

A NOTE ON EMERGENCE AND OVIPOSITION OF *PARAGOMPHUS NYASICUS* KIMMINS AT LAKE MALAWI, MALAWI (ANISOPTERA: GOMPHIDAE)

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Abstract – In the night of 22 to 23 Sept. 2001, emergence of the sp. was observed at Chembe village, Lake Malawi. About one individual per 1 metre beach emerged on a strip of 50 m length, all exuviae were very close to the waterline. Most individuals emerged after midnight, 6 to 9 h after sunset which is later than previously reported for tropical gomphids. This emergence delay may either be typical for *P. nyasicus* or be caused by human activity at the beach which lasted until well after dusk. The sex ratio was equal. ♀♀ oviposited by abdomen dipping onto the sand that has just been touched by the tiny lake waves. The dipping frequency appeared to be correlated to the frequency by which these little wavelets would roll onto the sand. ♂♂ patrolled or perched on the sand very close to the waterline but did not appear to show territorial activity.

Introduction and locality

Paragomphus nyasicus Kimmins, 1955 is known from several localities around the southern

shore of Lake Malawi (PINHEY, 1966; 1979). During a brief stay in the village of Chembe on the Cape Maclear Peninsula, southern shore of Lake Malawi, between 19 and 24 September 2001, I briefly observed oviposition and emergence of *P. nyasicus*.

The lake shore around Chembe was sandy and the beach approximately 5 to 15 m wide (Fig. 1). Except for the time around noon it was intensively used by local people for bathing, washing clothes, canoeing and fishing. Tourists used it for canoeing, swimming and sunbathing. At this particular beach local people and tourists continued swimming and walking at the beach until late at night. Despite of all these activities taking place directly at the waterline (the emergence site) dozens to hundreds of gomphid exuviae were seen. Four freshly emerged females collected from the exuviae were kindly identified by K.-D. Dijkstra as *P. nyasicus*. Because all collected exuviae except *Ictingomphus* sp. were morphologically very similar to those four I tentatively assigned all



Fig. 1. The waterline of the sandy beach at Chembe village, southern Lake Malawi, Malawi. This is the habitat of *Paragomphus nyasicus* used for emergence, patrol and oviposition.

exuviae collected as belonging to *P. nyasicus*. A few males collected at the lake shore all belonged to *P. nyasicus*, too.

Observations and discussion

Emergence

On 22 Sept. 2001 I cleared a stretch of beach, 50 metres in length, from all exuviae about two hours before sunset. This resulted in 22 male and 23 female exuviae. I surveyed the stretch of beach at three times of the night using a torch light. I collected a total of 52 exuviae, i.e. about 1 per m shore line. All exuviae were found within 30 cm of the waterline. The numbers of exuviae (δ , ♀) were distributed as follows: 0:00 h (3, 6), 3:00 (17, 15) and, just after sunrise, at 6:00 (4, 6, 1unsexed). Thus, at this night most larvae (60%) had emerged between 0:00 and 3:00 local time, that is 6 to 9 hours after sunset. Unfortunately, I did not count the number of adults sitting on the exuviae at each survey but more than half of the exuviae at the 3:00 count were empty indicating the adults had not waited until dawn for departing.

In the tropics it seems to be the rule that gomphids emerge at night, i.e. 1-2, sometimes up to 4 hours after sunset (CORBET, 1983; MILLER, 1964). The adults of *Crenigomphus renei* emerged after sunset but flew away at dawn (CORBET, 1983).

The late emergence and maiden flight before dawn may represent an occasional event that I happened to witness. Alternatively, it may represent a deviation in *P. nyasicus* from the usual emergence pattern in tropical gomphids (cf. CORBET, 1983; MILLER, 1964). Finally, gomphid larvae are known to postpone emergence when conditions are unfavourable (SUHLING & MÜLLER, 1996). It is possible that *P. nyasicus* postponed emergence because of the human activity at the waterline which extended to several hours beyond dusk and sometimes included the use of light or fire. It remains to be studied whether undisturbed stretches of beach produce a similar emergence pattern to the one observed here.

My total collection comprised 46 male (48%) and 50 female exuviae from around Chembe village which agrees with other gomphids and non-seasonal dragonflies (CORBET

& HOESS, 1998). At the defined stretch of beach and beyond I only found undamaged exuviae. By contrast, three out of the four *Ictinogomphus* larvae were found alive but without head, without head and thorax or with the gut extruding from the body, perhaps all indicating recent predation attempts. However, *Ictinogomphus* larvae are approximately three times larger, mainly wider, than *P. nyasicus*.

Oviposition

During the day, adult females were swiftly flying along the beach in a height of about 10 to 15 cm. They appeared very suddenly, hovered and carried out dipping movements, presumably for oviposition. During more than ten of such presumed oviposition bouts the female dipped her abdomen onto the sand exactly into the point where the tiny lake waves were rolling back. It could not be established whether the eggs were washed back with the tiny wave or whether they remained on the wet sand, nor whether the females actually touched the water or the wet sand. A formal classification into CORBET's (1999) scheme is, therefore, not possible. The dipping frequency in three females observed between 10:00 and 11:00 local time was very low. It was, from my visual impression, related to the frequency with which these little wavelets would occur: (i) seven beats separated by 5 to 8 s each, (ii) five beats every 5 to 10 s, (iii) four beats every 5 to 15 s. After these regular dips all three females were seen to carry out a further two dips separated by 1 or 2 s only which took place about 0.5 to 1 m away from the surf while the females were flying away towards the open lake.

Patrolling

Males of this species were seen patrolling or sitting on the sandy ground directly at the verge of the water which PINHEY (1961) regards as typical for the genus. No territorial activity was observed but males flying by often elicited chases by other males reminding the situation in *O. f. forcipatus* (KAISER, 1974) and *O. f. unguiculatus* (MILLER & MILLER 1985). The only other species observed using the same microhabitat was *Phyllomacromia picta* but males of this species flew higher, about 30 to 50 cm above the surf.

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