from *T. nigra* are not in the direction of *T. zillii*. The body- and fin-colours[1] are in fact reminiscent of *T. leucosticta*, a mouth-brooding species which is an inhabitant of Lake Albert, the source of the East African stocks of *T. zillii*, and is known[2] to have been distributed with the latter in many East African waters from ponds at Kisumu. The toothed lower pharyngeal bone of the 'hybrid' is figured in Whitehead's full report, and he notes its resemblance to that figured for *T. leucosticta*[3]. The gill-rakers on the lower part of the anterior arch are 8–12 in *T. zillii*, 15–20 in *T. nigra*, 18–22 in the 'hybrids', 19–24 in *T. leucosticta*. The dorsal spines are 14–16 in *T. zillii*, 17–19 in *T. nigra*, 15–18 in the 'hybrids' and in *T. leucosticta*[2].

Whitehead's claim to have effected the cross *T. zillii* × *T. nigra* in a pond rests on the presence there after six weeks of a female carrying eggs in the mouth, and this is not adequate evidence.

We suggest that many of the supposed hybrids were *T. leucosticta*—individuals inadvertently introduced with *T. zillii* or their progeny. It would be less surprising if some hybridization should occur between these and *T. nigra*, and some of the problematical fishes need re-examination with this possibility in mind, as Mr. Whitehead now agrees in correspondence with us.

Since we wrote the above, we have examined one of the 'hybrids' from Tebere ponds and find it indistinguishable from *T. leucosticta*.

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Aquarium Behaviour and Breeding of *Hymenochirus*

Hymenochirus[1] is a genus of West African clawed aquatic toads which are considered to be closely related to *Xenopus*. In fact its members were originally described as belonging to the genus *Xenopus*[2].

Two years ago we were by chance able to obtain 15 young specimens of *Hymenochirus boettgeri* (Torn.) from a German importer of pet fishes, who had offered "afrikanische Kleinfrösche". As it turned out that nothing is known about the biology of this toad and that, so far as we can find, neither the breeding habits nor even the larvæ have hitherto been described, we decided to study the aquarium behaviour of the toads instead of using them for tissue preparations.

Hymenochirus is a true aquatic toad, and in spite of the fact that it moves, with jumps, much more easily on dry land than does *Xenopus* it has never been possible to find a toad on the terrestrial part of the aquarium. There are no external sex differences in the genital region but the females are usually identified through their broad body form. The toads are apparently exclusively carnivorous and feed willingly on *Tubifex* worms, *Daphnia* and various kinds of gnat larvæ, but also on different kinds of 'dead' food such as raw fish meat. The prey is obviously discovered and caught mainly with the aid of sight.

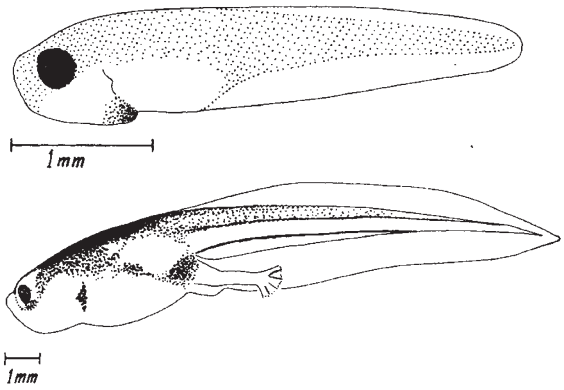

Fig. 1. Tadpoles of *Hymenochirus boettgeri*. The upper specimen is newly hatched, the lower one is 14 days old

A vibration sound, which recalls that of *Xenopus*, is produced by the *Hymenochirus* males. In this case, however, short croaking periods alternate with silent periods. Each croaking interval terminates with a sudden rise in the pitch of the voice.

The males are often seen clasping females as well as other males in the typical *Xenopus* manner. Two attempts were made to induce spermiation and ovulation with luteinizing gonadotrophin, but without success. However, a sunny position of the aquarium has recently been sufficient to induce the spawning act, which has taken place during the night hours in a slightly alkaline water at 23–24° C.

Copulation is performed in a very peculiar manner. It occurs at the surface, usually in connexion with an inhalation of air, and starts with the female turning upside down with the male still clinging to her back. Her genital tract is now kept slightly protruding above the surface of the water and 2–10 eggs are deposited. After this process the couple return to the bottom. The surfacing is repeated about every second minute until the ovaries are apparently exhausted after about fifty times.

The eggs float on the surface but they do not stick together. They are about 0·9 mm. in diameter, with jelly about 1·5 mm. The larvæ hatch after 2 days at a length of 3·2–3·5 mm. and are already pronouncedly pigmented at this stage. On the fourth day they start feeding on small aquatic animals, and much to our astonishment they took exclusively to a carnivorous diet during the whole larval period. Consequently the tadpoles of *Hymenochirus* are quite unlike those of *Xenopus* in this respect; they are unlike them in several other respects also. The filtering apparatus and the tentacles are omitted, they do not rest in the water in the typical oblique position, and the whole appearance is very fish-like.

It is clear that a study of the larval and adult biology of *Hymenochirus boettgeri* discloses a number of interesting differences between this species and *Xenopus laevis*. The adaptational and taxonomical significances of these diversities between the two genera of African pipide toads are under consideration.

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