SHORT COMMUNICATION

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A TROPICAL DERBIDAE (FULGOROIDEA, HOMOPTERA) THAT MIMICS A PREDATOR (SALTICIDAE, ARANEAE)

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aFor ten years we have been investigating arboreal arthropod communities in tropical lowland rain forests, mainly by using an improved fogging technique that allows us to sample arthropod communities in a tree specific way (Floren & Linsenmair 1997). This work has been carried out in the Kinabalu National Park, substation Poring Hot Spring, and surrounding areas in Sabah, Malaysia. While fogging some fruit trees in a private garden we found 20 adult individuals (males and females) of an as yet unidentified Derbidae species (Fulgoroidea, Homoptera) on two langsat trees (*Langsium domesticum*, Meliaceae) which showed the image of a Salticidae on both of the wings (Fig. 1). This imitation is so realistic that the insect was erroneously sorted out as a spider in the first instance. The homopteran measured six to seven millimeters in length. Nine jumping spiders (genus *Palpelius*), resembling the imitate in size and pattern, were collected from the langsat trees and, in addition, from one durian tree (*Durio zibethinus*, Bombacaceae) and two rambutan trees (*Nephelium lappaceum*, Sapindaceae).

As shown in Fig. 1, the image of the salticid on the transparent homopteran wing is not symmetrical. On both wings the image of the spider is shown in frontally. The tip of each wing bears the front legs one and two of the spider, bent in natural posture. In the black eye region the characteristic principal eyes can be recognized, followed by two indicated lateral eyes. A pale white spot under the eyes represents the basal parts of the chelicerae, contrasted by the darker lateral pedipalps (spider coloration faded in alcohol). Two elongated dark strips, one along the lower margin of the basal part of the wing and the other, somewhat weaker above, represent the opposite pair of legs. Only the dark parts of the spider representations are streaked with a red venation. When the wings are folded, the spider images match exactly, thus enhancing the outline of its body.

The described case is assumed to be a rare form of Batesian mimicry, where the prey mimics its predator. That such defense mimicry is effective has been demonstrated experimentally for some species of Tephritidae (Diptera) which bear a striped wing pattern. However, the wing pattern is only effective in combination with a wing-waving display. To an approaching salticid the fly pretends the presence of a conspecific and initiates territorial display or courtship behavior of the spider, making an attack unlikely (Greene *et al.* 1987, Mather & Roitberg 1987). There are a few other reports of this type of mimicry (based on similarities in appearance and behavioral traits), however, they have never been tested experimentally. They comprise a homopteran species of the Issidae, a single nymph of *Amycle* (Fulgoridae), and an assassin bug (Reduviidae) that may mimic a pholcid spider (Pholcidae) (Zolnerowich 1992).

In the present case of the Derbidae, it is surprising how accurate the salticid is imitated. We assume this to be a signal for a visually orientated receiver. Of course this must be considered carefully because we have neither behavioral observations nor any experimental proof for this hypothesis. However, salticids are the dominant family of vagrant spiders in the canopy. For example, of the 5% Arachnidae which were on average collected in the crowns of individual

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trees in Poring Hot Springs (Floren & Linsenmair 1997), jumping spiders contributed between 11 and 25% of all spider individuals and between 20 and 25% of all species of spiders (Deeleman, pers. comm.) They orientate and hunt almost entirely by sight with enormously enlarged principal eyes situated on the frontal plane of the head (Harland & Jackson 2000). In Poring, salticids rival in number the comb-footed spiders (Theridiidae) which are sedentary web spinners. In the third place of numerical dominance in canopy spiders are the vagrant crab spiders (Thomisidae) which practis a sit-and-wait strategy to capture their prey. The eyesight of both groups is comparatively poor.

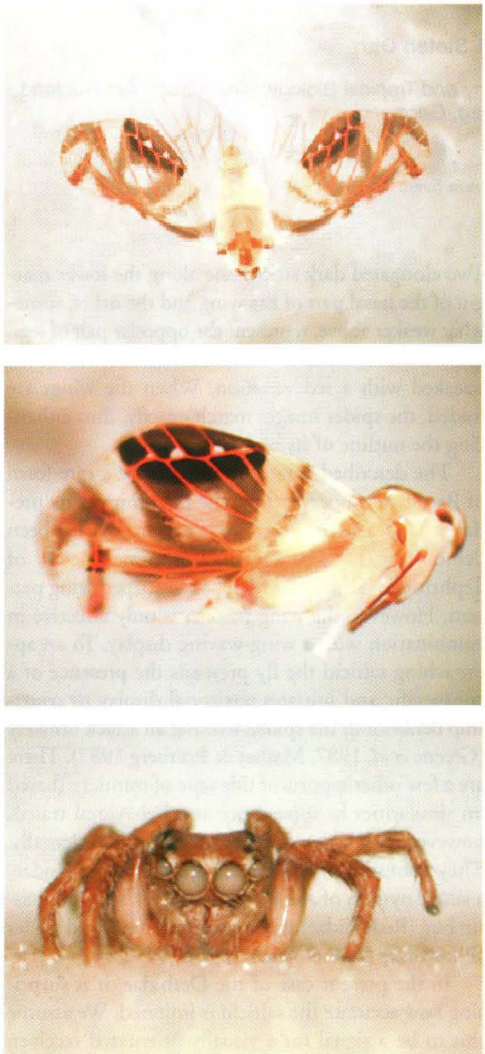

FIG.1. The as yet unidentified species of Derbidae (Homoptera) with the image of a Salticidae spider on both wings (top) which match exactly when the wings are folded (middle). The Salticidae (genus *Palpelius*) collected from the same locality (below).

If the display of the Derbidae really is primarily an optical signal then it must be precise due to the excellent visual potential of salticids. Particularly, leg-like patterns are known to be potent signals that cause salticids to immediately display back (cited after Greene *et al.* 1987). The exact image of the spider prosoma might enhance this signal. In addition, it is very unlikely that the derbid species shows a continuous wing-waving pattern like the tephritids (pers. comm. Remane). Our argumentation is furthermore supported by some recent experiments which show that display behavior in salticids is initiated when encountering their own image in front of a mirror (Harland *et al.* 1999). On the other hand, a display never occurred when the jumping spider was confronted with an insect.

The information presented here indicates that derbid Homoptera avoid predation by jumping spiders through a defense mimicry. How effective this mimicry is, and whether it has an effect against attacking salticids in general, as indicated by the experiments with tephritid flies (Greene *et al.* 1987), can only be judged after more detailed studies.

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