Apatura camiba
Euthalia lubentina
Rapala melampus
Syntarucus plinius
Spindasis lohita
Sarangesa dasahara

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33. ON THE PHENOMENON OF DRUMMING IN EGG-LAYING FEMALE BUTTERFLIES

Dr. Ilse's note about the 'Behaviour of Butterflies before Oviposition' [*JBNHS*, 1956, 53 (3)] very lucidly reviews the present state of our knowledge of the 'drumming' behaviour—quick alternate tapping on the leaves with forelegs—by female butterflies immediately before the deposition of each egg. The reference made by her to my observation on the behaviour of the egg-laying female of the Lemon Butterfly, *Papilio demoleus*, encourages me to write the following few lines on this subject.

While working on the colour and form perception in some butterflies, I had occasion of observing their way of life very closely. To study the normal behaviour of these butterflies, natural surroundings were imitated as nearly as possible in a special part of a large cage. Here, I was able to observe 'drumming' in *Papilio demoleus*, *Papilio polytes*, *Polydorus aristolochia* and *Graphium agamemnon*. I actually used this behaviour in the female of *Papilio demoleus* as a basis for a series of experiments on colour vision (Vaidya, 1956).

There is still a lot of doubt about the exact purpose served by such tapping on the leaf by female butterflies before oviposition. The explanation offered by Bell (1909)—that it helps in driving away the spiders and micro-ichneumons from the leaf which would otherwise destroy the eggs and the larva—seems to me also too fragile to be acceptable. Dr. Ilse (l.c.) maintains that this behaviour allows the female butterfly to select the exact plant (larval host plant) for egg-laying by testing the chemical properties of the leaf, and then to select such a leaf as is not too turgid or too dry by testing its physical properties. This explanation, which comes of a long standing experience of nature study, seems to be very near the truth.

Some of my recent observations, however, stand in apparent contradiction to the above hypothesis. They are as follows:

(*a*) During my experiments on the responses to colours by the egg-laying females of the Lemon Butterfly, *Papilio demoleus*, I observed that an egg was laid on an artificial paper leaf (a saturated blue-green paper of the standardized Ostwald series). In view of the fact that this paper was not even remotely identical with a leaf of the citrus (the larval host plant) in physical properties like texture, turgidity, etc., nor in its chemical nature, it is difficult to explain this behaviour by Dr. Ilse's hypothesis. It seemed that the actual

response to coloured papers by the egg-laying females was directed by the odour of the citrus plant kept outside the cage but not very far away from the experimental arrangement.

(*b*) In the presence of a strong odour of crushed citrus leaves a number of females of *Papilio demoleus* in my cage actually laid *after drumming*, a large number of eggs on wet soil, on white mosquito-netting, on wire-netting, on an empty tin (which I sometimes used to store water), on my white dress and even on my fingers. This observation shows that even where drumming is performed, eggs may be laid, under certain conditions, on objects in no way comparable to a citrus leaf.

(*c*) Recently, I was watching in the Citrus Nursery attached to the Government Fruit Experimental Station at Kirkee, a female of *Papilio demoleus* laying eggs. On two occasions, I found that *after performing the usual drumming* this female laid eggs on two different weedy plants growing in the citrus beds. One of them belonged to the Compositae and the other to the Graminae. These are surely quite unlike in chemical composition to Rutaceae, to which all citrus plants belong. Moreover, it must be remembered that the plants belonging to Compositae and Graminae can never support the larval development of *Papilio demoleus*.

In the light of these observations, I feel, it is necessary to re-consider the whole problem of 'drumming behaviour' in egg-laying butterflies.

In *Papilio demoleus*, I have observed that the drumming is accompanied by the simultaneous fluttering of the wings. At the moment of the actual deposition of an egg, the drumming stops abruptly but the fluttering of wings continues. It seems that drumming and fluttering of wings are effects of some common cause.

As an egg rapidly makes its way through the oviduct to the female genital opening as a result of contraction of muscles in the wall of the oviduct, the female is probably under the influence of 'pangs of labour' of considerable intensity. May I suggest that drumming with forelegs and fluttering of wings are probably nothing but external manifestations of a momentary uneasiness arising from pain?

A detailed discussion on this subject will be included in a paper on the observations and experiments on the behaviour of the egg-laying female of *Papilio demoleus*.

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