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Repaired damage to a shell of *Mutela alata* (Lea) (Bivalvia, Unionoida) from Lake Malawi

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A 68 mm long left valve of *Mutela alata* (Lea, 1864) from near Monkey Bay in the southern part of Lake Malawi shows well repaired trauma more or less in the centre. It is obvious that the animal has lived and prospered for some time after the event. Speculations on what may have caused this type of damage (predation by Openbill Stork *Anastomus lamelligerus*?) are presented.

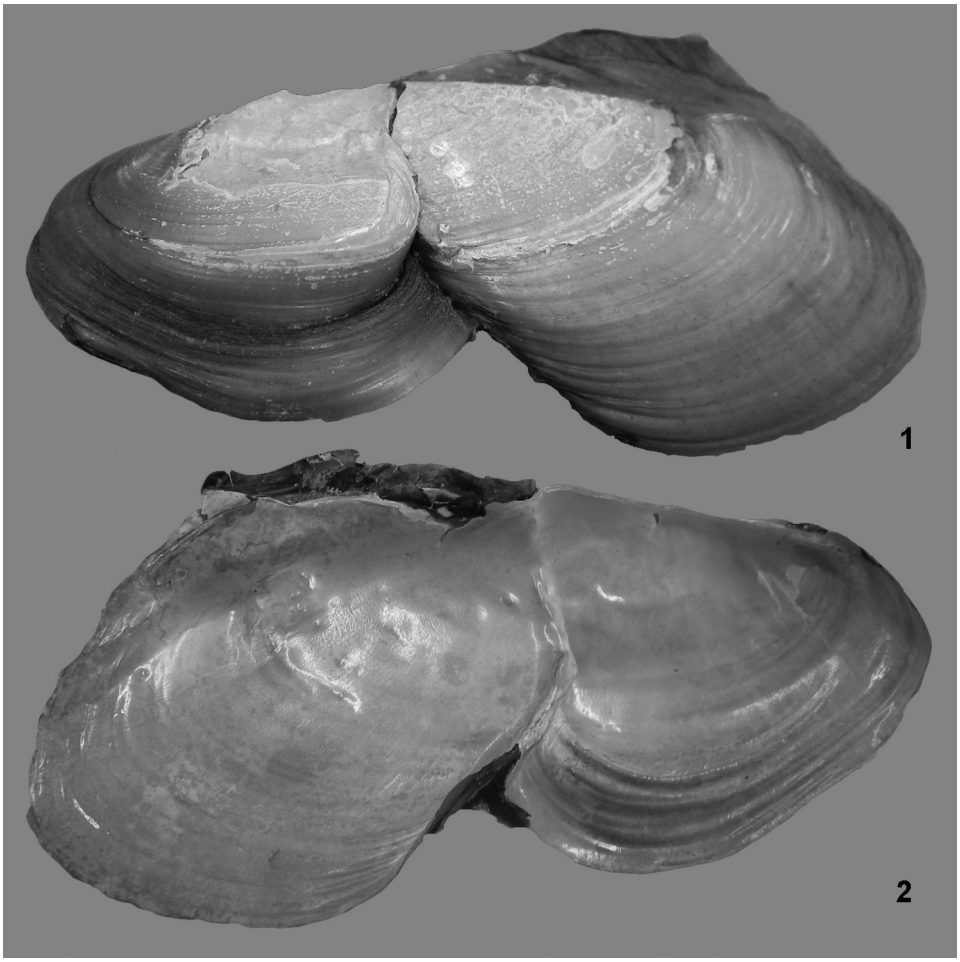
Key words: Bivalvia, Mutelidae, *Mutela*, repaired damage, Openbill Stork, *Anastomus lamelligerus*, Lake Malawi, Malawi .

Recently Mr H.P.M.G. Menkhorst (Krimpen aan de IJssel) donated the malacological fruits of his two trips to Malawi (1983, 1985) to the National Museum of Natural History, Leiden (abbreviated RMNH). This valuable material is complementary to the already copious holdings of mollusc material of this south central African country in the Leiden Museum. From time to time these specimens will be reported upon.

Among the freshwater bivalve material there is a beautifully repaired damaged left valve of *Mutela alata* (Lea, 1864) from the southern parts of Lake Malawi; unfortunately the companion right valve is not available. For details of the freshwater bivalves of Lake Malawi we refer to Mandahl-Barth (1972, 1988) and Scholz (2003). *M. alata* is "endemic to Lake Malawi, Lake Malombe and the Shire River." (Scholz, loc. cit.: 32). The thin and fragile, but fresh, valve was collected by Mr Menkhorst in shore vegetation near the "Old Cottage", Monkey Bay (Mangochi Dist.), in August 1985 (figs 1-2). Its greatest length is 68 mm. The trauma is situated more or less in the middle of the shell suggesting a predator's bite perpendicular to the axis. The survival of this particular bivalve after extensive repairs testifies to the surprising ability of the molluscs to overcome trauma to the shell.

It is tempting to speculate on the origin of the damage. Obviously the individual in question had time to repair its shell and to continue its life for some time afterwards. There are two main categories of causes of trauma, i.e. mechanical and biological damage. The specimen may have had some accident, e.g. having been crushed between falling rocks or stones. This is unlikely because any falling rock or stone may have had more impact, perhaps to such a degree that repair of the smashed shell would be almost impossible. Also, these najads live in and on sandy substrates. As the photos (figs 1-2) show, the break on the outside is fairly clean and rather points towards a predator having dropped the mussel from its mouth.

There are few data on the predators of unionoid bivalves in Lake Malawi. Fryer's classical paper on fish ecology s.l. in this lake (1959) does mention bivalve molluscs (e.g. the much smaller *Corbicula*) but unionoid taxa are not discussed. Modern literature on Lake Malawi fishes (e.g. Konings, 2007) contains no details of najad-eating cichlids, although



Figs **1-2**. Damaged and repaired left valve of *Mutela alata* (Lea) from the shores of Monkey Bay in the southern parts of Lake Malaŵi (RMNH), maximum length 68 mm. Photos Dr A.J. de Winter.

the gastropod diet of local haplochromid fish species is well documented[1]. Scholz (2003: 31) discounts crabs (*Potamonautes* spp.) and otters (*Aonyx capensis* and *Lutra maculicollis*) as predators of bivalves. Apart from fishes, there are possible predators among the birds (e.g. Openbill Storks, *Anastomus lamelligerus*).

[1]Corbet (1961: 16) mentions *Mutela* among the food of the lungfish *Protopterus aethiopicus* in Lake Victoria. Lungfishes originally did not occur in Lake Malaŵi, but another taxon, *P. annectens brieni*, now does occur here, even in the neighbourhood of Monkey Bay (Snoeks, 2004: 20; see also Tweddle, 1989). However, the najad specimen in question was collected in 1985 and the lungfish is recorded in the lake for the first time in the late eighties of last century, although it may have been present well before that time. Therefore for the time being, a lungfish as predator of the present shell is ruled out.

Although a fairly large number of non-Passeres occasionally prey on adult freshwater mussels (see Hockey, Dean & Ryan, 2005) in only a few cases these make up a substantial part of the feeding range of the birds in question. On the other hand, Openbill Storks are specialist and obligatory molluscivores (Brown, Urban & Newman, 1982; Hockey, Dean & Ryan, 2005), foraging on both gastropods and bivalves. These birds are common in Malaŵi (Dowsett-Lemaire & Dowsett, 2006). Hancock, Kushlan & Kahl (1992: 65-66) and Hockey, Dean & Ryan (2005: 619) mention the genus *Mutela* among its food.

Obviously the bivalve in question lived to repair the damage until it died later on. According to Scholz (2003: 73, text fig. 8.36) it has probably just reached adult size (68 mm) which is in the range of 65-75 mm. The normal shell gape of 0.5-5 mm may have been widened without unduly bothering the animal. It may again have been picked up by an Openbill Stork and left to open in the sun as these birds are wont to do; indeed, all freshwater shells from this locality found in the shore vegetation (*Bellamya*, *Lanistes*, *Corbicula*, *Coelatura*, *Mutela* spp.) may be Openbill Stork prey remains. These specialists normally do not destroy the shell of their prey.

There is a considerable body of ornithological literature on the food and feeding habits of the Openbill Stork in Africa. In checking through this, it was found that Root (1963) published some interesting observations implying that the shell of bivalve prey is not destroyed. This is corroborated by Kahl (1971) who even figures (his fig. 7) a bivalve shell that has been opened with minimal damage along the posteroventral margins. Incidentally, the shell under discussion here does not show any marginal damage at all so that the body must have been extracted cleanly, possibly after it died outside the water. Generally there seems to be controversy in the ornithological literature as to the function of the specialized bill of this stork species; proof that the gap in the bill plays a role in destroying snail shells is, to say the least, meagre (Kahl, 1971: 33).

A preliminary conclusion here is that it is not unlikely that the figured specimen has survived at least one Openbill Stork attack but somehow perished after sufficient time for repairs, maybe even as a sequel to a second attack by a representative of the same species of bird.

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