important for determining their host and habitat specificity.

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External Sexual Differences and their Significance in *Mormyrus kannume* Forskal. 1775

Mormyrus kannume is distributed in the Nile system from the five major lakes of Uganda to the delta, and probably also in the Athi River system in Kenya¹. The present communication was compiled from observations on specimens from the shallow waters of northern Lake Victoria.

There are external sexual differences in *M. kannume*. The base of the anal fin of the female is inclined at an angle of between 17 and 28° to an arbitrary axis between eye and tail fork, whereas in the male this angle lies between 32 and 33°. In the female or immature male, the anal fin is angular in outline, and the slender rays diverge from the base to the periphery of the fin. The anal fin of the mature male is rounded in outline, and the thickened, tapered rays converge to the periphery from the fin base, and due to the constriction at the periphery, when the fin is spread, a depression appears in the centre. Every immature male has an anal fin similar to that of a female, except for the angle at which it is attached to the body. As the testis ripens, the anal fin becomes modified to the form found in the mature male, and after breeding, the testis regresses and the anal fin gradually assumes its original form.

The significance of the modified anal fin cannot be conclusively demonstrated, since the breeding behaviour of *M. kannume* has not been observed. The simultaneous maturation of the gonad and modification of the anal fin in the male, however, indicate that the anal fin has an important function during breeding. If recently killed male and female are placed side by side with their anal fins spread and in contact at the peripheries, a chamber is formed between their anal fins in the manner illustrated in Fig. 1. If this chamber is used to surround the eggs

during fertilization, fewer spermatazoa might need to be produced than if the gametes were dissipated into the surrounding water before fertilization. Therefore the use of a fertilization chamber in *M. kannume* during spawning might account for the relatively minute testis of the mature male. In every mature male fish with a total weight of less than 600 gm., the testis never weighed more than 3 gm., and a specimen weighing more than 4 kgm. had a ripe testis which weighed only 7 gm. In a variety of experiments in which macerated testis material and eggs taken from ovulated ovaries were mixed in small volumes of water, effective fertilization was never more than 25 per cent, and frequently less than 10 per cent. This may indicate that the gametes of this species are viable for only a limited period after contact with water, and that fertilization is possible only where immediate intimacy between ovum and sperm occurs. Immediate contact between ovum and sperm may be possible within the fertilization chamber.

M. kannume is a very active gregarious species which probably has the co-ordinative ability to form a fertilization chamber. I have observed that, after being frightened, individuals of *Marcusenius nigricans*, another very active gregarious Mormyrid, form an unusually compact shoal which swims as a single unit through rocky crevices. Individuals of *M. kannume* may also be able to maintain close contact with each other while swimming, and as an extension of this type of behaviour, pairs may be able to form a fertilization chamber during spawning.

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Isolation of Liver Nuclei

A METHOD of isolating pure nuclei from rat liver has been elaborated from those described by Alfrey¹, Schneider and Hogeboom², Chauveau³ and Zbarskij⁴.

A rat was fasted for 24 hr. and then killed by decapitation. The liver was perfused with 0.25 M saccharose containing 0.0018 M calcium chloride and homogenized in a Teflon Potter-Elvehjem homogenizer for 2-3 min. at 1,000 r.p.m. in 0.25 M saccharose (+ 0.0018 M calcium chloride) at 1:10 dilution. The homogenate was filtered through four sheets of cotton gauze or through Jena G O glass filter. The filtrate was afterwards centrifuged for 5 min. at 500 r.p.m. in the horizontal head at 0-2° C. Thereafter we pipetted out the supernatant, which was not sharply separated from the precipitate, and put it on the surface of 0.34 M saccharose (+ 0.0018 M calcium chloride) and then centrifuged for 10 min. at 2,000 r.p.m. and 0-2° C. in the horizontal head. The supernatant was rejected and the precipitate, composed mainly of nuclei, was resuspended in 0.25 saccharose (+ 0.0018 M calcium chloride) and again put on the surface of 2.2 M saccharose, the density of which was exactly 1.272 gm./ml. This density, according to Zbarskij⁴, allows the sedimentation of pure nuclei only, and at the same time it prevents the sedimentation of smaller cellular structures and of whole cells.

Fig. 1. Diagrammatic transverse section of a pair of fish in lateral contact in the region of their anal fins. (x 4). W, Depression in centre of male anal fin; X, mature male (34 cm.); Y, female (33 cm.); Z, extruded ova within the fertilization chamber