological Garden (Oct., Dec., Jan., Febr.).

Stentor Roselii Ehrb.

Body very large, length 700 μ —1 mm.

This species has been found by Johnson to reach 2 mm in length

and to have a breadth of 0,19 mm across the frontal field. The body is colourless or grayish yellow, and when fully expanded assumes a beautiful trumpet-shape. The frontal field of this species shows the highest development of any *Stentor*. The macronucleus may be cord-like or moniliform, and previous to or after division may be partly moniliform partly cord-like. I agree with Johnson in the view that the sheath is not due to a mucilaginous secretion, but is wholly composed of the slime among which the animal usually anchors itself.

Habitat: Lehen (Oct., Nov.), Hugstettin (Nov.), Universitätswiese (Nov., Dec.), Waldsee Upper (Dec.), Zoological Garden (Oct., Jan.).

Stentor igneus Ehrbg.

Body large or very large, length 200—400 μ .

The specimens were typical, but very faintly coloured, and possessing not a single macronucleus, but usually from 2—5.

Habitat: Lehen (Nov.).

Stentor niger Ehrbg.

Body very large, length 270—400 μ .

The specimens did not differ in any marked degree from the type.

Habitat: Lehen (Nov.).

Stentor multiformis O. F. Müll.

Body of medium size, length 80—105 μ .

This species I took at first for a small *Stentor coeruleus*. It has been described as a dwarf *Stentor coeruleus* by Gruber, and as *Stentor multiformis* by Stein. It was first described by O. F. Müller as *Vorticella multiformis*.

Habitat: Lehen (Oct.), Zoological Garden (Dec., Jan.).

Caenomorpha Perty.

Of this genus, the single species *Caenomorpha medusula* was found.

Caenomorpha medusula Perty.

Body small or of medium size length 80—110 μ , breadth 50—60 μ .

The specimens agreed very closely with the description of Perty, not differing in any essential point.

Habitat: Lehen (Nov.), Moosewald (Oct.).

Oligotricha.

This order is represented by members of the two families Halterina and Tintinnina.

Strombilidium Schew.

Of this genus the single species, *Strombilidium gyrans* was found.

Strombilidium gyrans Stokes.

Body small, length 60—63 μ , breadth 38—40 μ .

This species seems at times to be fixed by a thread and revolving with remarkable velocity round its longitudinal axis. The posterior part is marked by a number of longitudinal stripes. The macronucleus is placed transversally in the anterior portion and at first appears to consist of two parts, but these are found to be joined by a thinner portion.

Habitat: Kandel (Nov.)

Strombilidium Cl. et L.

Of this genus the two species, *Strombilidium turbo*, *Strombilidium viride*, were found.

Strombilidium turbo Cl. et L.

Body very small, length 35—40 μ , breadth 28—30 μ .

The specimens were typical. Trichocysts absent.

Habitat: Waldsee Upper (Nov., Dec.).

Strombilidium viride Stein.

Body small or of medium size, length 65—80 μ , breadth 40—45 μ .

The specimens were typical, but contained green and brown fragments. The macronucleus was spherical in almost all the specimens. The majority of the specimens were in a sheath or cyst which is brownish in colour and roughly cylindrical in shape.

Habitat: Universitätswiese (Nov.).

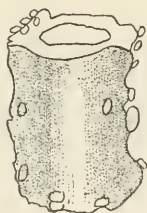


Fig. 2. Cyst of *Strombilidium viride*.

Halteria Cl. et L.

Of this genus the single species, *Halteria grandinella* was found.

Halteria grandinella O. F. Müll.

Body very small, length 30—40 μ .

The specimens did not differ from the type.

Habitat: Brunnen Herdern (Dec.), Altwasser Breisach (Dec.).

Tintinnidium Kent.

Of this genus only one species, *Tintinnidium fluvatile* was found.

Tintinnidium fluvatile Stein.

Body of medium size, length 80, breadth 16 μ .

The specimens agreed closely with the description of *Tintinnidium fluvatile*. The sheath was transparent, mucilaginous and with an uneven

surface, it measured $320\ \mu$ in length and $24\ \mu$ in breadth. The animal when retracted measured $32\ \mu$ in length and $16\ \mu$ in breadth. The macronucleus is oval and laterally situated. The retractile pedicle is attached to the side of the sheath. The specimens differed from that figured by Bütschli, in showing no feather-like appearance of the anterior cilia.

Habitat: Universitätswiese (Nov.).

Hypotricha.

This order is represented by members of the following families Oxytrichina, Euplotina, Aspidiscina.

Urostyla Ehrbg.

Of this genus only one species, *Urostyla viridis*, was found.

Urostyla viridis Stein.

Body of medium size, length $100\text{--}120\ \mu$, breadth $32\text{--}40\ \mu$.

The specimens were little different from the type. They were densely packed with Zoochlorellae. The peristome did not exceed the third of the length. The macronucleus was more spherical than oval in shape. The largest specimen measured $112\ \mu$ in length, and $32\ \mu$ in breadth.

Habitat: Zoological Garden (Dec.).

Kerona Ehrbg.

Of this genus the single species, *Kerona polyporum* was found.

Kerona polyporum Ehrbg.

Body large, length $130\text{--}180\ \mu$.

This species was found in abundance on *Hydra fusca*. The specimens were typical. I have been unable always to get the six parallel rows of ventral setae. Otherwise the specimens agreed with the description of the species.

Habitat: Altwasser Breisach (Dec.), Hanflocher (Dec.).

Stichotricha Perty.

Of the genus two species, *Stichotricha secunda*, and *Stichotricha aruleata* were found.

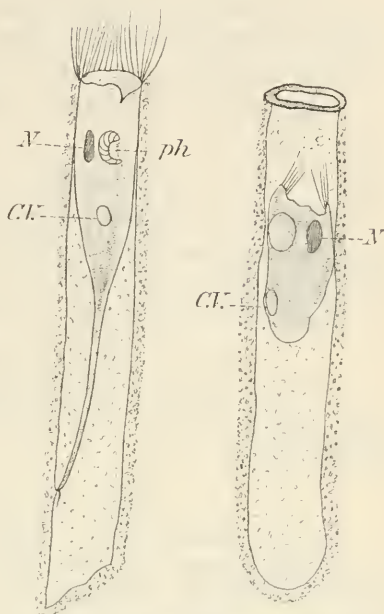


Fig. 3. *Tintinnidium fluvatile*.

Stichotricha secunda Perty.

Body of medium size or large, length 100—220 μ , breadth 20—35 μ .

The specimens were typical, but none of them reached the maximum measurements. The largest measured specimen was 192 μ in length and 32 μ in breadth. Many of the specimens were found in beautiful mucilaginous sheaths.

Habitat: Universitätswiese (Nov.), Waldsee Lower (Dec.). Zoological Garden (Jan.).

Stichotricha aculeata Wrzesn.

Body of medium size, length 90—100 μ , breadth 24 μ .

The specimens did not differ in any essential point from the type. The species is very rare, only three specimens being found.

Habitat: Universitätswiese (Nov.).

Schizosiphon Sav. Kent.

Of this genus which was founded by Saville Kent for the *Stichotricha socialis* of Gruber, the representative species *Schizosiphon socialis* was found.

Schizosiphon socialis Gruber.

Body of medium size or large, length 180—210 μ .

The specimens found agreed in every detail with the description given by Gruber. The tube or zoocytium is pendulous, granular in appearance and branches dichotomously.

Habitat: Universitätswiese (Nov.).

Uroleptus Ehrbg. emended. Stein.

Of this genus the three species, *Uroleptus musculus*, *Uroleptus piscis* and *Uroleptus mobilis* were found.

Uroleptus musculus Ehrbg.

Body large, length 144—220 μ , breadth 40—52 μ .

Of this species, specimens were found which agreed with the description and figure of Ehrenberg, but specimens were found which could not be placed in this species, and which agreed closely with that figured by Bütschli as *Blepharisma musculus* and said by him to be synonymous with the *Uroleptus musculus* of Ehrenberg. The present specimens varied from 144—148 μ in length and from 35—40 μ in breadth.

Habitat: Kandel (Nov.).

Uroleptus piscis Ehrbg.

Body very large, length 600—800 μ , breadth 80—110 μ .

The specimens were typical, and gave an average length of 684 μ and an average breadth of 86 μ .

Habitat: Kandel (Nov.), Ziegelei Merzhausen (Dec.), Altwasser Breisach (Dec.).

Uroleptus mobilis Englm.

Body very large, length 330—400 μ , breadth 35—40 μ .

The specimens did not differ from the typical, except in their being slightly smaller. The species is very rare.

Habitat: Altwasser Breisach (Dec.).

Oxytricha Ehrbg.

Of this genus the single species, *Oxytricha pellionella* was found.

Oxytricha pellionella O. F. Müll.

Body small or of medium size, length 68—100 μ , breadth 19—24 μ .

The specimens agreed in every way with the description given of the species.

Habitat: Altwasser Breisach (Dec.), Hanflocher (Dec.).

Stylonychia Ehrbg.

Of this genus the two species, *Stylonychia mytilus* and *Stylonychia pustulata*, were found.

Stylonychia mytilus O. F. Müll.

Body large or very large, length 280—275 μ .

The specimens were typical and were found in almost every sample that was taken.

Habitat: Lehen (Oct., Nov.), Hugstettin (Nov.), Hanflocher (Nov.), Hochdorfer (Dec.), Deichelweir (Nov.), Waldsee Upper (Nov.), Waldsee Lower (Dec.), Ziegelei Merzhausen (Dec.), Altwasser Breisach (Dec.), Elsässer Breisach (Dec.), Zoological Garden (Oct., Dec., Jan., Febr.), Kandel (Nov., Dec.), Brunnen Herdern (Dec.).

Stylonychia pustulata.

Body large, length 180—220 μ , breadth 85—110 μ .

The specimens did not differ in any essential point from the type.

Habitat: Deichelweir (Nov.), Ziegelei Merzhausen (Dec.), Zoological Garden (Oct., Jan.).

Euplotes Ehrbg.

Of this genus, two species were found, *Euplotes charon* and *Euplotes patella*.

Euplotes charon O. F. Müll.

Body of medium size, length 80—83 μ , breadth 38—40 μ .

The specimens were typical. The species seems to be generally distributed.

Habitat: The species was found in every collection made.

Euplotes patella O. F. Müll.

Body of medium size or large, length 100—125 μ , breadth 60—75 μ .

The specimens did not differ in any important point from the type. The dorsal surface was marked by furrows which varied in number from 6 to 7. The specimens were all coloured green by Zoochlorellae. The species seems to be generally distributed.

Habitat: The species was found in every collection made.

Aspidisca Ehrbg.

Of this genus two species, *Aspidisca lynceus* and *Aspidisca costata* were found.

Aspidisca lynceus O. F. Müll.

Body small, length 40—55 μ , breadth 25—32 μ .

The specimens were typical, but I could find no trace of furrows on the dorsal surface even in the largest specimen.

The species is generally distributed.

Habitat: The species was found in almost all the collections made.

Aspidisca costata Duj.

Body very small, length 30—40 μ , breadth 22—31 μ .

The species agreed closely with the description given. The dorsal face had always 6 well marked furrows.

Habitat: Ziegelei Merzhausen (Dec.), Altwasser Breisach (Dec.).

Peritricha.

This order is represented by members of the two families Spirochonia and Vorticellina.

Spirochona Stein.

Of this genus the single species, *Spirochona gemmipara* was found.

Spirochona gemmipara Stein.

Body of medium size, length 100—120 μ .

The specimens were typical. Macronucleus was oval or circular.

Habitat: On *Gammarus pulex*.

Trichodina Ehrbg.

Of this genus the single species, *Trichodina pediculus* was found.

Trichodina pediculus Ehrbg.

Body small or of medium size, diameter 60—75 μ .

The specimens were circular in shape when seen from above. The sides of the body are concave and the macronucleus is band shaped, and placed transversally.

Habitat: Altwasser Breisach (Dec.), Hochdorfer (Dec.).

Vorticella Linnaeus.

Of this genus eight distinct species were found, but many forms were found that did not agree with the descriptions given of any former species, yet they differed from the known species in such a manner that it seems better to keep them for further study.

Vorticella nebulifera O. F. Müll.

Body of medium size, length 70—90 μ , breadth 34—44 μ .

The specimens were typical or varied so little from it that they are included here. Surface of the body smooth. Specimens are either colourless or coloured green with Zoochlorellae.

Habitat: Kandel (Nov.), Altwasser Breisach (Dec.), Hochdorfer (Dec.).

Vorticella campanula Ehrbg.

Body of medium size, length 100 μ , breadth 85 μ .

The specimens were typical, opaque, and found in groups.

Habitat: Lehen (Oct., Nov.), Kandel (Dec.), Universitätswiese (Nov.), Hugstettin (Nov.), Zoological Garden (Oct., Jan., Febr.).

Vorticella citrina Ehrbg.

Body of medium size, length 88—120 μ , breadth 69—115 μ .

Two types of specimens were found which must be placed here. The first type agreed in every way with the descriptions of *Vorticella citrina*, except in its smaller size. The second type, obtained in the same locality was much smaller in size varying from 50—70 μ in length, and had markedly convex sides, but in every other detail agreed with *Vorticella citrina*.

Habitat: Ziegelei Herdern (Nov.).

Vorticella alba Fromm.

Body small, length 54—64 μ , breadth of body 27—32 μ , breadth of peristome 37—40 μ .

The specimens presented considerable difficulty, as they were considerably larger than any formerly described. In the specimens the peristome border was not reversed but only thickened, the ciliary disc was elevated in the middle above the peristome border, the body was smooth, and they were always solitary.

Habitat: Kandel (Nov.), Universitätswiese (Nov., Dec.), Deichwehr (Nov.).

Vorticella cucullus Fromm.

Body of medium size, length 85—100 μ , anterior breadth 53—60 μ .

Three specimens were found and they were cone shaped with

straight sides grayish in colour and measured from 85—93 μ in length and from 54—58 μ in anterior breadth. The surface of the body was smooth and the ciliary disc was not prominent.

Habitat: Elsässer Breisach (Dec.).

Vorticella longifilum Sav. Kent.

Body of medium size, length 80—90 μ , anterior breadth 40—45 μ .

Only two specimens were found, but they agreed so closely with the description given by Saville Kent that they are included here. The pedicle was fully 12 times as long as the body in one, and fully 13 times in the other.

Habitat: Zoological Garden (Jan.).

Vorticella picta Ehrbg.

Body small, length 43—45 μ , breadth 32—36 μ .

A single specimen was found at the bottom of the aquarium. It was recognized by the smooth body surface, and by the contractile portion of the pedicle being formed not of one continuous thread, but of short pieces placed the one above the other.

Habitat: Elsässer Breisach (Jan.).

Vorticella monilata Tatem.

Body small or of medium size, length 60—90 μ , breadth 37—56 μ .

The specimens were few but typical, the only noteworthy feature being that in some the rows of tubercles could not be said to be parallel.

Habitat: Elsässer Breisach (Jan.).

Carchesium Ehrbg.

Of this genus only one species, *Carchesium polypinum* was found.

Carchesium polypinum Linn.

Body small or of medium size, length 60—100 μ , breadth 42—60 μ .

The specimens agreed with the description given of this species except in their greater size 80—100 μ in length and 50—60 μ in breadth. With regard to size they agreed with *Carchesium spectabile* but in no other feature. The colonies were small varying in number from 2—30 individuals.

Habitat: Lehen (Nov.), Kandel (Nov.), Waldsee Upper (Nov.), Waldsee Lower (Dec.).

Zoothamnium Ehrbg.

Of this genus only one species was found, *Zoothamnium affine*.

Zoothamnium affine Stein.

Body small or of medium size, length 68—93 μ .

This species was recognized by its relatively thick pedicle, which

was smooth when extended. Considerable variation appears in the different colonies in the general contour.

Habitat: Lehen (Oct.).

Epistylis Ehrbg.

Of this genus only one species *Epistylis nympharum* was found.

Epistylis nympharum Englm.

Body of medium size, length 100—120 μ , anterior breadth 48 μ , posterior breadth 40 μ .

The specimens differed so little from the type that there was no hesitation in placing them here. The surface of the body is marked by transverse stripes, and the macronucleus in band-shaped, arched and placed longitudinally.

Habitat: Altwasser Breisach (Dec.), Elsässer Breisach (Dec.).

Pyxidium Sav. Kent.

Of this genus only one species was found, *Pyxidium cothurnoides*.

Pyxidium cothurnoides Sav. Kent.

Body small, length 50—60 μ , breadth 30—33 μ .

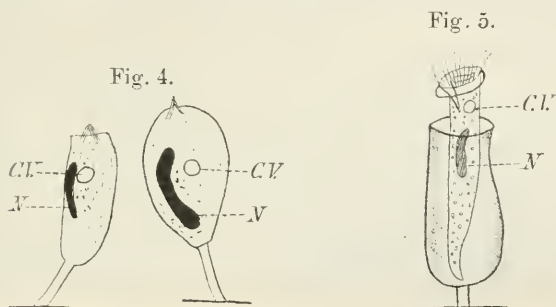


Fig. 4.

Fig. 5.

Fig. 4. *Pyxidium cothurnoides*.

Fig. 5. *Cothurniopsis vaga* (after Roux).

The body is oval with the ciliary disc minute, furnished with two circlets of cilia projecting beyond the border of the peristome. Macronucleus band-shaped and slightly curved is placed longitudinally. The stalk very short less than one fourth the length of the body.

Habitat: Attached to the carapace of Cypris or of Cyclops. Altwasser Breisach (Dec.).

Cothurniopsis Entz.

Of this genus only one species *Cothurniopsis vaga* was found.

Cothurniopsis vaga Schrank.

Body of medium size or large, length 115—140 μ , breadth 51 μ .

The specimens found were typical examples of this species with body conical in shape and grayish in colour and peduncle short and thick.

Habitat: Attached to Cyclops, Hochdorfer (Dec.).

Lagenophrys Stein.

Of this genus only one species was found, *Lagenophrys vaginicola*.

Lagenophrys vaginicola Stein.



Fig. 6. *Lagenophrys vaginicola*. — The drawings were made with a Leitz Zeichenocular. Objective No. 6 and tube length 190 mm.

This species is quite characteristic with a heart shaped lorica, flattened on the side by which it is attached and convex on the free side. The anterior end is broader and it is slightly concave in the middle where the opening which is surrounded by two semicircular valvular processes or lips is found. The macronucleus is band-shaped and arched, and placed in a transversal position.

Habitat: Attached to Cyclops. Hochdorfer.

2. Über einen Hund aus der paläolithischen Zeit Rußlands. *Canis Poutiatini*.

Von Prof. Th. Studer in Bern.

(Mit 2 Tafeln.)

eingeg. 25. März 1905.

Die Frage, ob der Haushund, *Canis familiaris*, von jetzt lebenden Caniden, Wolf, Schakal und andern abstamme, oder aus einer der mehreren, im Diluvium wild lebenden Canidenarten hervorgegangen sei, bildet noch eine offene, vielfach diskutierte Kontroverse. Gegenüber der Annahme, die noch heute in Lehrbüchern (Zittel, Max Weber u. a.) und von Spezialforschern wie Pallas, GÜldenstedt, Jeitteles, Nehring verfochten wird, daß aus Schakalen die kleinen, aus Wölfen große Hunderassen erzeugt wurden, haben sich schon Blainville (*Osteographie*, *Canis*) und besonders Pictet (*Traité de paléontologie* 1853 S. 203 Bd. I) dahin ausgesprochen, daß eine diluviale Form, welche als *Canis familiaris fossilis* Pictet bezeichnet wurde, die Stammform der Haushunde sei; ihnen schließen sich an Bourguignat, gestützt auf die von Marcel de Serres, Dubreuil, und Jean Jean, in der Höhle von Lunel-Vieil gefundenen Canidenknochen, die er einem Hunde zuschreibt, der als *Canis ferus* Bourg. bezeichnet wird, Woldrich, welcher mehrere diluviale Caniden, die dem *C. familiaris*-Typus angehören, als Urformen der Haushunde betrachtet. Boule zeigte ferner, »Prédécesseurs de nos canidae« (*Compt. rend. de l'Acad. des Sc. Paris* 28. Jan. 1889 und Gaudry et Boule, *Matériaux pour l'hist. des temps quatern.*, 4 fasc. Paris 1892), daß bereits im mittleren Pliocän die heutigen Hundeformen ausgebildet

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