

THREE LEPIDOPTERA WHICH ATTACK DIOSCOREAS IN SINGAPORE.

In the course of two years observations on Dioscoreas in Singapore, the caterpillars of three lepidoptera have attracted attention. They are:—

Theretra nessus, Moore

Loxura atymnus, Horsf. and

Tagiades gana, Butl.

The second is the most injurious.

Theretra nessus is a Sphingid, already recorded as attacking the common yam (*Dioscorea alata*, Linn.). Owing to the large size which the caterpillar attains, the number of leaves consumed is considerable; but as the eggs are laid singly, the injury to a plant is generally restricted to what is required to satisfy the appetite of one individual.

Offered a choice of food-plants of the genus *Dioscorea*, the caterpillars refused none; but they ate the leaves of *D. alata*, Linn., *D. pyrifolia*, Kunth, *D. bulbifera*, Linn., *D. pentaphylla*, Linn., and of a Philippine ally of the last which is thought to be *D. Cumingii*, Prain and Burkill, in preference to those of *D. aculeata*, Lamk., and *D. triphylla*, Linn. It is known that dioscorine is present in the leaves of the last named; but the surface is covered with small bristly hairs; and it is likely that the hairs deterred the caterpillars from feeding readily more than any dioscorine present.

The moth of *Theretra nessus* is figured in Moore's *Lepidoptera of Ceylon*, (1882-83), plate 86, and there is a description of it on p. 22 of volume II.

Across the fore wings the moth is 11 cm. The general colour is dull red and olive green above, but below orange. The fore wings are nearly white at the tip, and white on the fore margin; behind this are diagonal belts of olive green, smoky grey and dull salmon. The caterpillar is of a pale green, streaked with white down the back and obliquely on the sides, the streaking ill-defined; and it has two defined white spots forward, which when it has been disturbed and has drawn in its head, have somewhat the position in which eyes might be expected. It attains a length of 14 centimetres (5½ inches). At maturity it spins a cocoon of a rather small amount of silk among leaves, drawing them together; and when it turns into a chrysalis is upwards of 11 cm., long, streaked in various shades between buff and claret.

The caterpillar of *Loxura atymnus* is a green slug-like object which eats the very young parts of the plant. So far it has only been found on *Dioscorea alata*, on *D. anguina* Roxb., and on an imported African yam. The eggs are laid singly, but many to a plant, on the tips of growing shoots, and the caterpillar devours by preference the

upper parts of the just expanding leaves, or less freely the tip of the stem. When a caterpillar on a rapidly growing shoot has found food in a pair of leaves for some days during which growth has carried the other softer parts far beyond; it does not wander up the shoot, but attacks the stem close at hand and eats the surface into small pits, which turn black; at times the shoot may be so much eaten as to break or to die above the place.

The caterpillar attains a length of 2.25 cm., with a maximum width forward of about 7 mm. The body is somewhat flattened towards the tail. The legs are entirely hidden by the overlapping sides, and the head is similarly hidden. The colour of the caterpillar is a rather light leaf-green with a pair of magenta markings, or with two pairs, on the back near the middle, the ground colour rather yellowish-green between them. Towards the head and the tail the green colour darkens a very little. And near to the tail are two retractile processes, withdrawn more often than exerted, very small and white, with papillae.

Ants commonly run over the caterpillars seeking for something that they cannot find. As formic acid is present in the caterpillars of some allied lepidoptera, it might possibly be a smell of this which attracts them; but evidence is lacking.

When the caterpillar is mature, it attaches itself to the stem and pupates, forming a chrysalis buff over the wings and along a broad streak down the back, elsewhere of the brightest green. The tail is very broad.

The butterfly has dark orange wings with a black border, and the hinder are provided with a broadish tail which is pale towards the extremity, and curves out of the plane of the wing. The black border runs from the middle of the anterior rounded edge of the forewing to the posterior angle of the hinder wing. Further the hind wings are slightly suffused with black. Below the wings are of an orange ochre, with a faint line across them parallel to the outer margins. The diameter across the expanded wings is 5 cm. It is figured in Distant's *Rhopalocera Malayana* (1882-86), plate xxxix., figure 2.

Tagiades gana feeds on the mature leaves of *D. alata*, and has also been observed on *D. cirrhosa*, Lour. It cuts into the leaf until it can fold over a piece of it and so manufactures with a little silk a covering for itself; or sometimes it fastens two leaves together. From within its covering it feeds on the foliage, making a new case as often as may be necessary. It is smooth skinned and narrow behind the head, which is bilobed behind. The chrysalis is hazel coloured, and rests in the last leaf-wrapping that the caterpillar has constructed.

The butterfly which is figured in Distant's *Rhopalocera Malayana* (1882-86), on plate xxiv, figure 7, is 9 cm. across the wings. These

wings are umber brown above, the hinder pair bluish white in the posterior third.

All three insects are Indian as well as Malayan, and one, if not the others, occurs in China.

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FRAGMENTS OF MALAYAN GEOGRAPHIC BOTANY.

No. I. Enumeration of Pahang plants collected by the late A. M. Burn Murdoch.

On a journey of inspection down the Pahang river in June, 1913, the late Mr. A. M. Burn Murdoch, took with him a collector from the Botanic Gardens, Singapore, and obtained the species here enumerated.

The collecting began near Temerloh, which is 75 miles in a straight line from the coast, and was continued down the tortuous course of the river to its mouth, whence again northwards, it was carried up the coast to Balok.

Nos. 151-179 came from Temerloh and its neighbourhood. Nos. 180-192 came from places on the first 60 miles of this river's course below Temerloh. Nos. 193-200, and 301-311 came from the neighbourhood of the Chenik river where is a forest reserve. Nos. 312-332 were collected below the Chenik river, chiefly about Kwala Pahang. Near Kuantan, Balok and Beserah were collected Nos. 201-224 and Nos. 333-350.

There is a paper by Mr. H. N. Ridley on the flora of this part of the Peninsula in the Transactions of the Linnean Society of London, 2nd Series, Botany, iii., pp. 267-408, enumerating very many more plants than are here recorded; but nevertheless Mr. Burn Murdoch's bundles add much information towards a knowledge of the distribution of plants in the Peninsula.

There is a further brief notice of the flora of the lower part of the Pahang river in the Journal of the Straits Branch of the Royal Asiatic Society, part 25 (1894) pp. 33-37.

Mr. Ridley has kindly described the novelties of the collection in the Journal of the Straits Branch of the Royal Asiatic Society, No. 68 (1915), pp. 12-14.

Here after each name an indication is given of the dispersal which that plant has in the Peninsula: and unfortunately the scantiness of our knowledge of the flora of the Eastern side is made evident in it.