

Interspecific Hybrids of *Tilapia* : *T. nigra* × *T. zillii*

THE increasing recognition of fish (and in the tropics of *Tilapia* in particular) as farm animals has stimulated interest in the breeding of new and useful strains. In Malacca, Hickling¹ hybridized two geographical stocks of *Tilapia mossambica* Peters to produce both a faster growing strain as well as a skewed sex ratio in favour of males, the latter greatly simplifying the monosex culture technique of Brown and van Someren². Hybrids have now been reported between *T. nilotica* (Linné) and *T. galilaea* (Artédi)³, but their value for fish culture has not yet been assessed. Field observations led Lowe to suspect hybridization of the former with *T. nigra* (Günther) and *T. esculenta* Graham in Uganda⁴.

The species involved in these crosses are female mouth-brooders. Although all show a basic similarity in breeding pattern, quite distinct from that of male mouth-brooders or substratum-spawners (as defined by Lowe⁵), interspecific differences, especially in courtship and male breeding coloration, have been considered important barriers to natural hybridization. It is therefore of great interest to record hybrids between the mouth-brooder *T. nigra* and the substratum-spawner *T. zillii* Gervais. It is difficult to imagine two more dissimilar species of *Tilapia*. They show striking differences, not only in breeding patterns but also in anatomy, behaviour and feeding habits.

Hybrids were found in a flooded rice paddy on the Tebere rice irrigation scheme in Kenya which had been stocked with *T. nigra*, but into which two male *T. zillii* had gained entry. Similar hybrids were also found in Lake Naivasha, Kenya, which had been stocked with both species. The hybrids were recognized in the field principally by coloration: dark body-shape the hybrids conformed to *T. nigra*; and the iridescent blue sheen of *T. zillii*; light, pearly green spots on the body and on dorsal, anal and caudal fins; no trace of the crimson flush on the chest found in breeding *T. zillii*, and no dorsal 'Tilapia-mark'; and six or seven dark vertical bars on the body (absent in large *T. nigra*). In general body-shape the hybrids conformed to *T. nigra*; however, in all but one case the mouths were noticeably smaller. The Tebere hybrids also exhibited a 'gasping' behaviour (protrusion of the mouth) and tended to erect dorsal and anal fins when handled, a behaviour found in *T. zillii* but rare in *T. nigra*.

In most anatomical characters the hybrids resembled *T. nigra*, but (except in one case) larger specimens lacked the enlarged snout (elongation of the horizontal ramus of the premaxilla) associated with that species. Premaxilla, maxilla, dentary and articular were slightly shorter than in *T. nigra*, but less robust than those of *T. zillii*. Otherwise neurocranial, branchiocranial and pectoral elements, very different in the two species, were in the hybrids within the range of proportions found in *T. nigra*. Jaw and pharyngeal dentition resembled that of *T. nigra*, although simplification of the outer jaw teeth appeared to have been retarded slightly. Some hybrids had the three anal spines of *T. zillii*, while others had four anal spines (found in 10–20 per cent of natural populations of *T. nigra*). Five anal spines, the normal in *T. nigra*, occurred in 11 per cent of the Tebere hybrids.

Since female hybrids were not recognized in the field, but afterwards when post-mortem colour

changes had eradicated the hybrid coloration, and since the few females found had either four or five anal spines, it is possible that female *T. nigra* were included in the samples. In most cases testes were well developed, and breeding occurred in ponds stocked with three- and four-spined males and five-spined females. No three-spined progeny were produced and the fry resembled *T. nigra* in all respects, including coloration. The cross male *T. zillii* × female *T. nigra* has been repeated at the Inland Fishery Research Station at Sagana in Kenya, and a brooding female was found after six weeks. The results of the reverse cross are not known.

Although the hybrids appear to be fertile, a skewed sex ratio may occur. Alternatively, spine-counts may facilitate the determination of the sex of small fishes. The production of a sterile or predominantly male weed-eating hybrid seems at present unlikely, only four hybrids having apparently fed on higher plants as does *T. zillii*.

These results will be reported more fully elsewhere.

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¹ Hickling, C. F., *Nature*, **183**, 28 (1959).

² Brown, J. M., and van Someren, V. D., *Nature*, **172**, 330 (1953).

³ Yashou, A., and Chervinsky, J., *Nature*, **164**, 1739 (1959).

⁴ Lowe, R. H., *Rev. Zool. Bot. Afr.*, **57** (Fasc. 1–2), 129 (1958).

⁵ Lowe, R. H., *Proc. Zool. Soc. Lond.*, **132**, Pt. 1, 1 (1959).

Occurrence of *Pyrosoma* on the Continental Slope

Hurley and McKnight¹ have reported that the pelagic tunicate *Pyrosoma atlanticum atlanticum* rests on or swims just above the sea-floor at a depth of 160–170 metres. Indirect observations made on this species in the course of a line-fishing survey of the fishes of the south-eastern Australian continental slope² corroborate the concentration of this species near the sea-floor and extend the habitat to the floor of the continental slope.

While fishing off the east coast of Tasmania during June 1954–July 1955, 1,141 specimens of *Hyperoglyphe porosa* (Richardson) (deep-sea trevally)—previously considered to be quite rare—were taken by dropline in depths ranging from 330 to 640 m. These fish were found to feed almost exclusively upon *Pyrosoma*, their stomachs often being crammed full with the tests of this organism. Of 363 stomachs containing food 86 per cent contained the tests of large colonies of *Pyrosoma*. Fish having *Pyrosoma* in their stomachs were taken on hooks set 2–48 m. from the floor of the continental slope. Since fish were never taken until the fishing gear was touching bottom it is assumed that *Pyrosoma* were available at these depths. This would seem to be confirmed by the observations of Hurley and McKnight¹. With one exception, all fishing operations were carried out during the hours of daylight, the incidence of *Pyrosoma* in the stomachs showing no significant variation throughout the day. Only 5 fish were taken at night and these had empty stomachs.

Thompson³ recorded occurrences of *Pyrosoma* from Tasmanian waters at all seasons of the year and at all depths examined (0–500 m.) and was unable to discern any particular season of maximum occurrence.