

## IMMATURE STAGES OF *PHRICODUS PAKISTANENSIS* HAMID (HETEROPTERA: PENTATOMIDAE) AND NOTES ON ITS BIOLOGY

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**Abstract.** Immature stages of *Phricodus pakistanensis* are described and illustrated. Mating, oviposition and hatching are discussed.

The immature stages of this relatively unknown genus have not been described before. Of the three known species, *Phricodus hystrix* has been collected in large numbers on sesame seed plants<sup>1</sup> and *P. pakistanensis* is reported on *Heliotropium ramosissimum*,<sup>2</sup> while the host of *P. ornatus* is not known. We were able to collect samples of *P. pakistanensis* more or less regularly over a period of one year to study the life history and the biology of this species. Although our observations are still far from complete, due to difficulties in breeding this species in the laboratory, we have enough data to indicate that the immature stages are present in the field for at least six months, from May to October. We were able to observe mating, oviposition, hatching and development through most of the nymphal instars, although not all in one consecutive sequence. Body measurements of the immature stages are given in Tables 1 and 2.

**Mating.** The mating in this species is remarkable in the sense that the male never mounts the female. In the laboratory, males were observed to become excited when a potential mate happened to come nearby. They moved their antennae vigorously, almost in a vibrating movement, hitting the dorsum of the female's abdomen. If the female was not ready to mate, she moved away from the site. Although the male tried to follow her for some distance, he quickly lost interest when he failed to locate her with his antennae. A female

that was ready to mate became motionless in response to the tapping by the male antennae on her dorsum and raised the tip of her abdomen. At this point the male turned around and, raising its abdomen like the female, backed up so that the tips of their abdomens were in contact with each other. Parandria were now seen to separate the first valvifers so that copulation could be effected. During mating the parandria were located underneath the first valvifer and were seen to keep these sclerites apart, thereby facilitating copulation. Apparently the rudimentary claspers performed no vital function during the mating processes. The mating couple rarely moved during copulation. Copulation lasted from five minutes to several hours but usually for 30-60 min. Both partners mated more than once during a day with each other or with other receptive mates.

**Oviposition, Incubation and Hatching.** Eggs were usually laid on the underside of leaves in clusters of 5-15 eggs. A single female laid as many as 35 eggs but the average number was 18 per female. Freshly laid eggs (Fig. 1) were light green with a bluish tinge, without any conspicuous projections or ridges. The operculum was circular and faced downwards. After the emergence of the nymph a translucent skin was left behind. The incubation period ranged from 10 to 16 days. The newly hatched nymphs were pale and moved very little during the next few hours while their coloration changed from pale to

TABLE 1. BODY MEASUREMENTS (mm) OF IMMATURE STAGES OF *Phricodus pakistanensis*.

	Egg	Nymphal instars				
		I	II	III	IV	V
Maximum length	0.90	1.00	1.28	1.92	2.48	3.40
Maximum width	0.60	0.64	0.80	1.12	1.68	2.00
Length of head	—	0.28	0.32	0.56	0.60	0.80
Width of head	—	0.42	0.52	0.64	0.88	1.00
Interocular distance	—	0.30	0.38	0.40	0.68	0.80
Length of pronotum	—	0.14	0.16	0.24	0.32	0.40
Width of pronotum	—	0.50	0.60	0.80	1.20	1.72
Length of scutellum	—	0.08	0.10	0.18	0.40	0.72
Length of wingpad	—	—	—	0.20	0.44	1.00

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TABLE 2. ANTENNAL AND LABIAL MEASUREMENTS (mm) OF IMMATURE TAGESS OF *Phricodus pakistanensis*.

Nymphal instar	Length of antennal segment				Width of antennal segment				Length of labial segment			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
I	0.08	0.08	0.12	0.32	0.06	0.06	0.06	0.08	0.12	0.12	0.12	0.16
II	0.12	0.16	0.24	0.48	0.08	0.06	0.06	0.08	0.16	0.20	0.22	0.22
III	0.16	0.20	0.30	0.56	0.08	0.08	0.10	0.16	0.20	0.24	0.24	0.24
IV	0.18	0.40	0.52	0.80	0.12	0.12	0.16	0.20	0.24	0.36	0.36	0.32
V	0.32	0.60	0.80	1.00	0.16	0.16	0.20	0.24	0.24	0.44	0.44	0.32

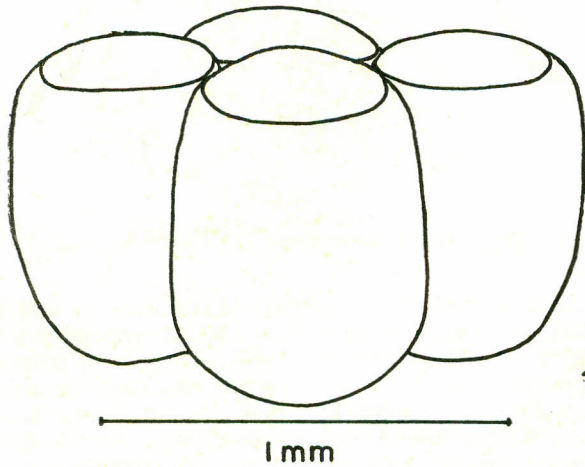


Fig. 1. Egg, *P. pakistanensis*.

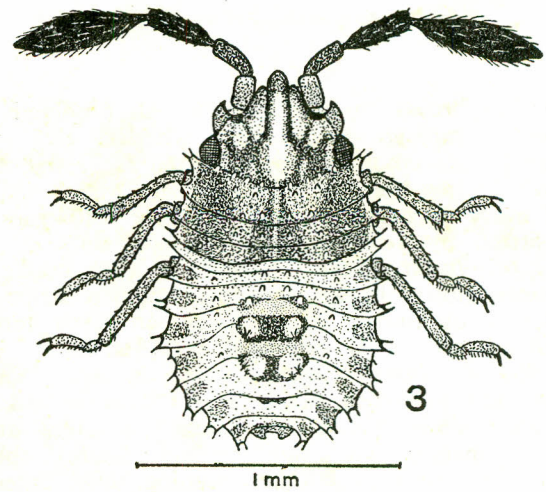


Fig. 3. Second instar, *P. pakistanensis*.

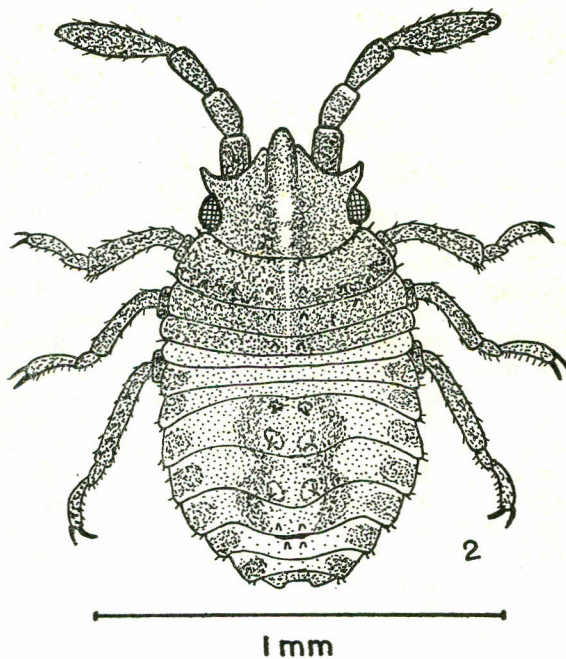


Fig. 2. First instar, *P. pakistanensis*.

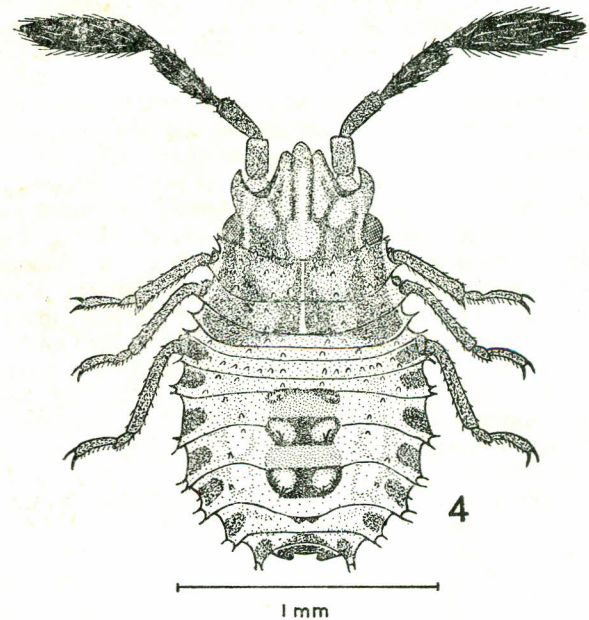


Fig. 4. Third instar, *P. pakistanensis*.

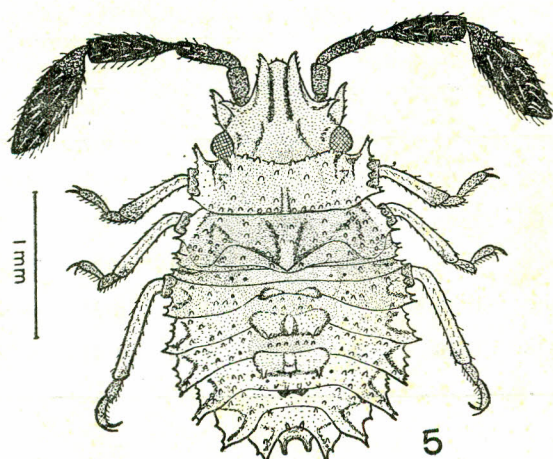


Fig. 5. Fourth instar, *P. pakistanensis*.

reddish brown to light brown. All observed eggs were incubated successfully, whether they were laid in the laboratory or collected from the field, except when they were parasitized. About one out of every 20 eggs collected from the field were parasitized by *Telenomus* sp. (Scelionidae).

*First Instar.* Like second except head and thorax mostly brown with pale median stripe on thorax, dumb-bell shaped area on sixth tergum lacking, all spines inconspicuous (Fig. 2).

*Second Instar.* Like third except vertex, meso and metanota mostly brown with median and lateral pale streaks, brown patches on lateral abdominal margin not extending onto lateral spines, legs light brown, labium reaching third antennal segment, spines on head, pronotum and abdomen indistinct (Fig. 3).

*Third Instar.* Like fourth except first abdominal segment with pale median stripe, lateral areas with dark brown patches, thorax and head markedly darker than abdomen, spines on juga small, not extending beyond tylus, labium reaching second abdominal segment, wingpads barely reaching anterior margin of first abdominal segment, body spines and projections inconspicuous (Fig. 4).

*Fourth Instar.* General shape (Fig. 5) and coloration like fifth except first and second antennal segments light brown, third and fourth black, head light reddish brown, with less pronounced longitudinal streaks than fifth instar, spines unicolorous, pronotum less patchy, lateral margin and spines pale, rest of thorax with a median pair of dark brown longitudinal markings and some darker areas laterally, wingpads small, extending onto first abdominal segment, anterior two-thirds of lateral wingpad margin spinose, spines generally not as conspicuous as in fifth instar.

*Fifth Instar.* General coloration light reddish brown (Fig. 6), antennal segments 3, 4 and apical two-thirds of 2 black, 1 and basal one-third of 2 light brown, head light brown with two dark brown longitudinal streaks along clypeus and four or six streaks across vertex, apex of spines dark brown, eyes scarlet;

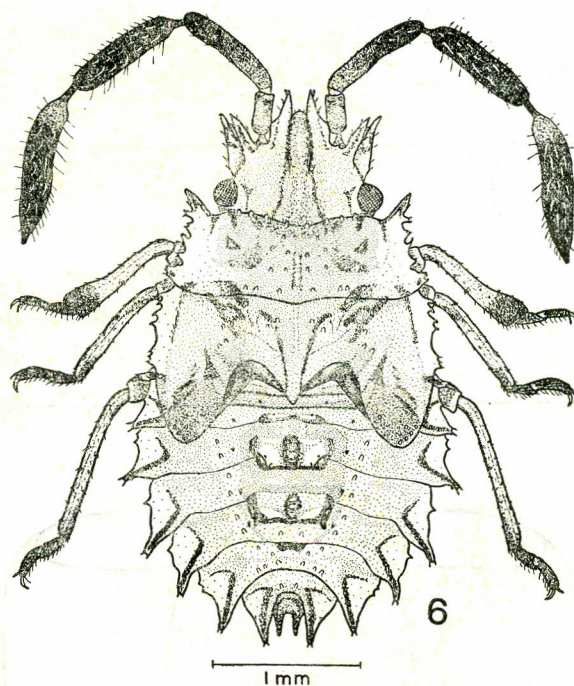


Fig. 6. Fifth instar, *P. pakistanensis*.

ventrally head pale, apical two segments of labium dark brown; pronotum light brown medially and along lateral spines, rest with dark brown patches continuous from base of wingpads to anterior margin; scutellum pale along the median carina, lateral areas with darker brown and red patches; wingpads dark brown except along lateral margin; abdomen pale with extensive reddish blotches, projections of abdominal terga 2-8 with dark brown streaks, area around abdominal scent glands and dumb-bell shaped area on sixth tergum dark brown, legs dark brown with lighter patches throughout.

General shape oval, narrow anteriorly and broader posteriorly, flat dorsoventrally with head, pronotum, wingpads and abdomen spinose; head with one pair of spines at apex of juga extending beyond tylus, two pairs in front of eyes and some smaller spines on vertex, eyes round, almost touching anterior margin of pronotum, antenna distinct, third and fourth segments markedly swollen and with distinct internodes and hairs, first and second with minute hairs only, labium long, reaching hind coxae; pronotum broader than long, laterally flattened and produced into large spines, anterior margin with small spines, wingpads reaching third abdominal tergum, lateral margin spinose in anterior one-half, a few small scattered spines present dorsally; abdomen spinose, posteriolateral angle of each tergum produced into a large spine with some small spines on lateral margins, dorsally small spines scattered all over abdomen, second and third pair of abdominal scent glands with a large spine near each opening, three pairs of abdominal scent glands present on terga 3, 4 and 5, anterior-most smaller than others, abdominal spiracles 2-7 all ventral, abdominal trichobothria as in adults.<sup>2</sup>

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