BIOLOGY

A New Key Character in Males of the Family Goodeidae (Cyprinodontiformes)

In the family Goodeidae, unlike the other viviparous Cyprinodontiformes, the male anal fin is not modified into a gonopodium. Three years ago, we discovered in *Skiffia lermae* (Goodeidae) a muscular structure which seems to serve as a reproductive organ and which we called a "pseudo-penis"[1,2]. This structure consists of a substantial muscular mass situated just behind the visceral cavity; it surrounds (*a*) a highly dilated vas deferens, the internal surface of which presents numerous villosities, and (*b*) a urinary canal.

To find out whether this structure exists in all the goodeid fish, in which case it could be considered as a key character, the following species (3) (belonging to the 4 sub-families of the Goodeidae) were examined:

1—Sub-family Ataeniobiinae: *Ataeniobius toweri* (UMMZ 172191)*.

2—Sub-family Goodeinae: *Allophorus robustus* (P 123), *Chapalichthys encaustus* (USNM 44163), *Goodea atripinnis* (USNM 41814), (ZMA 102146), *Zoogoneticus robustus* (ZMA 102140).

3—Sub-family Characondontinae: *Characodon lateralis* (USNM 132451), (P 316).

4—Sub-family Girandinichthyinae: *Girardinichthys innominatus* (USNM 161295), *Lermichthys multiradiatus* (USNM 161297), *Skiffia bilineata* (ZMA 100581).

The organ was found to exist in all the species examined.

In members of the sub-family Goodeinae the urinary canal is apparently not enclosed in the muscular pseudo-penis, but is twined around its caudal wall. If this is in fact the case, it implies that the urogenital system in this sub-family represents an intermediate stage between that of the other sub-families of Goodeidae and that of the family Anablepidae.

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* Origin of the specimens: P, Instituto Politecnico Nacional, Mexico; UMMZ, University of Michigan Museum of Zoology; USNM, United States National Museum (Smithsonian Institute); ZMA, Zoological Museum of Amsterdam.

[1] Mohsen, T., *C.R. Acad. Sci., Paris*, **252**, 3227 (1961).
[2] Mohsen, T., *Ann. Fac. Sci., Dakar*, **6**, 163 (1961).

Oculotrema hippopotami (Trematoda: Monogenea) in Uganda

Oculotrema hippopotami was described by Stunkard[1] from material labelled 'from the eye of a hippopotamus', and presumably collected by A. Looss from a Nile hippopotamus in the zoological gardens, Cairo. This hippopotamus must have been taken to Cairo from the Sudan, or possibly from Uganda, because *Hippopotamus amphibius* has been absent from the River Nile north of Dongola in the Sudan for at least the past 70 years[2]. The Sudan, or Uganda, and not Egypt, should therefore be given as the locality of the type specimen of *O. hippopotami*.

During their study of *Hippopotamus amphibius* around the north-eastern shores of Lake Edward in Western Uganda, workers from the Nuffield Unit of Tropical Animal Ecology have noticed a high incidence of infestation with *Oculotrema hippopotami*. The uppermost eye of 1,263 dead hippopotami was examined for the presence or absence of the trematode. Of this sample, 960 were positive; that is, the infestation rate is 76 per cent in this region. Six or more worms frequently occur in each eye, moving around the eyeball under the eyelids; they do not appear to harm the eye. *Oculotrema* probably feeds on epithelial cells, as well as the diet of tears so graphically described by Rothschild and Clay[3]. No fresh or digested blood was seen within the intestinal caeca of live worms.

Living mature worms are at least 12 mm long when extended, and the opisthaptor is 1·7 mm long and 2·3 mm wide when flattened. These measurements are larger than those given by Stunkard[1], who was working with fixed and contracted specimens. In almost all other characters the specimens of *O. hippopotami* from Uganda agree very closely with Stunkard's detailed description and measurements. The following are four slight differences:

(*a*) Intestinal caeca; in some specimens, at least, the caecum on the same side as the ovary is the longer, whereas in Stunkard's specimens it was always the shorter.

(*b*) The antero-posterior length of the testis in mature worms is 0·3–0·85 mm, width 0·6–1·1 mm; in Stunkard's specimens it was 0·2–0·37 mm long and 0·7–0·9 mm wide.

(*c*) Maximum number of eggs retained within the uterus, 40; in Stunkard's specimens, 12.

(*d*) Size of eggs, 235–265μ × 135–160μ; Stunkard's specimens were 230–270μ × 120–140μ.

Almost all genera of the order Monogenea parasitize fish and amphibians, and *Oculotrema* is so far the only genus which has been described from a mammal. This unique habitat, added to initial doubts as to the origin of the type specimen, has led many parasitologists to question the validity of the original labelling. Indeed, Baer[4] relegated the worm to a footnote, with comments to the effect that this was either an accidental infestation or a case of faulty labelling. The present observations in Uganda show that this is not so, and that *Oculotrema hippopotami* fully deserves its name.

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[1] Stunkard, H. W., *Parasitology*, **16**, 436 (1924).
[2] Lydekker, R., *The Royal Natural History* (London: Frederick Warne, 1894).
[3] Rothschild, M., and Clay, T., *Fleas, Flukes and Cuckoos: a Study of Bird Parasites* (London: Collins, 1952).
[4] Baer, J. G., *Ecology of Animal Parasites* (Urbana: University of Illinois Press, 1952).

Daily Fluctuations of Drift Invertebrates in a Dartmoor Stream

Although several workers have investigated the transport of invertebrates from lake outflows, little has been done on the problem in rivers. Notable exceptions to this are Waters[1,2] in the United States, Wolff[3] in Sweden and especially Müller[4–7] in Sweden and Germany.

The insect component of the mid-water drift is nearly all of truly aquatic origin, but terrestrial insects may dominate the surface drift. Thus two methods of sampling must be used, namely, surface nets and modified marine high-speed plankton nets. The latter consist of a net enclosed in a metal cylinder and a flow meter fixed in the hind end of the tube. All sampling took place over 24 h, the nets being changed every 3 h to give a total of 8 samples per 24 h.

After a year's sampling, it became apparent that there was a continuous invertebrate drift downstream and that this was greatest at night, especially just after sunset. The figures for March 1964 may be used to illustrate the daily fluctuations in the numbers of 'drift invertebrates'. Three tubes and one surface net were used at a sampling point, the tubes being referred to as left, middle and right, according to their position athwart the stream.

In March, the collections in all three tubes showed large numbers of invertebrates drifting downstream at night while comparatively few were obtained by day (Fig. 1).