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REARING AND DESCRIPTION OF THE EARLY STAGES OF THE NEARCTIC SPECIES OF *PERIDEA*, WITH SPECIAL REFERENCE TO *P. BASITRIENS* (LEPIDOPTERA: NOTODONTIDAE)

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The genus *Peridea* Stephens, according to Forbes (1948), is composed of two subgenera; *Lophodonta* Packard and *Peridea*. To the former belong the two species, *angulosa* (J.E. Smith, 1797) and *ferruginea* Packard, 1864; to the latter only one species, *basitriens* (Walker, 1855). The foodplant of *angulosa* is given by Forbes (1948) as "oak," that of *ferruginea* as "birch." The larva of *basitriens* has never been described, while the larvae of the other two species have been described and figured in color by Packard (1895).

Efforts to fill this gap in our knowledge have been made by several lepidopterists, but there has been no report of successful rearing of *basitriens*. The most recent investigator to publish a detailed report about the failure to rear *basitriens* was Ferguson (1963). Efforts to rear *basitriens* were also made at the Entomology Research Institute, Canada Department of Agriculture, Ottawa, Ont., but without success; on the report sheet is the interesting remark that the little caterpillars "dried" after hatching from the eggs.

As part of the Museum's program to build a collection of associated caterpillars, we attempted to rear *basitriens* during our summer field work in 1963 and 1964 at the Queen's University Biological Station, Chaffeys Locks, Ont., where the species is of common occurrence. A wide assortment of native plants from trees to weeds and even water lilies was tried without success. The young larvae dried in a web at the inner edge of the petri dish (plastic, 145 mm diameter). Additional unsuccessful attempts were also made in 1965 during our field work in Rondeau Provincial Park, Ont.

The first step to success in rearing these caterpillars came through the realization that the young larvae of all three species of *Peridea* were subject to very high mortality in rearing. This suggested that the difficulty lay not only in providing the right foodplant, but also in duplicating the appropriate microclimatic conditions. It seemed probable that the caterpillars of all three species normally lived high in treetops, where, it was suggested, there would be a more humid microclimatic environment. Therefore, in 1966 at the Queen's University Biological Station we tried transferring the young larvae of *Peridea* spp., after they hatched from eggs in a petri dish, to tightly sealed 3 oz. jars with various kinds of leaves. Our intention was to give the young larvae increased humidity. But even then the mortality was high, and in the case of *basitriens*, 100 per cent.

When the last larvae of *basitriens* were transferred from the petri dish, where they had hatched from the eggs laid there by the female moth, into the jar with sugar maple and *Ostrya* leaves, three unhatched eggs were also transferred. The caterpillars hatching from these three eggs readily accepted and fed upon leaves of sugar maple. The surprise was not so much that the larvae were eating maple, but that they were eating at all. It had been more or less clear that a com-

mon tree should be the foodplant, as the moth is, as already remarked, one of the most common notodontids at that locality. In the first instar the larvae chafe the leaves in the same way as most first instar notodontid larvae do; from the second instar on they eat the whole leaf, proceeding along one of the veins and resting inconspicuously on the uneaten portion of the vein.

The experience with the transferred eggs and the larvae hatching directly in the small jar prompted us to try this again, but not to handle the small caterpillars at all. There were no more *basitriens* eggs available, but we had some eggs of *angulosa*, the larvae of which had previously survived in the ratio of only about 1:30. About 15 eggs were distributed to each of several firmly-capped 3 oz. jars containing cut oak leaves. There was almost no mortality immediately following hatching.

When, however, the 3 oz. jars were overcrowded, the survival rate was very low indeed. In one experiment, 100 eggs of *P. ferruginea* were placed in a single 3 oz. jar. Instead of beginning to feed, many of the newly hatched larvae went to the top of the jar, spun a web, and dried up as they had done previously in the petri dish.

Rearing experiments with all three species were repeated in 1967 in Kendal, Ont. About 12-15 eggs were placed in each 3 oz. jar. Hatching occurred without difficulty, but about 50% of the young larvae died around the first moulting, a mortality which is by no means unusual at this stage. But after the first moult all three species were easily reared to pupation. After a week in the 3 oz. jars the larvae of *angulosa* and *ferruginea* were transferred to petri dishes, where they developed almost without loss. Our experience indicates that the caterpillars of *basitriens* are best retained in the 3 oz. jars until pupation, possibly because they do not like to be put in a plane position, but prefer to rest upright on a leaf where they attach themselves by a silk thread even in the last instar.

It follows then, that all three species of the genus *Peridea* can be reared, provided the precautions described above are observed.

DESCRIPTION OF THE IMMATURE STAGES OF *PERIDEA BASITRIENS*

EGG: The color is very light pastel yellowish, while the eggs of *angulosa* are more whitish and those of *ferruginea* greenish.

LARVA: This belongs to the group of noctuiform notodontid caterpillars, and so clearly separates *basitriens* from the genus *Notodonta* where it was included by previous authors, like McDunnough (1938). By all indications it belongs to the genus *Peridea* where Forbes (1948) put it even without knowing the caterpillar. A close relationship exists between the genera *Peridea* and *Hyperaeschra* Butler.

First instar: after ca. three days 5mm long; head light yellowish brown; body uniformly light green. The first instar larva of *angulosa* has a faint yellow lateral stripe and its head is light brown. The first instar larva of *ferruginea* at this stage already has all the markings characteristic of the mature larva and its head is uniformly black.

Second instar: after ca. four days 7mm long; head light yellowish-brown; body uniformly light green. The second instar larva of *angulosa* has a yellow lateral stripe which is more strongly developed than in the first instar. On the yellowish-brown head appear dark lateral stripes which are not present in the second instar

larva of *basitriens*. The second instar larva of *ferruginea* has a dark olive green head with blackish-brown borders and stripes of the same color on each side of the frontal suture; there is also a yellowish stripe proceeding posteriorly from the mouth. The dorsal and subdorsal lines are yellowish and slightly interrupted at the intersegmental junctions. The two dorsal lines are each twice as wide as the subdorsal line. A wavy spiracular line is present.

Third instar: after *ca.* six days 10 to 12mm long; head yellowish-brown with a blackish-purple lateral stripe; body light green with three broken sulfur-yellow dorsal and subdorsal lines on each side, the third of which is irregularly wavy. The third instar larva of *angulosa* has the same three lines, and in addition a fourth, the spiracular line, which begins at the sides of the yellowish-brown head as a yellow stripe bordered dorsally by reddish-brown. Some of the same red coloring extends faintly as bordering of the spiracular line along the few first few abdominal segments. The third instar larva of *ferruginea* is closely similar to the second instar larva except that the head is light yellowish green like the body, and the yellowish stripe posteriorly from the mouth is more pronounced.

Fourth instar: after *ca.* six days 16mm long; head yellowish-brown with a pastel greenish tinge and with a black lateral stripe bordered weakly dorsally by some purplish-red; body light green. The purplish-red color extends from the head over the first two thoracic segments along a fourth yellow, the spiracular line, which appears for the first time in this instar, in addition to the three lines of the third instar. The spiracular line is visibly interrupted at the intersegmental divisions. The spiracles are purplish-red.

The fourth instar caterpillar of *angulosa* has the third, supraspiracular, line of wavy yellowish dots, the spiracular line edged with bright red along its whole length. Some red also shows on the abdomen, and in the mid dorsum on the last segment. Head pastel green; the stripe on both sides bright red and bordered with yellow. First thoracic spiracle white with black bordering, the abdominal spiracles inconspicuous.

The fourth instar larva of *ferruginea* shows no change from that of the third instar except added reddish coloring to the yellowish stripe posteriorly from the mouth, also pinkish - (reddish-) brown background coloring interiorly between the subdorsal lines.

Fifth instar (Fig. 1): after *ca.* nine days 20 mm long and after another *ca.* eight to 10 days 35mm long; head light pastel green with a black lateral stripe bordered by purplish-red and a bit of yellow; the red extends to the first and second thoracic segments and tapers out over the third thoracic and first abdominal segments; body a bit darker; spiracles yellow, reddish-purplish ringed; dorsal line white, subdorsal also white but weaker, the supraspiracular and spiracular pastel yellow lines broken up into dots, some of them conspicuous, both lines wavy. The main dorsal lines are faintly prolonged onto the head.

The fifth instar larva of *angulosa* has three color phases; it may be medium pastel green, pinkish, or of an intermediate color. The green form seems to be predominant. All color phases occur among sibling larvae. Head of same color as body. Dorsal line white; subdorsal line broken up in dots but straight, white; supraspiracular line of whitish-yellowish dots on each segment, wavy; spiracular line strong yellow, the length of the body, with red "smears" along the whole length. Body below the supraspiracular line more distinctly colored. The stripe on the head is like that in the fourth instar larva, as are the spiracles.

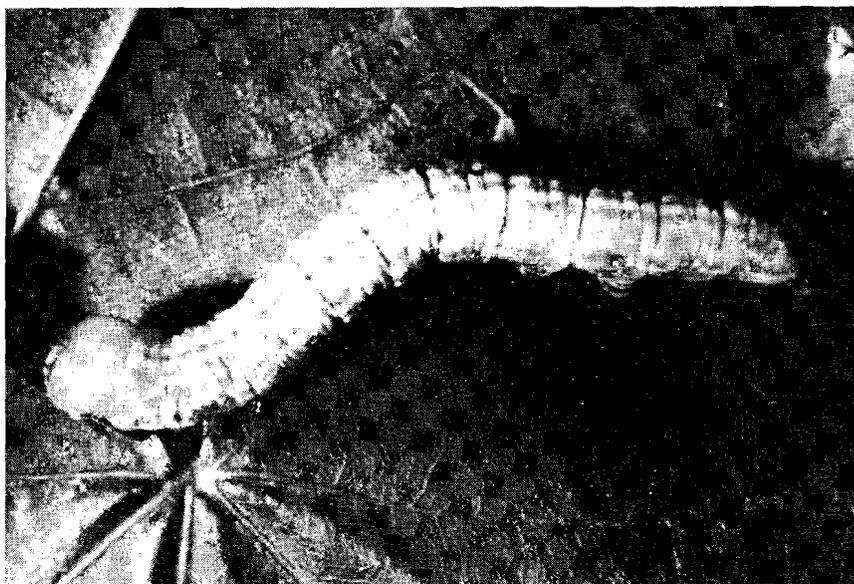


Figure 1. Fifth instar larva of *Peridea basitriens*, 1966, Chaffeys Locks, Ont. Photo: Neg. No. 66 ENT 24, Photogr. Dept.-R.O.M. (L. Warren).

The fifth instar larva of *ferruginea* has the dorsal lines more whitish than yellowish; between them is the light pastel green color of the body; the inner border of the lines has a pinkish tinge. On the anal segment the posterior half is dorsally pinkish in color, while on the thoracic segments there is little pinkish. The dorsal whitish lines in this species are very visibly continued on to the head. Laterally of these lines are two transverse stripes, whitish and overlaid with dark brown; on the genae there is a yellowish-reddish stripe with dark brown border; this stripe is continued posteriorly in mauve-reddish over yellowish-orange pastel color over thoracic segments 1 and 2 without the dark brown border. Spiracle on first thoracic segment all black; spiracles on abdominal segments yellowish-with pinkish peritreme. The supraspiracular and spiracular lines of pastel yellow dots occur from the third thoracic segment to the last abdominal one. The subdorsal whitish line is very faint and interrupted.

The feature which most clearly distinguishes the mature *basitriens* larva from those of the two other species is the light pastel yellowish sur-coloring laterally on the intersegmental joints, especially of the abdominal segments.

PUPA: For the three species, these are very similar. Pupation occurs in the ground in a thin cocoon. The rather plump pupae are dark mahogany brown. The cremaster, usually with a variety of hooks in the notodontids, lacks these in *Peridea*, leaving the end of the pupa round and blunt, and in *angulosa* with a little bump at the end. The pupa of *basitriens* is about 19.5 to 20mm long, the darkest in color of the three and not quite so plump. The pupa of *ferruginea* cannot be distinguished from that of *basitriens* by characters now available, except for color and that it is perhaps a little bit more plump. The pupa of *angulosa* is about 21mm long and the lightest in color of the three.

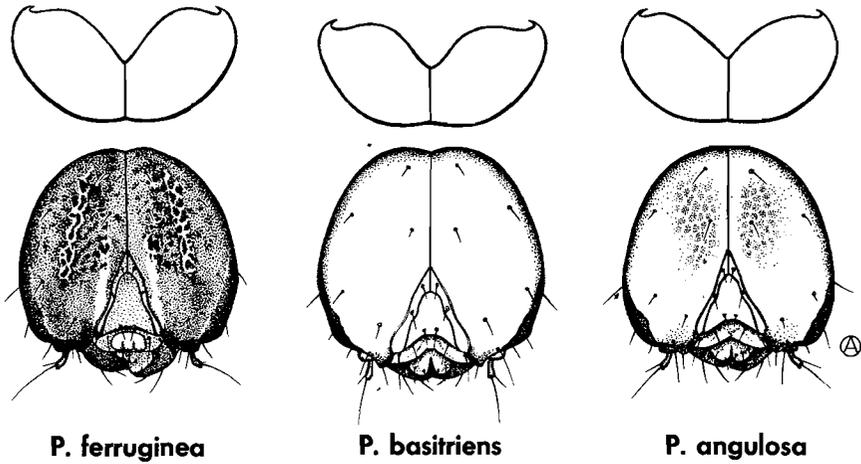


Figure 2. Frontal and dorsal views of the heads of *Peridea* spp. larvae.

DIAGNOSTIC TABLE FOR THE LIVING MATURE LARVAE OF THE NORTH AMERICAN SPECIES OF *PERIDEA*

	<i>P. ferruginea</i>	<i>P. angulosa</i>	<i>P. basitriens</i>
HEAD CAPSULE	with distinct dorsal markings of dark dots and light-colored stripes; lateral stripes on genae yellowish-reddish, bordered with dark brown	almost no dorsal pattern, only indistinct dark dots, lateral stripes on genae bright red, bordered with yellow	no dorsal pattern, lateral stripes on genae black, bordered by purplish red and a bit of yellow
BASE COLOR	pastel green	pastel green or pinkish or intermediate	pastel green, overlaid with pastel yellow laterally at the joints of the abdominal segments
DORSAL LINES	very clearly extended on to the head	prolonged on to the head	faintly prolonged on to the head
LATERAL LINES ON THORAX AND ABDOMEN	mauve-reddish over yellowish-orange pastel on T I and II	strong yellow spiracular line with longitudinal red smears	purplish-red on T I and II, tapering off over T III and A 1
COLOR OF SPIRACLES	thoracic-black; abdom. - yellowish, pinkish ringed	thoracic - white, black ringed; abdom. - inconspicuous	thoracic and abdom. yellow, reddish-purple ringed
SPIRACULAR LINES	irregular yellow dots, waving	compact yellow line with added red	irregular yellow dots, waving

KEY TO THE MATURE LARVAE OF THE NORTH AMERICAN SPECIES
OF *PERIDEA*

1. Epicranium with a distinct dorsal pattern of dark dots and light stripes (Fig. 2) *P. ferruginea*
Epicranium without a distinct dorsal pattern 2
2. Head capsule in frontal view with lateral margins rounded, distinctly narrower dorsally than orally, dorsomedian depression absent, posterior margin of head capsule in dorsal view not much rounded and forming medially a sharp angle (Fig. 2) *P. angulosa*

Head capsule in frontal view with lateral margins in the oral half with two perceptible angles, not much narrower dorsally than orally, dorso-medial depression present, posterior margin of head capsule in dorsal view strongly rounded and forming medially a rounded angle (Fig. 2) *P. basitriens*

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