mocht hat. Sie erklärt sich beim Neufundländer durch die Kreuzung einer starken und einer oder zwei schwächerer Rassen, von denen gerade die schwächere, der Pudel, schon die Tendenz zur Verdickung des horizontalen Astes und die stärkere (lothringischer Wolf, Dogge), die zur starken Verbreiterung des aufsteigenden Astes zeigt. Es liegt nahe, diese Erklärung auch auf den menschlichen Unterkiefer von Mauer anzuwenden, der mir danach, so alt er auch ist, noch nicht als eine Urform der Anthropiden, sondern schon als das Kreuzungsprodukt einer noch älteren starken und einer gleichfalls älteren schwachen Anthropidenrasse erscheint. Auch der Schädel und Skeletteile des *Homo mousteriensis hauseri* zeigen in den Größenverhältnissen einzelner Teile auffallende Differenzen.

Den Herren Dr. Biedermann-Imhoof und Geh. Hofrat Prof. Dr. Blasius sage ich für ihre gütige Unterstützung besten Dank.

11. On a Trypanoplasma from the stomach of the conger eel. (Conger niger.)

By R. Elmhirst, Superintendent of the Marine Station at Millport, and C. H. Martin, Demonstrator in Zoology at Glasgow University.

(With 5 figures.)

eingeg. 6. Januar 1910.

While examining some marine fish for intestinal protozoa to act as a control to some work which one of us is at present pursuing on the intestinal parasites of the fowl[1], we found in the stomach of a dead conger eel a heavy infection of a *Trypanoplasma*. Up to the present, as far as we know, there are only two descriptions of an intestinal *Trypanoplasma* to be found in the literature of the group. In 1905 Lèger gave a short description of a *Trypanoplasma* from the stomach of Box Boops from the Mediterranean, under the name of *Trypanoplasma intestinalis*[2]. Lèger's original account of this form was not illustrated, but two of his drawings have since been published by Woodcock in his account of the Haemoflagellates[3]. The other intestinal form, *Trypanoplasma ventriculi*, was found by Keysselitz in the stomach of a *Cyclopterus lumpus* at Bergen, and was described shortly by him in his paper on the "Generations und Wirtswechsel von *Trypanoplasma borreli*"[4].

The normal *Trypanoplasma* from the stomach of a conger is a rather elongated form, the body of which measures roughly 18 μ by 2,7 μ. The anterior flagellum measures 15 μ the free end of the flagellum

[1] Proc. Roy. Soc. Vol. 81. 1909.
[2] C. R. Soc. Biol. T. LVIII. p. 511. 1905.
[3] Treatise on Zoology Part I. p. 250. Black, London, 1909.
[4] Archive für Protist. T. VII. p. 37. 1906.

attached to the membrane measures 10 μ, but the size of the animal seems subject to considerable variation. When examined alive in the stomach juice of its host at room temperature, the parasite is extremely active, though after a period of about 24 hours it becomes gradually more sluggish, remaining motionless for considerable periods in a very characteristic head to tail position.

Whether these three forms (*Trypanoplasma*, *intestinalis*, *rentriculi*, and the form from the conger) really belong to the same species, is a question that in the present state of our knowledge it would be impossible to answer, but it seems safest at present to place this form from the stomach of the conger in a new species, — *Trypanoplasma congeri*.

Trypanoplasma congeri has, up to the present, only been found in three fasting congers, which had been kept in the tanks at Millport for about five months and seemed perfectly healthy in every respect.

In eight congers caught on the line near Millport, in which the stomachs were full of food, no trace of the parasite could be found. On the other hand, in those congers in which it is present, the parasite is

Fig. 1.

Fig. 2.

Fig. 1. Normal *Trypanoplasma congeri*.
Fig. 2. *Trypanoplasma* in head to tail position.

so abundant that, especially in one individual, live films from the stomach wall were simply a quivering mass of *Trypanoplasma*.

By those who have examined the blood fishes for *Trypanoplasma* the significance of this fact will be readily appreciated, (e. g. Keysselitz on *Trypanoplasma borreli*, p. 20: — »Ein weiterer Mangel ergibt sich aus der im Hinblick auf die Flagellatenvermehrung bei Warmblutern außerordentlich großen Seltenheit von Teilungsstadien«).

In films from the stomach of an infected conger, all the stages of division are readily obtainable, and some are figured in this paper. A full description of this process will, however, be given in a later paper, at present we should only like to add a few more details as to the habitat of the parasite, and its reaction to changes of environment.

In the conger, as is well known, the cardiac portion of the stomach is prolonged into a coecum, which stretches down the whole length of the abdominal cavity. It is in this region of the stomach that the

Trypanoplasma is especially abundant in association with a parasitic Trematode, *Lecithochirium rufoviride*, Rudolphi.

No trace of the parasite has up to the present been found in any other part of the intestine or rectum, or in the blood[5]. The reaction of the stomach wall in the fasting conger was found to be slightly alkaline, though whether in the case of the conger there are periodical short secretions of stomach juice, corresponding to those found in fasting dogs, is a question that cannot well be answered. In a stomach film mounted in the stomach juice and kept at room temperature after a period of 20 hours some of the *Trypanoplasma* became motionless, assuming the head to tail position, and after rounding off became disintegrated. During this period (some slightly active Trypanoplasmas

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 3, 4 and 5. Stages of division. All figures were drawn with Zeiss Comp. oc. 8 and 1,5 Apochromat.

can be found on the slide after 88 hours) an increasing number of highly aberrant forms make their appearance. These forms which never become very numerous are roughly half the size of the smallest normal *Trypanoplasma*, but they are provided with an enormously long anterior flagellum.

If the film from the stomach is mounted in a drop of the intestinal fuice the *Trypanoplasmas* immediately become united at first in pairs and then in groups and disappear entirely at the end of about two hours.

We propose, during the ensuing summer to try and work out the life cycle of this form, and, if possible, arrive at some idea as to the peculiar physiological condition of the stomach of the host which seems to be associated with the presence of this parasite.

[5] Laveran and Mesnil also examined the blood of ten congers for flagellates without success. Vid. Trypanosomes et Trypanosomiases p. 380. Paris 1904.