NOTES OF SPAWNING BEHAVIOUR OF BARBEL *CLARIAS GARIEPINUS* BURCHELL IN RHODESIA

E. A. HOLL

Fisheries Research Centre, Henderson Research Station, Mazoe, Rhodesia

INTRODUCTION

Although the barbel *Clarias gariepinus* is widely distributed in Southern Africa, little is known about its breeding. During the period December 1964 to February 1966, spawning of barbel was observed in the Savory dam at the Fisheries Research Centre, Mazoe, Rhodesia. The surface of this dam varies in size from 20 acres when full to 12 acres at the end of the dry season. It is fed by storm water via a small temporary stream that rises in a large vlei just above the dam. As the water level of the dam rises after the first rains a flat area at the mouth of the stream becomes inundated to a shallow depth, submerging two grasses (*Echinochloa* spp. and *Panicum* sp.) some small sedges and *Polygonum* sp. This forms an ideal spawning site for barbel.

ONSET OF SPAWNING

In 1964 the stream was reduced to a dry bed before the rains. It came down in spate for the first time due to heavy rain during the night of 8th December, overflowing its banks and inundating the low-lying, surrounding area. The next day, large numbers of *Clarias* were observed migrating upstream. The fish were first seen at 0830 hours and the run continued until 1100 hours, when all activity had ceased. All fish were large, with no fish below 38 cm. total length. A number were caught and examined and all were found to be ready to spawn or spent. At least four pairs of fish were observed spawning in the newly flooded area adjacent to the stream. Although careful watch was kept, no further runs were observed during the rest of the rainy season, although there were a number of further spates.

The 1965-1966 rainy season was characterised by very late rains, with the main rains falling in February, instead of December to January, as is normal. No spawning migrations were observed until the morning of 10th February, when the small stream had begun to run for the first time, and the dam level had been raised overnight, inundating a small area of vegetation around the stream mouth.

Altogether, three spawning runs were observed during February; on 10th, 14th and 23rd. Each one occurred after heavy rains during the preceding night, followed by a rise in the level of the dam. The number of fish in each run were small in comparison with the run of 1964 and no fish were observed in the stream. All spawning activity occurred in the embayment around the mouth of the stream, in newly submerged areas. At no time was the water flow in the stream high, as in 1965, and it is possible that the fish did not migrate into the vlei area for this reason.

The short duration of the spawning run and the occurrence of only one run in 1964, together with the more prolonged and late spawning in 1966, is of considerable interest. These features would indicate that a sudden inflow of a considerable amount of fresh water is

associated with factors that trigger spawning migrations, with fish swimming towards the source of the fresh water. Chemical and temperature differences between dam and stream water may be concerned in the triggering of migration as well, but it was not possible to study these aspects at the time. Migration upstream, pairing and commencement of breeding, probably start as soon as the effect of fresh water is noticeable. Greenwood (1965) gives a time of within 18 hours of flooding for the appearance of fish in breeding areas in Lake Victoria. From observations at Savory dam this time is much shorter.

Where *Clarias mossambicus* may only appear during the late afternoon and evening in Lake Victoria, *C. gariepinus*, as far as has been determined, appear only at night or in the very early morning, with no migrations having been observed in the afternoon. Some spawning may be completed before morning, as with *C. mossambicus*, but many fish remain in the breeding area until about 1030 hours, after which activity wanes rapidly, ceasing by about 1100 hours.

According to Jubb (1961), it is not possible to separate *C. mossambicus* and *C. gariepinus* taxonomically, so that the difference in time of arrival at the spawning grounds is possibly due to the difference in size of the waters studied.

SPAWNING BEHAVIOUR

It was not possible to observe spawning behaviour in 1964, due to the turbidity of the water, but with gentler flow in 1966 turbidity was low on the spawning grounds and it was possible to observe spawning behaviour of a number of pairs of *Clarias*.

The fish bred in water varying from two to twenty-four inches in depth. Pairing had already taken place and spawning was in progress by the time that the observations were made. One pair swam very close together, twisting and turning in unison among the weeds, with one or other at times slightly ahead. They traced out an erratic course among the weeds, moving out from the shore and then back. Once back near the shore, the male sped up slightly, splashing the water with his tail, and got ahead of the female, who stopped swimming. He then curved his body round the front of her head and the pair remained in this position for fifteen to twenty seconds; the female stretched out and the male with his head on one side of her body and his tail on the other. The body muscles of the male then became tense and he began to slip over the head and body of the female. She then humped forward, pushing the male over her back and off her side. The pair then moved off, splashing, into deeper water, swimming together amongst the weeds. They returned to the shallows again after intervals of twenty to forty seconds, to repeat the pattern. The number of times this pattern is carried out is not known. Some pairs of fish were seen to repeat it more than ten times, others less, before leaving the spawning area.

The actual shedding and fertilising of the eggs occurs during the period that the fish are swimming, with eggs being deposited on the vegetation in the breeding area. No eggs were found on examination of the sites where the fish had remained still. The eggs were distributed over a wide area and they were all found near the base of small sedge plants, in clusters of two to five per plant. None were found on submerged grasses or *Polygonum* plants. The eggs varied from 1½ mm. to 2 mm. in diameter, the same size as those of *Clarias mossambicus*

(Greenwood 1955), and were clear, yellow-brown in colour. A characteristic feature is a large adhesive area whereby the egg is attached to the substrate.

EGG DEVELOPMENT

A number of eggs were taken to the laboratory and kept in running water at a temperature varying between 20C and 24C. Hatching took place forty to forty eight hours later. The newly hatched larvae were about 3.5 mm. to 4.0 mm. in length and swam actively, resting on the substrate at intervals, using a small adhesive area on the ventral surface to anchor themselves. This is possibly a glandular area on the yolk sac which secretes a sticky slime. The yolk sac was completely resorbed in seven days, after which time the young fish were 7.0 mm. to 9.0 mm. in length. Unfortunately, the young fry reared in the laboratory did not survive after they had reached 10.0 mm., and it was not possible to sample young fry from the dam, so no comparison between development in vivo vs. in vitro was possible.

GROWTH OF YOUNG CLARIAS

It was not possible to devote much time to this aspect of *Clarias* reproduction, but a small number of young fish were caught in the breeding area of the Savory dam in both seasons. In 1964-1965 season, four *Clarias* were caught 65 days after the only spawning migration was observed. Their total lengths ranged from 37 mm. to 48 mm. 48 days later a further seven young fish were caught, with total lengths ranging from 60 mm. to 65 mm.

In 1965-1966 season, sixteen young *Clarias* were taken in a minnow seine net 63 days to 70 days after spawning, and their length ranged from 60 mm. to 80 mm. This growth was nearly double that of the previous season.

In both years young barbel have remained in shallow, weedy water up to the above sizes after which they were no longer taken in samples and had possibly moved into deeper water. In the very early stages they fed on zooplankton, changing to an insectivorous diet when they reach about 30 mm. with Chironomid larvae forming a major item in the diet.

Mortality is probably high in the early stages. Mortality of the eggs was high at the time of spawning, as large numbers of dead and unfertilized eggs were found in cracks in the clay bottom of the dam. It is probable that eggs and small fry are preyed upon by other species of fish, although samples of fish taken in the breeding area did not have *Clarias* eggs in their stomachs. Herons and hamerkops may also take young fish.

GENERAL

Sampling of gonads of *C. gariepinus* in the 1,000 acre Mazoe dam near the Research Centre (where this fish forms an important component of the commercial catches) indicates that the spawning period is relatively short (Van der Lingen 1965). Here the first ripening females occurred in October, 1964, and the first fish ready to spawn in December, 1964. No females ready to spawn were taken after January, 1965 while spent fish were taken in this month. Males getting ready to spawn and ready to spawn were only taken in December and January.

This, together with the data from Savory dam, would indicate that *Clarias* get ready to spawn in October to November, but these fish are probably dependant on the stimulus of flood

water or a rising water level for triggering the act of spawning, and that spawning may be delayed until conditions are suitable.

REFERENCES

GREENWOOD, P. H. 1955. Reproduction in the Cat-fish, *Clarias mossambicus* Peters. *Nature* 176: 516-517.

GREENWOOD, P. H. 1956. Breeding of *Clarias mossambicus* Peters, in Lake Victoria. C.S.A. Second Symposium on African Hydrobiology and Inland Fisheries.

JUBB, R. A. 1961. *An Illustrated Guide to the Freshwater Fishes of the Zambesi River, Lake Kariba, Pungwe, Sabie, Lundi and Limpopo Rivers*. Bulawayo, Stuart Manning.

LOWE, ROSEMARY N. 1955. Report on the *Tilapia* and other Fish and Fisheries of Lake Nyasa 1945-47. *Colonial Office Fishery Publications, Lond.* 1 (2): 71.

VAN DER LINGEN, M. I. 1965. Some problems of Breeding Biology of Fish in Impounded Waters. Kariba Research Symposium: Lake Kariba Fisheries Research Institute, Kariba: 97-103.