

laufenden, ringförmigen Gang vorstellt, kreisförmig eingeschlossen ist. Mit ihm steht es durch einen dorsalwärts gelegenen, von 6 Schließzellen umstellten Porus in Verbindung. Die Ausmündung erfolgt durch einen kurzen ectodermalen Harnleiter. Zimmer beschreibt in seiner Arbeit die Antennendrüse als ringförmig geschlossenen Schlauch, ohne ein Endsäckchen zu erwähnen.

Wien, 4. Februar 1913.

7. On the Effect of Castration on the Thumb of the Frog. (*Rana fusca*.)

By Geoffrey Smith, M.A., Fellow of New College, Oxford.

(With 3 figures.)

eingeg. 10. Februar 1913.

As the result of experiments upon the Frog, published under the title of Studies in the Experimental Analysis of Sex, Part 8, in the Quarterly Journal of Microscopical Science (1), Dr. Schuster and I criticised the conclusions which Dr. Nussbaum (2) and Prof. Meisenheimer (3) have drawn from similar experiments, and expressed the opinion that the experiments of these authors were not sufficient to prove that the growth of the papillae on the thumb of a castrated frog could be induced by the injection of testis (or ovarian) extracts.

I have lately obtained further results which show conclusively that our sceptical attitude was justified, and that it is extremely improbable that the growth of the papillae recorded by these authors was in any instance caused by the injections employed. At the same time the new results I have obtained necessitate a slight modification of the view which was given in our former paper of the cycle of changes through which the thumb goes.

The crucial experiment which has just come to a successful end is as follows. A certain male specimen of *Rana fusca*, weighing about 15 grs, was completely castrated on December 15th, 1911. At this time the thumb showed a well-developed pad of brown papillae which had not quite obtained their full size or pigmentation. The appearance of the thumb under a dissecting microscope is shown in fig. 1, and some of the papillae under Zeiss 2 AA are shown in fig. 1 a.

From the time of castration the thumb was inspected from time to time and no perceptible change appeared in it until May and June 1912 when it appeared that the papillae were greatly reduced. The disappearance of the papillae continued during the summer and by September all traces of papillae had completely disappeared from both thumbs. To make absolutely sure that the thumbs were perfectly smooth one of them was cut off and examined with great care all over under the microscope

(Zeiss 2AA), but no trace of a papilla could be found. A drawing of one of the thumbs at this stage and a small piece of its outline under a higher power is given in figs. 2 and 2a.

During October and November 1912 I examined the remaining thumb and could not detect any growth of papillae, but in January 1913 an inspection of the thumb roused my suspicions and on examining it under a lens I noticed to my great surprise the presence of marked papillae all over the thumb pad. The animal was killed at the end of January 1913 and the thumb was examined both under low and high powers, and the condition of the papillae is shown in figs. 3 and 3a. It is clear that a very marked new growth of papillae has occurred since the assumption of the perfectly smooth condition shown in figs. 2 and 2a. The animal was dissected in order to make sure that no testicular tissue

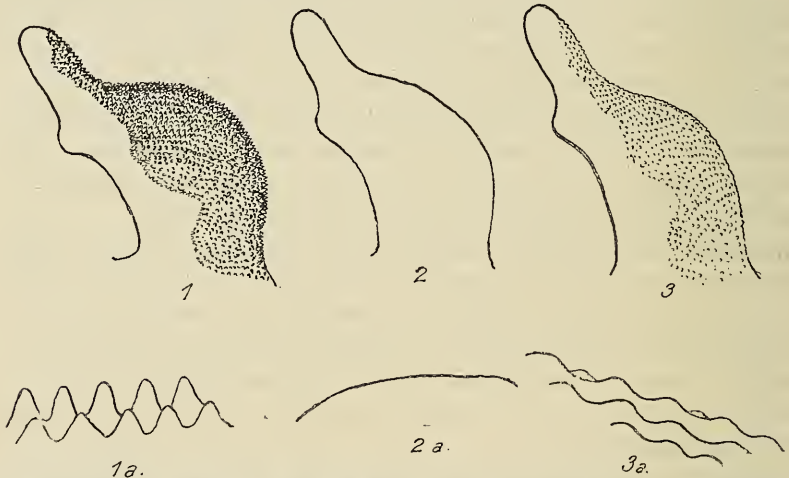


Fig. 1. Thumb of Male on Dec. 15th 1911, at time of castration. a. More highly magnified view of some of the papillae of above.
 Fig. 2. Thumb of same male in September 1912. a. More highly magnified view of outline at this time, showing entire absence of papillae.
 Fig. 3. Thumb of same male in January 1913, showing re-growth of papillae. a. More highly magnified view of the papillae at this time.

had been left behind, but the dissection revealed an entire absence of the testes which had been completely removed. The frog weighed at death about 12 grammes, having thus lost about 3 grammes in weight.

We see, therefore, that a male frog completely castrated in December 1911, after acquiring perfectly smooth thumbs without a trace of papillae on them in the summer and autumn of 1912, grew papillae again in January 1913, without any experimental treatment at all.

Now the validity of Profs. Nussbaum's and Meisenheimer's

experiments rests on the supposition that after castration the papillae (rapidly) disappear and never grow again. Dr. Schuster and I pointed out in our paper that the effect of castration is not to make the papillae immediately disappear; that indeed six months after the operation marked papillae might still be present. This fact is clearly a source of error in experiments where injections are made within six months of castration by an observer who is under the impression that the papillae have completely disappeared when they may not have done so. But in some of Professor Meisenheimer's experiments the injections or implantations of testes and ovaries were not made until a year after the castration was performed. In these cases the frogs had passed through a summer and had presumably acquired smooth thumbs, so that their acquisition of papillae the following autumn might certainly be ascribed to the experimental treatment, provided that a re-growth of papillae in a castrated frog without further treatment never occurs. If it does occur, (and the experiment described in this paper shows that it does), there is no need to ascribe the re-growth observed by Prof. Meisenheimer to the injections of testes and ovaries, because it would take place in the normal course of events. It is obvious that the re-growth of the papillae on the thumb more than a year after castration without any further experimental treatment and after the thumb had been perfectly smooth, entirely destroys the value of all experiments performed on the supposition that such an event could not occur.

While thoroughly confirming Dr. Schuster and myself in the belief that no evidence exists sufficient to prove that injection of testes or ovarian extracts or implantation of testes or ovaries can call forth the growth of papillae on the thumb of a castrated frog, the experiment recorded in this paper, together with others of a similar nature, necessitates the modification of our views in one particular.

We adopted the view that the smooth tumid condition assumed by the thumb of a normal male during the summer months was due not so much to the casting off of the papillae, as to the growth and thickening of the epidermis of the pad. While fully convinced that this growth and thickening does occur in the summer months in normal male frogs, it is clear that the pad may become smooth without any marked growth and thickening. This is clearly shown in the experiment recorded in this paper where the thumb pad became ultimately quite smooth without any active thickening or increase in size. The fact that this increase did not occur in the castrated frog probably accounts for the comparatively small size of the papillae subsequently produced. It will be remembered that in the normal male frog the annual growth and activity of

the testes occurs in the summer months when the thumb pad becomes tumid and smooth, and we argued that these two processes were probably causally connected, and that castration, by preventing the thickening of the pad in summer, inhibited the production of papillae the following autumn and winter. There is every reason for holding that this theory is correct, but the experiment described in this paper shows that castration does not prevent the pad ultimately becoming smooth in the summer or the production of small papillae the following winter. Without denying therefore that the full development of the thumb pad is in some way causally connected with the growth and activity of the testes, probably by the latter influencing the composition of the blood, we hold that there is no sufficient experimental evidence to prove that the means by which this influence is brought about is by a hormone which can be extracted from the testes, or that treatment with testicular or ovarian substance can influence the growth of the papillae on the thumb in a castrated frog.

Literature.

- 1) G. Smith and E. Schuster, On the Effects of the Removal and Transplantation of the Gonad in the Frog. Q.J.M.S. Vol. 57. p. 439. 1912.
- 2) M. Nussbaum, Pflügers Archiv f. Physiologie. Bd. CXXXVI. S. 519. 1909.
- 3) J. Meisenheimer, Zoologischer Anzeiger. Bd. XXXVIII. S. 53. 1911.

8. *Oikopleura najadis* nov. spec., eine neue Appendicularie aus der Adria.

Von Erwin Uebel.

Aus dem zoologischen Institut der k. k. Universität Innsbruck.

(Mit 3 Figuren.)

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Bei der Bearbeitung des Appendicularienmaterials, welches auf den Terminfahrten S. M. S. Najade in der Adria gesammelt und mir zur Bearbeitung übergeben wurde, stieß ich mehrfach auf eine *Oikopleura*, die nach ihrer geringen Größe und dem Bau des Magendarmes große Ähnlichkeit mit *Oikopleura parva* Lohmann zeigte. Bei näherer Untersuchung ergaben sich aber so beträchtliche Unterschiede, daß ich bald zur Überzeugung kam, eine neue Form vor mir zu haben. Auch der beste Kenner der Copelaten, Herr Prof. H. Lohmann (Hamburg), dem ich Material zur Nachprüfung sandte, hält nach brieflicher Mitteilung die fragliche *Oikopleura* für eine »gut gesicherte Art«. Da bis zum Abschluß meiner Arbeit noch geraume Zeit verstreichen dürfte, erlaube ich mir im folgenden eine kurze Beschreibung der neuen Art, die ich *Oikopleura najadis* benenne, zu geben.

Der Rumpf (vgl. Fig. 1) ist — im Gegensatz zu *Oikopleura*

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