ECO-ENTOMOLOGICAL OBSERVATIONS FROM THE AMAZON.

IV. Occurrence and feeding habits of the aquatic caterpillar **Palustra laboulbeni** Bar, 1873 (Arctiidae: Lepidoptera) in the vicinity of Manaus, Brazil.

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Abstract

Aquatic larvae of **Palustra laboulbeni** Bar, 1873 are recorded for the first time from Brazil. They live among macrophytes in different types of lakes around Manaus and mostly feed on algae. Observations on their respiration are given.

INTRODUCTION

Aquatic larvae of **Palustra laboulbeni** were first reported from lakes of French Guiana, where they fed on leaves of **Mayaca fluviatilis** (Bar 1873). The species may also occur in stationary waters of Venezuela and Colombia (Travassos Filho, pers. comm.). It is now recorded for the first time in Brazil.

RESULTS AND DISCUSSION

Aquatic larvae of **Palustra laboulbeni** were mainly encountered in lakes of the Várzea region (Junk, 1980), especially in "mixed water areas" (Fittkau et al., 1975; Prance, 1979) with low current. Specific locations include the Lago Janauarí across the Rio Negro from Manaus (comp. Irmler, 1975) and the Lago Janauacá near the Rio Solimões (comp. Santos, 1980). With rising water level and throughout the high water period (May-July), larvae of **P. laboulbeni** could be observed grazing on reets of "floating meadows" (Junk, 1970), in particular of **Echinochloa spectabilis, Hymenachne amplexicaulis, Oryza grandiglumis, Paspalum repens** (Gramineae), as well as **Urtricularia olivacea** (Lentibulariaceae). Examination of gut contents revealed that young larvae had been ingesting algae — predominantly Chlorophyceae **(Oedogonium)** and some Chrysophyceae **(Melosira)** — which reach their maximum production during high water level (Schmidt, 1973). Older larvae additionally fed on decomposing leaves and on roots of the macrophytes mentioned above. In laboratory cultures, lettuce was accepted as well.

The greatest number of larvae was observed in June, while floating cocoons were most abundant

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in mid-July. Results of rearing experiments in the laboratory (water temperature 23° - 25°C) suggest that the larval stage may last 30 to 35 days, the pupal stage about 15 days. Moulting is preceded by a color change: the short orange-coloured and tear dropshaped setae at the central and posterior dorsum of the larvae (see below) turn black. Throughout the moulting process, which occurs mainly at night, the larvae remain motionless and horizontally at the water surface.

With falling water level in August, the number of larvae decreased rapidly. Between October and April, no larvae were found.

Larvae of **Palustra laboulbeni** are also found in permanent lakes and igarapés of the terra firme, mainly during the dry season. In May/June 1977 and 1981, they were collected in two lakes situated at km 45 on the Manaus-Itacoatiara highway (AM-010). Lake A contained "clear water" *, lake B "whitish water", caused by heavy deposits of kaolinite in its basin. Larvae occured more numerously in lake B where they lived between roots of **Fuirena umbellata** and **Eleocharis nodulosa** (Cyperaceae). Their predominant food source were Chlorophyceae **(Spirogyra, Mougeotia)**. Along the same highway, at km 21, larvae were observed in August/September 1977 and 1982 in a "clear water" igarapé feeding on **Cabomba schwartzii** Nymphaeaceae which was heavily covered with Chlorophyceae. In a "clear water" lake nearby, the food consisted of **Utricularia** sp. and Chlorophyceae.

Larvae of **P. laboulbeni** show two kinds of setae, important for respiration. The first type is found dorsally and consists of two tufts of short and tear drop-shaped setae (Fig. 1; comp. Laboulbene, 1873) on each body segment except the last. On the anterior dorsum they are black, on the central and posterior dorsum they are orange-coloured. Aside from the difference in colour, they were found to be identical in structure (Cruz-Landim, pers. comm.). Beginning with the abdominal segment VI, the orange-coloured setae gradually increase in length, being longest on segment IX. The second type is found laterally in form of several tufts of long, black filiform setae on each segment of the body. When underwater, those filiform setae which emerge near the dorsum point backwards and cover the entire dorsal surface of the animal (the tear drop-shaped setae included) like a roof. The cavity thus formed is filled with air which gives the larvae a silvery lustre. The air supplies 18 open

(*) Clear/black water-complex: "clear water" during the dry season, "black water" during the rainy season (Junk, pers. comm.).

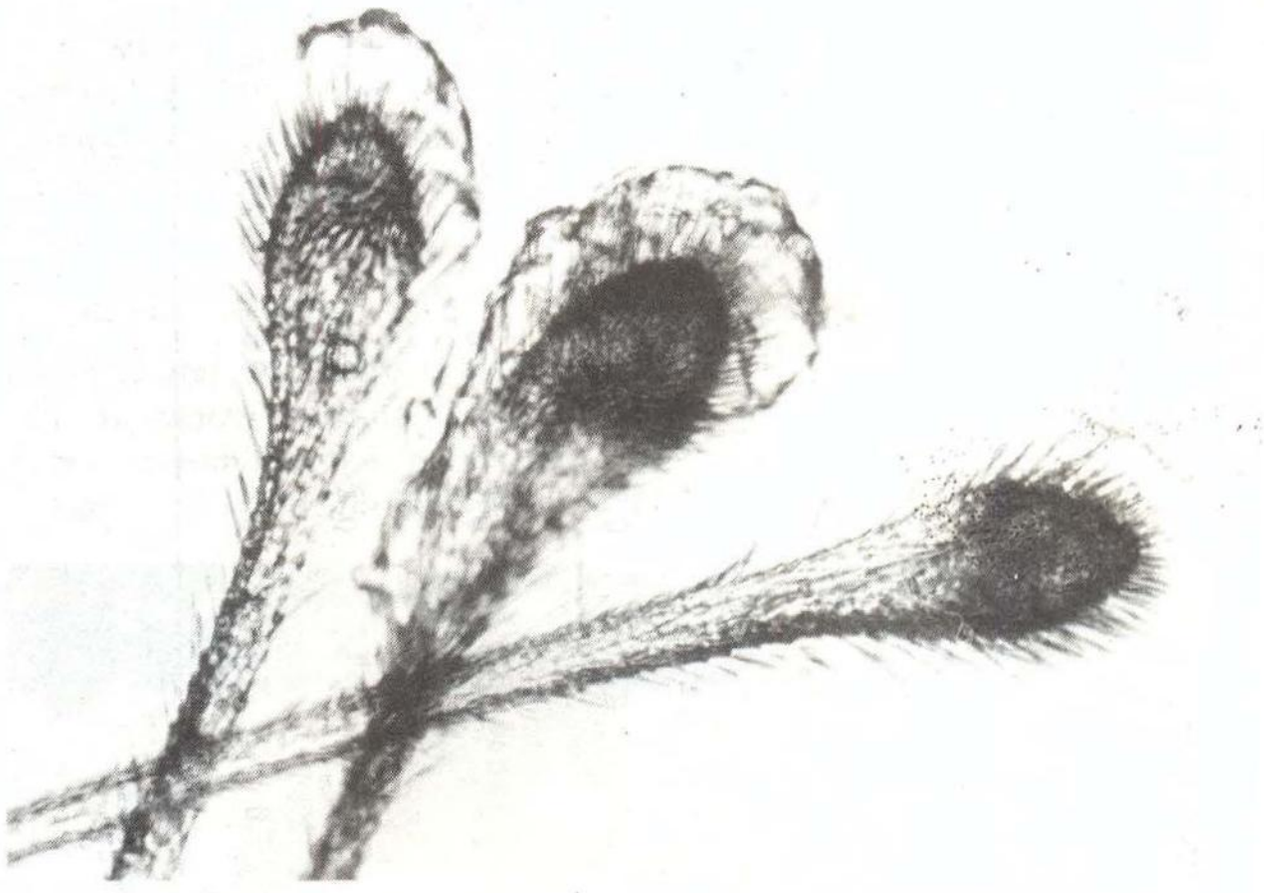

Fig. 1 Upper part of tear drop-shaped, hydrophobic setae from the dorsum of a **Palustra laboulbeni** larva (X 100; photo by Cruz-Landim).

stigmata located laterally, one on each side of thoracic segment I and abdominal segments I-VIII. To renew this air, the larva drifts to the water's surface where the body is maintained at an angle between 20 and 40 degrees.

As soon as the tip of the abdomen reaches the water's surface, the long tear drop-shaped setae of segment IX surpass the filiform setae which cover the dorsum, break the surface film of the water, and the air of the cavity is exchanged. The tear drop-shaped setae which are found inside the cavity are assumed to increase the capacity for air storage and to retain the air in the cavity as long as the larva is under water. They may also have a sensory function (comp. Fig. 2).

Aquatic larvae of **Palustra laboulbeni** tolerate a wide range of water qualities (Table 1). Their natural enemies seem to be frogs while fishes were not observed to feed on them. It remains to be investigated, whether Várzea lakes represent the main habitat for the larvae of **P. laboulbeni** during the time of high water level and, in addition, where the adults remain throughout the low water period.

TABLE 1 — Physico-chemical characteristics of some water bodies where larvae of Palustra laboulbeni **were collected; (further explanation in the text).**

locality	month/ year	water type	temperature 9-10 A.M. (°C)	pH	K_{20} (μS/cm)	NO_2 [μg N/l]	NO_3 [μg N/l]	PO_4 [μg P/l]	NH_4^+ [μg N/l]
Lago Janauarí(*)	8/82	mixed water	31,5	6,1	62,1	0,7	5,5	12,9	21,0
AM-010: km 21 Igarapé	8/82	"clear water"(+)	25,1	4,8	7,1	0,6	2,0	6,6	13,8
AM-010: km 45 lake A	5/81	"clear water"(+)	30,5	5,0	6,5	0,4	2,6	6,3	32,9
lake B	5/81	"whitish water"	29,5	6,0	7,8	0,2	7,5	22,7	67,8

(*) Sample taken in "floating meadows"; (+) clear/black water-complex.

MATERIAL

Larvae and adults of **Palustra laboulbeni** Bar, 1873 were deposited in the Systematic Entomology Collection of INPA, Manaus/AM, Brazil.

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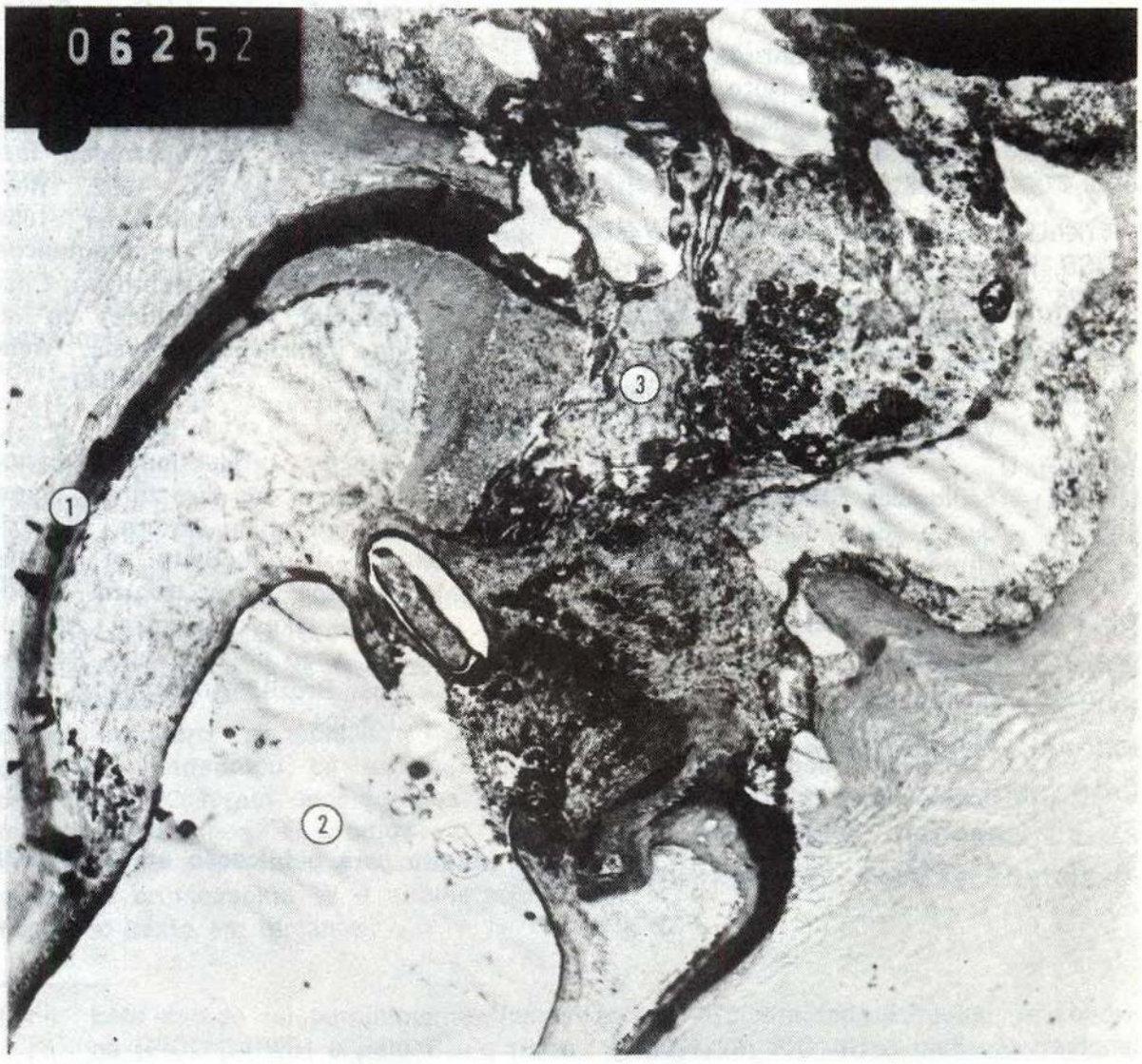

Fig. 2 Base of a black and tear drop-shaped seta from the anterior dorsal part of a **Palustra laboulbeni** larva (X 2400; photomicrograph by Cruz-Landim); 1 = cuticle of the body, 2 = lumen of the seta, 3 = possible sensory cell.

Resumo

Larvas aquáticas de **Palustra laboulbeni** Bar, 1873 são referidas pela primeira vez no Brasil. Elas vivem entre macrófitas em diferentes tipos de lagos nas proximidades de Manaus e se alimentam principalmente de algas. Observações sobre a respiração das larvas são dadas.

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