

LUNGFISH RE-ESTABLISHED IN LAKE MALAWI CATCHMENT AREA

D. TWEDDLE

Fisheries Department,
P. O. Box 27,
Monkey Bay, Malawi

One of the biggest mysteries of the Lake Malawi fish fauna is the disappearance of lungfish (*Protopterus* sp.), fossils of which occur in the Chiwondo sedimentary deposits of northern Malawi (Clark, *et al.*, 1966; 1970). The Chiwondo beds, which have been dated at 2.5 to 5 million years old (Kafulu, *et al.*, 1981; Crossley, 1982), are characteristic of marshy and lagoon environments and are believed to have been deposited in the early stages of the rifting process which led to the formation of Lake Malawi (Crossley, 1980). Lungfish, as air breathers, are well adapted to marshy environments, but can also thrive in open waters, e.g. Lake Victoria, provided cover is available around the periphery for spawning and larval protection.

There are two possible explanations for the disappearance of the genus from proto-Lake Malawi: (1) total desiccation of the completely isolated lake for some years (Lungfish can survive several months of desiccation in cocoons buried in dried up mud.), or (2) suffocation by volcanic ash. There are examples of both pyroclastic flows and volcanic ash layers from the nearby Rungwe volcanics in the northern lake area (Crossley, 1980; 1982; B. Owen, pers. comm.). Volcanic ash from the eruptions in the Katwe area of Uganda 8,000 - 10,000 years ago has been blamed for the extinction of Nile Perch and Nile Crocodiles in Lake Edward (Beadle, 1981).

As the fish fauna of Malawi's river systems was, we believed, very well known (e.g. Tweddle, 1980; Tweddle & Willoughby, 1978), the collection of a specimen of the lungfish, *Protopterus annectens brieni* Poll, from the Mpatsanjoka Dambo, near Salima, in 1986 was unexpected. Enquiries among the fishermen in the area revealed that lungfish were unknown in the Mpatsanjoka Dambo until 1978, and the fishermen blamed a big flood then which diverted the Lilongwe River system into the dambo. The fishermen believed the fish to have come from that system. Lungfish, however, have never been recorded there.

An alternative, more plausible, explanation was sought, based on the fact that fishes from the Lower Shire River were exported by an aquarium fish dealer based in Salima in the early 1970s. The fauna of the Lower Shire, which contains lungfish, is separated from that of Lake Malawi by the Murchison Rapids, which are a barrier to upstream movement of all fish except the eel, *Anquilla nebulosa labiata* Peters (Tweddle *et al.*, 1979).

Enquiries revealed that a vehicle carrying fish from the Lower Shire to Salima (probably in 1973) had become bogged down in a drift near the Mpatsanjoka and had tilted sideways, spilling some of the drums of fish. Lungfish were present in that shipment. The lungfish which escaped then were introduced into a perfect habitat and apparently managed to reproduce, as the 1986 fish was only 42cm long and 323g in weight. The growth rate of lungfish beyond the larval stages (Johnels & Svensson, 1954; Greenwood, 1958, 1986) has not, to my knowledge, been documented, but the 1986 fish could not have been 13 years old. The date of 1978 given by fishermen for the first appearance of the fish in the dambo suggests that those fish were the offspring of the original few individuals which were introduced.

The lungfish are now almost certainly well-established in the ideal environment of the extensive Mpatsanjoka Dambo, and it remains to be seen whether they will expand from there and eventually colonise Lake Malawi itself. In this context it is worth noting that there have been recent unconfirmed reports of lungfish in trawl catches in the South East Arm of the lake.

Any unexpected records from Lake Malawi of fishes not previously recorded from the system but known to occur in the Lower Shire River will now have to be treated with caution. *Ctenopoma ctenotis* (Boulenger) has been reported from the Lake Malawi catchment area in the past (Worthington, 1933) reported a single specimen from the 1925 Christy collection.) but has never been seen since. As recent surveys (e.g. Tweddle & Willoughby, 1978) have been more thorough and more extensive than any previously, and have yielded numerous new records, it is believed that the earlier record is due to a wrong locality label, a common mistake with early collections (see corrections to earlier records by, e.g. Trewavas, 1946; Jackson, et al., 1963; Howes, 1980). It should be noted that the *Ctenopoma* record would not be the only locality error in the Christy collection. Worthington (1933) recorded two specimens of *Barbus eutaenia* Boulenger (correctly identified) from the collection from Deep Bay, now Chilumba. *B. eutaenia* is found in Malawi only in the upland streams of the Ruo River system and does not occur anywhere in the Lake Malawi catchment area. If *Ctenopoma* should turn up in future surveys, particularly in the Mpatsanjoka, it would not be possible to ascertain whether the earlier record was correct or whether the new record also followed accidental introduction, though the aquarium fish exporter states that while he is not sure what else escaped, he is fairly certain that *Ctenopoma* was not present in the shipment.

LITERATURE CITED

- BEADLE, L. C. (1981) *The inland waters of tropical Africa: an introduction to tropical limnology*. Second edition. Longman, New York.
CLARK, J. D., E. A. STEPHENS & S. C. CORYNDON (1966) Pleistocene fossiliferous lake beds of the Malawi (Nyasa) Rift: a preliminary report. *Am. Anthrop.* 68(2): 46-87.

- CLARK, J. D., C. V. HAYNES, J. E. MAWBY & A. GAUTIER (1970) Interim report on palaeo-anthropological investigations in the Lake Malawi Rift. *Actes VI^e Congrès panafric. Préhist. l'Etude Quatern. Dakar 1967. Quaternaria* 13: 305-354.
- CROSSLEY, R. (1980) Malawi Rift Valley research - recent developments and future prospects. *Univ. Malawi Chancellor Coll. Staff Seminar Paper* 9: 10pp. Duplicated.
- CROSSLEY, R. (1982) Late Cenozoic stratigraphy of the Karonga area in the Malawi Rift. *Palaeoecol. Afr. Surrounding Isl.* 15: 139-144.
- GREENWOOD, P. H. (1958) Reproduction in the East African lung-fish *Protopterus aethiopicus* Heckel. *Proc. Zool. Soc. Lond.* 130(4): 547-567.
- GREENWOOD, P. H. (1986) The natural history of African lungfishes. *J. Morphol. Suppl.* 1: 163-179.
- HOWES, G. J. (1980) The anatomy, phylogeny and classification of barilline cyprinid fishes. *Bull. Br. Mus. (nat. Hist.) (Zool.)* 37(3): 129-198.
- JACKSON, P. B. N., T. D. ILES, D. HARDING & G. FRYER (1963) Report on the survey of northern Lake Nyasa 1954-1955. Government Printer, Zomba, Malawi.
- JOHNELS, A. G. & G. S. O. SVENSSON (1954) On the biology of *Protopterus annectens* (Owen). *Ark. Zool.* 7: 131-164.
- KAUFULU, Z., E. S. VRBA & T. D. WHITE (1981) Age of the Chiwondo Beds, northern Malawi. *Ann. Transv. Mus.* 33:1-8.
- TREWAVAS, E. (1946) The types of African cichlids described by Borodin in 1931 and 1936, and of two species described by Boulenger in 1901. *Proc. Zool. Soc. Lond.* 116(2): 240-246.
- TWEDDLE, D. (1980) The river fishes of Malawi, with a discussion on the relationships between the various river systems. Paper presented at Limnological Society of southern Africa Annual Congress, Grahamstown, July 1980. (Abstract).
- TWEDDLE, D., D. S. C. LEWIS & N. G. WILLOUGHBY (1979) The nature of the barrier separating the Lake Malawi and Zambezi fish faunas. *Ichthyol. Bull. Rhodes Univ.* 39: 1-9.
- TWEDDLE, D. & N. G. WILLOUGHBY (1978) *Electrofishing survey of the affluent streams of Lake Malawi in the Viphya-Chintheche area*. Rome, FAO, FI:MLW/75/01 /1: 32pp.
- WORTHINGTON, E. B. (1933) The fishes of Lake Nyasa (other than Cichlidae). *Proc. Zool. Soc. Lond.* 1933(2): 285-316.