A NOTE ON THE BEHAVIOUR OF LARVAL *CORDULEGASTER BOLTONI* (DON.) IN CAPTIVITY (ANISOPTERA: CORDULEGASTERIDAE)

Larvae of *C. boltoni* inhabit well-oxygenated current water. They are usually regarded as mud-dwellers par excellence (P. ROBERT, 1958, *Die Libellen (Odonaten)*, Kümmerley & Frey, Bern), burrowing in layers of humus overlying sand (P.S. CORBET, 1962, *A biology of dragonflies*, Whiterby, London). This species is quite commonly found in shaded rivulets in the hilly area between Wassenberg and Roermond on both sides of the Dutch-German border, immediately east

of the river Maas. The larvae lie buried in the fine white sand, covering the bottom of these mostly swift streams.

In order to study the emergence, I transferred in June, 1977 one ultimate instar and three younger larvae into a large tank, the bottom of which was covered with a thick layer of sand, taken from the original habitat. When put into the water, the mature larva did not sink down, but drifted motionless at the water surface. I embedded the larva into the sand outside the water, so that only head and thorax remained uncovered. In this position it remained motionless for five days. One day, touched by direct sunlight, it very slowly, with almost unperceivable movements, retracted a little deeper into the sand. Though a certain inertness may be regarded as characteristic of burrowing larvae (like those of *Cordulegaster* and gomphids), the inactivity of this specimen, which did not move at all since its capture, was almost certainly due to metamorphosis and near ecdysis. It has been reported (J.G. NEEDHAM & C. BETTEN, 1901, *Bull. N.Y. St. Mus.* 47: 383-612) that a *Cordulegaster* larva remained buried in the same position for weeks.

Unfortunately I did not observe emergence, which took place during the night after the fifth day (cf. B. KIAUTA, 1964, *Loski Razgl.* 11: 183-192). In the morning I found a female clinging to the stripe of putty between two panes of the tank, with the tip of its ovipositor touching the sand. Wings were fully stretched out, but still folded. The exuvia was firmly attached to the underside of the cover of the tank, to where the larva had climbed along the strips of putty, over a distance of more than 40 cm. The imago must have emerged while the larva was hanging upside-down and, after emergence, have crawled down backwards along the stripe of putty. It did not open its wings before the next day. On the second day after emergence it flew off after a long period of wing vibrations. Under natural conditions the *C. boltoni* larvae are known to walk for many metres far from water prior to transformation (P.S. CORBET, C. LONGFIELD & N.W. MOORE, 1960, *Dragonflies*, Collins, London).

When put into the water, the three younger larvae exhibited a more characteristic behaviour as has been described by A. HEYMER (1973, *Rev. Comp. Anim.* 7: 103-112) and R. PRODON (1976, *Le substrat, facteur écologique et éthologique de la vie aquatique: observations et expériences sur les larves de Microptera testacea et Cordulegaster annulatus*. Thèse Univ. Claude Bernard, Lyon). After resting motionless on the sand for about 10 min, they began to dig, bending their middle- and hind legs inwards and beneath the body and then pushing them upwards. First the abdomen was covered with sand, then the thorax and finally the head. After about 30 min the larvae had completely sunk into the sand, and they remained hidden until the next morning, when they had adopted the normal attitude, with eyes and tip of abdomen protruding from the sand.

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