



Dive! Dive! Dive!

Oviposition behaviour of *Euphaea impar*

Story and photographs by C.Y. Choong

Last issue, we brought you striking portraits of some odonates. This issue C.Y. Choong tells us more about a damselfly behaviour – flight-diving.

IF butterflies attract much attention from naturalists for their vibrant hues, dragonflies and damselflies also have similar characteristics to offer, with their striking wing and body colours. Nevertheless,

dragonflies receive less attention than butterflies as they have less economic significance. Yet, they are good indicators for aquatic ecosystems, and their larvae (nymphs) have proven to be good bio-control agents of insect pests.

Odonates

Odonates, loosely known as dragonflies, are insects in the order Odonata, which has three suborders: Anisoptera (dragonflies), Zygoptera (damselflies) and Anisozygoptera. The first two suborders are widespread but Anisozygoptera is only represented by a single species in Japan with another

in the Himalayas. There are more than 5,000 recognised odonate species worldwide, and in Malaysia alone no less than 300 species have been recorded (Orr 2003).

Dragonflies and damselflies are collectively referred to as dragonflies. Sometimes, the term 'odonates' is preferred to avoid confusion. Odonates are conspicuous insects with two large compound eyes, two pairs of delicate and membranous wings, and a long slender abdomen. Their life history occurs in two different stages: aquatic and aerial. The larval stage is spent in an aquatic environment, but the



adulthood is terrestrial. Both the larvae and adults are good hunters. Prey may be stalked or ambushed.

Euphaea impar

One of the most striking damselflies found in Malaysian forests is *Euphaea impar* Selys (family Euphaeidae). This damselfly is a widely distributed tropical species found in Thailand, Indonesia, Peninsular Malaysia and Borneo. The male *E. impar* is conspicuous by its bright blue side thorax, the dark markings at the upper side of its synthorax, and the broad bluish-black patch at the tips of the hindwings. The hindwings measure up to 23mm and the body length is 34mm.

The female is less vibrant in colour. The bright blue markings in the male's thorax are replaced by dull olive green in the female. The female also does not have the bluish-black patch at the tips of the hindwings. Usually, the males can be encountered while wandering along shaded forest streams, as the insects spend considerable time

perched among vegetation along the banks.

Oviposition behaviour

Egg-laying in odonates is either endophytic or exophytic. All Zygoptera and some Anisoptera are endophytic as they have well-developed ovipositors that help to insert their eggs into plant tissues above or below the water surface. On the other hand, exophytic odonates (most Anisoptera) lack functional ovipositors and, therefore, deposit their eggs directly onto the surface of water.

In the case of endophytic oviposition, two main approaches have been observed. The first is when the female plunges its abdomen tip into the water. This approach seems to be more common.

The second approach is underwater oviposition, where the female descends beneath the water by backing down a reed stem or a solid object that is sticking out of the water. This fully immersive egg-laying behaviour is

LEFT TO RIGHT: Female *E. impar* perched on a twig after her first attempt at diving into running water failed;

Laying her eggs underwater.

strictly restricted to Zygoptera, and only occurs in a number of damselfly families.

Anisoptera do not close their wings and so would find it difficult to break the water surface. Fully immersive oviposition has thus not been recorded in Anisoptera. Beneath the water, females may descend to a depth of 50cm or more, and may remain submerged from 15-30 minutes. The underwater oviposition may be achieved in tandem or alone.

Personal observation

One sunny morning in December 2004, I was out searching for odonates at the forest fringe of the Universiti Kebangsaan Malaysia Bangi campus. My eyes were glued on an unaccompanied female *E. impar* that was perched



CLOCKWISE FROM TOP LEFT: A male *E. impar* conspicuously perched on a twig;

The bright blue thorax and broad bluish-black patch at the tip of the hindwings distinguishes the male *E. impar*;

The female has positioned herself against the water current during underwater oviposition;

A dull olive-green female *E. impar*; the female lacks the bluish-black patch at the ends of the hingwings.

near a shaded forest stream. Her dull olive green body made her less prominent, but her presence was exciting as this was only the second time I had spotted a female *E. impar* at the same location after visiting the area fifteen times.

The female lifted herself, and hovered over the stream at a height of 15-20cm. Suddenly, she dived at high speed into the stream against the current at an angle of 45-70 degrees. She failed to break the water surface, however, as the running water was too fast. She then retreated to her original perch, where I had my camera out to snap some good shots. My presence and the flash from the camera did not seem to frighten her, but after five minutes, she tried diving again into the same spot. This time she successfully penetrated the water. I was stunned.

In the water, she clung to the slime-covered rocks and plant roots at the bottom of the stream, which was 5-10cm deep. Slowly, she crawled forwards and backwards, ovipositing eggs. All the time her head was against

the water current so that her body and wings were anti-parallel to the water flow. After she had finished depositing her eggs, she suddenly released her legs, allowing the current to push her out of the water. She then vanished into the forest. The entire underwater process took 30 minutes.

Corbet (1983) described submerged oviposition as a slow backing down into the water. Therefore, my observation of flight-dive oviposition has not yet been recorded in odonates (John Truemen, pers. comm.). Most members of the family Euphaeidae breed in running water (Silsby 2001), so it is not surprising to note that *E. impar* chooses to oviposit in fast-running forest streams. The flight-dive oviposition behaviour with the absence of any male might explain Silsby's (2001) comment that copulation and oviposition has rarely been witnessed in Euphaeidae. Nevertheless, flight-dive behaviour has been recorded in Anisoptera (mainly family Gomphidae) where the insects plunged beneath the water and quickly flew out (Corbet

1983). It is, however, doubtful that the behaviour in Anisoptera is associated with egg-laying ■

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