

NOTES ON THE LIFE-HISTORY OF LYCORMA DELICATULA WHITE IN NANKING.*

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1. Introduction.

The family Fulgoridae is best known by the great lantern-fly of Brazil and the peculiar candle-fly of China and the East Indies. The candle-fly has been reported to occur only in Fukien and other parts of south China and is classified as *Fulgoria candelaria* (Sowerby, 1925). The lantern-fly herewith described is a close relative to the candle-fly and has been found in Nanking and as far north as Peping. It belongs to the species, *Lycorma delicatula* White. During the year 1928-29 the writer had the opportunity to make a preliminary study of its life-history in Nanking.

2. Life-history.

a. *The Adult.*

The adults possess the distinct characteristics of the family with two ocelli and a pair of red antennae inserted below the eyes. The long beak plainly arises from the head and extends backward between the legs. The fore wings are dark blue in color with black spots while the hind wings have a mixture of brilliant color patterns, being reddish in the anal area, bluish in the costal region and dark brown at the apex. The sexes can be easily distinguished by the genitalia at the posterior end of the body. The male has a pair of podical plates and a pair of furculae which appear dark brown in color. The female has a pair of reddish egg-guides at the tip of the abdomen. The adults are commonly found during the autumn from August to October.

b. *The Eggs.*

The eggs are found on the bark of the trees particularly on *Ailanthus altissima* Swingle and *Melia azederach* Linnaeus. They are laid in masses covered by a brownish substance and arranged in rows. The number of eggs in each mass varies from 25-35, and each egg measures 3 mm. in length and 1 mm. in width. Late in the spring the egg-masses change to light yellowish in color and the substance which covers them gradually drop off.

c. *The Nymphs.*

The nymphs hatch in the first part of April, being almost transparent and whitish in color and measuring about 3 mm. in length. The nymphal period extends from April to the end of June. All the observations made in the field are given in the following table:

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Date of Observation.	Characters.
April 12th.	Body entirely whitish and transparent with two black eyes.
May 10th.	Body black in color with white spots.
June 5th.	Body with red and black bands and markings on the dorsal surface.
June 30th.	Newly transformed adults with pinkish wings and body.
July 20th.	Adults more reddish in color, wings light-blue with black spots.
August 19th.	Adults with dark-blue wings.

In view of the results of observation recorded, it is conceivable that the nymphal periods may vary considerably according to the influence of the environmental conditions, particularly temperature.

3. Biology of the Nymphs

a. Locomotion.

The nymphs always move obliquely toward one direction or the other instead of going straight forward. They rarely turn themselves backward even when there are obstructions in front of them. In case they are disturbed, they make a jump to a considerable distance.

b. Food.

The nymphs do not feed upon the leaves but suck the juices from the stems. They can usually be found on the under side of the leaves and around the petioles or young stems. They remain quiet and stick their proboscis into the epidermal layer of the stem. During the very hot weather in June and July they hide themselves at the noon hour beneath the leaves or stems. Early in the morning or late in the afternoon they are seen to crawl around on the upper surfaces of the leaves.

4. Biology of the Adults.

a. Habits and Habitat.

Most of the adults move around on the trunks and are rarely found on stems. They remain in one place for a considerable period of time and stick their probosces into the bark. They rarely take their flight even when insects such as ants, wasps and ladybird beetles try to disturb them. They frequently produce a fluid which is acid in reaction from the posterior end of the body. It has been observed that within two hours one adult produced this fluid as many as three times.

b. Mating

During the latter part of September the male begins to move around and seek its mate. When it meets a female, it moves around her with the fore wings stretched out and the hind wings vibrating gracefully. In most cases, a young or immature female moves away to avoid the male. When the mature ones happen to meet, the female turns her abdomen upward and lifts up her hind legs to wait for the copulation. The male then lies oblique to the female and by several trials succeeds in the act of mating.

c. *Oviposition.*

The period of mating requires ten to twenty-two hours. The male usually dies after the exhaustion of its energy and in most cases it dies before separating from the female. The female carries the dead male around for a number of hours and finally drops it off to the ground. After mating the female continues to feed upon the juices of the trees for about ten to twenty-five hours, and after that she moves around back and forth to seek a suitable place for laying her eggs. She always chooses the rough surface of the bark and usually the surface where eggs were previously laid. The female secretes a sort of milky substance to pave the rough surface of the bark and at the same time eggs are laid one after another. The total number of eggs laid is from twenty-five to thirty-five and the eggs are arranged in five to six rows. The whole process of oviposition takes less than an hour (2:30-3:15 p.m.; Oct. 14th, 1928). At first the coat of the egg-mass is white and milky in color and waxy in texture, but finally it becomes brownish in appearance. After laying her eggs the female dies within sixteen to twenty-two hours and some females may survive for about two to three days.

d. *Natural Enemies.*

It has been observed several times that the Praying-mantis, *Empusa flabellicornis* and *Mantis bicornis* seize these lantern-flies and eat up their abdomens. Besides there are two kinds of wasps which sting them and carry them away.

5. *Summary.*

(1). The lantern-fly in Nanking belongs to the species, *Lycorma delicatula* White and a preliminary study of its life-history was made during the year of 1928-29.

(2). The type of metamorphosis in this insect is paurometabola and field observations were made from April 12th to August 19th, 1928-29.

(3). The biology of both nymphs and adults were observed and studied.

(4). The plant hosts are *Ailanthus altissima* Swingle and *Melia azederach* Linnaeus and no evidence of definite economic importance has been found.

Literature cited.

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