



Remarkable variation in *Phryganistria virgea* (Westwood, 1848) [Pharnaciini (Phasmatidae)] from India

The tribe Pharnaciini Günther, 1953 (Clitumninae: Phasmatidae) is so far represented in India by four genera out of five known from the world. These are *Pharnacia* Stål, 1877, *Phobaeticus* Brunner 1907, *Phryganistria* Stål, 1875 and *Tirachoidea* Brunner v. Wattenwyl, 1893. The fifth genus *Baculonistria* Hannemann, 2008 is known from China only, again a country adjacent to India. The genus *Phryganistria* is comprised of six species of which only one species *Phryganistria virgea* (Westwood, 1848) was first recorded from Assam, India by James Wood-Mason in 1877 and was identified as *Phibalosoma virgea* and the species is so far known from northeastern India (Sikkim and Darjeeling of West Bengal); Bangladesh (Sylhet, the type locality of the holotype male); Bhutan and Pulau Penang.

A female collected from Mouling National Park (MNP), Arunachal Pradesh has been identified now as *Phryganistria virgea*, shows many notable characteristics and deviations from typical description. A male came from Sibsagar (Assam) which is hardly different from the description for the male of *Phryganistria virgea*. The states Arunachal Pradesh, Assam and Meghalaya (Shillong) are adjacent and previously treated as single state Assam. The pre-independence Assam was even bigger by including part of present Bangladesh (Sylhet). The entire area is almost homogeneous in floral and faunal

composition. A detailed description of the male, female and eggs are given along with affinities with the related species under the genus.

The dry preserved male and female specimens in the collection of Orthoptera Section of Zoological Survey of India, Kolkata (Calcutta) are very old. Mostly they are without definite date of collection but the date of entry in sectional register is from 12.05.1936 to 14.06.1938. The rest females, all identified as *Phryganistria virgea*, are from Assam: Nemotha, 24.82°N, 92.80°E; Meghalaya: Shillong, 25.47°N, 91.37°E; Tamil Nadu: Yarkaud, 11.77°N, 78.20°E. Their morphology shows several grades of modification from the female from MNP.

Description

Female (MNP): Head, thorax and abdomen entirely smooth. Eyes rounded. Head elongated, with a medio-dorsal fine carina; posterior of head with a median notch.

Thorax: Prothorax a little flat, with a pair of elongated and a slightly raised swollen areas at anterior division, posterior division a little longer and almost smooth. Mesothorax and metathorax rounded; former of nearly uniform diameter, a little widened at the insertion of legs; metathorax a little less than half of mesothorax and of uniform diameter.



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Forelegs: in femora, anteroventral and posteroventral carinae spineless; triangular spines on both posterodorsal (8 spines) and anterodorsal carina (17–18 spines), gradually shorter distally and irregularly spaced; in tibiae, distal end without any lobulated expansion (as in middle and hind legs), only the posterodorsal carina with 30–32 minute spines among fine stiff bristles.

Midlegs: comparatively shorter than fore and hindlegs. Femur with 7 spines on anterodorsal carina, 5 small spines on posterodorsal carina; posteroventral carina with 8–9 spines, a little bigger than the former; the anteroventral carina with 5–6 further stouter spines, medioventral carina smooth. Tibia with 15–16 small spines on anterodorsal carina; similar but more minute spines on posterodorsal carina (12–15); anteroventral carina with 16 minute spines; posteroventral carina with 16–17 minute spines; 1st tarsal segment is shorter than rest segments together and little foliaceous distally (probably same is true for other legs).

Hindleg: femora with 7 minute spines on anterodorsal carina, with 5–6 minute spines on posterodorsal carina, 7–8 small spines on anteroventral carina and with 8–9 minute spines on posteroventral carina; medioventral carina spineless; tibiae with 20–23 very minute spines on anterodorsal carina, with almost similar number of minute spines on posterodorsal carina, 20 minute spines on anteroventral carina and with 17 minute spines on posteroventral carina.

Median segment: This is half of the metanotum.

Abdominal segments: These are gradually longer distally up to 6th segment and then

gradually shorter behind; 9th and 10th segments are nearly of similar length; all abdominal segments are rounded and hardly flattened dorsoventrally; 7th segment is narrowed in front; last three segments are nearly triangular in outline; 10th tergum carinated, divided into two nearly lobe like portions by a concavity in the middle; the rear end almost is straight. The supra anal lamina minute, rounded at extremity, strongly keeled in middle, extends very little beyond the tip of the lobes of the 10th segment. Cerci thick, very little shorter than the supra anal lamina, a little flat and beset with black bristles. Preopercular organ bears a pair of small, nearly triangular spines beset with few hairs; one is a little shorter than the other.

Operculum (broken): Extends beyond the end of 10th segment by at least the length of 9th and 10th together, laterally compressed, proximal 1/3rd smooth, the distal 2/3rd shows longitudinal fine parallel lines or striations along entire length.

Egg (ex. abdomen): bear superficial similarity with *Phryganistria virgea*, *P. grandis* and *P. heusii* (vide drawings, Hannemann, 2008: 273). Capsule oval in cross section along middle, longer than wide, surface black, smooth except for fine granulations. Operculum black, oval, its surface flat and irregular. Capitulum lost, borne by the nipple like organ (0.75 mm). Micropyle triangular to heart shaped, its longitudinal length comparatively short, postero-lateral margin wider, with minimum depression below and with short median line. Length 4.9 (excluding capitulum), width 4.0.

Measurements (mm): female: Length of body up to tip of 10th segment 265;

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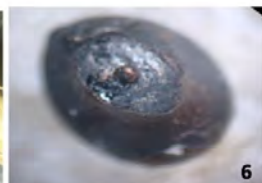


Image 1–8. *Phryganistria virgea*: 1—Female, entire | 2—Male, entire | 3—Supra anal plate of female | 4—Last abdominal segments of female | 5—Pre-opercular organ of female | 6–8—Egg of female.

antennae 45.0mm + (broken); prothorax 12, mesothorax 59, metathorax 27, median segment 13, rest of abdomen 145; in fore leg, femur 76, tibia 101, tarsi lost; in midleg, femur 54, tibia 62, tarsi 24; in hindleg, femur 62, tibia 78, tarsi lost; operculum 35.0 + (broken at tip).

Material examined:

DDBR/349, 04.v.2003, 1 female, 2km from Jengging on the way to Karko village, Mouling National Park, Upper Siang District, Arunachal Pradesh, 28.58°N, 94.86°E, elevation 613m. coll. N. Teehar & G. Lollen, preserved at Orthoptera section, Z.S.I., Kolkata.

Male (Assam): Eyes large, rounded, protruding. Head smooth, narrowed behind, with four indistinct lobes behind. Antennae longer than anterior femur. Prothorax longer than wide, smooth. Mesothorax long, smooth, very little wide in front, a little wider behind. Metathorax nearly $\frac{1}{2}$ of mesothorax. Median segment just a little less than half of metathorax. Abdominal segments 2–6 gradually longer posteriorly; 7th shorter than 6th, 8–10th triangular in outline, 8–9th carinated, junction of 8–9th is widened; 10th divided into laterally compressed lobes which are beset interiorly with spines. Cerci long, incurved, do not reach apex of the lobe of 10th segment.

Forelegs: in femur, anterodorsal carina with 22 small, triangular spines being gradually minute distally; posteroventral carina with 2 minute spines near basal half. Tibia almost spineless except for stiff bristles. Metatarsus a little longer than rest segments together.

Midlegs: in femur, all carinae with 10–12 minute spines; medioventral carina spineless. In tibia, anteroventral carina and

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posteroventral carina with 22–24 small spines; spines on anterodorsal carina 17–18; all spines are close beset distally. Metatarsus as long as rest segments together.

Hindlegs: in femur, anterodorsal carina and posterodorsal carina with 12–14 minute spines; anteroventral carina and posteroventral carina with 12–13 spines which are a bit longer than anterodorsal carina and posterodorsal carina; medioventral carina spineless. Tibia without spines on dorsal carinae; with 22 fine spines on anteroventral carina and posteroventral carina, medioventral carina with 5–6 minute spines at distances. Metatarsus as long as rest segments together.

Poculum swollen, not with blackish tint, surface smooth, not ridged, with distinct transverse line in front of posterior triangular area.

Measurements (mm):

Male: Body length 148.0 (longest among 5 examples); head 4.8; antennae 67.5; prothorax 5.0; mesothorax 34; metathorax 18.0; median segment 8.0, rest abdomen 78.0. In foreleg: femur 53, tibia 65, tarsi 24; in midleg:



Image 9–11. 9—*Phryganistria virgea* (MNP, upper), *P. virgea* (Shillong, middle) and *P. virgea* (Yarkaud, lower) | 10—Poculum of *P. virgea* (MNP, upper), *P. virgea* (Nemotha, lower) | 11—Egg of *P. virgea* (Shillong).

femur 42, tibia 42, tarsi 17; in hindleg: femur 49, tibia 54, tarsi 22.

Material examined: Regd. No. 989/H5, 1 male, Sibsagar, Assam, 26.98°N, 94.63°E, coll. Moti Ram, (identified

as *Phryganistria virgea* by Günther).

Relationship

The MNP female shows some similarities and dissimilarities with the following examples. With the single female from



Yarkaud, (Regd. No. 1006/H5), the MNP female is most related by the presence of size, formation of operculum and nearly similar poculum. However, the MNP female differs from *Phryganistria virgea* by the absence of posteromedian tubercle on abdominal tergites, margins of abdominal segments 2–7 are not widened laterally, the median segment is longer, metatarsus more lobated, less number of spines on legs and completely different form and length of micropylar plate.

The following features in males of *Phryganistria virgea* (Hennemann et al., 2008: 215) are not present in the male from Assam:

1. Cheeks sometimes with a faint dark postocular stripe.
2. Tibiae often with a few faint, pale transverse bands; the basal one most distinct.
3. Pronotum slightly shorter.
4. Cerci extend beyond apex of anal segment.
5. Profemora considerably longer than head, pro- and mesonotum combined.

Compared to *Phryganistria heusii* (Hennemann & Conle, 1997), the MNP female does not bear posteromedian tubercle on abdominal tergites 2–6 of female, fore femora not black and basal area not pale straw, shape of preopercular organ different and the micropylar plate is shorter.

Compared to *Phryganistria fruhstorferi* (Brunner v. Wattenwyl, 1907), in MNP female, the females are longer in length and the operculum is very much extended beyond the end of 10th segment; in male, lateral surfaces of the thorax not black and the

lateral lobes of 10th segment not tapered as in *Phryganistria fruhstorferi*.

The MNP female differs much from *P. grandis* Rehn, 1906, by its longer median segment, spiniform preopercular organ (lobular in *Phryganistria grandis*). The preopercular organ is narrowed and longer in the MNP female (shortened boat form in *Phryganistria grandis*). The micropylar plate is quite short and not elongated in the MNP female.

Intermediate features in *Phryganistria virgea* (Westwood, 1848)

The two females of *Phryganistria virgea* from Shillong, Meghalaya have the following peculiarities.

1. Nearly same length and construction of body as *Phryganistria virgea*.
2. The abdominal tergites of segments 3–6 with lateral margins not horizontally expanded (laterally broadened) as in *Phryganistria virgea*, rather distinctly deflexed down alongside the body. As a result, in a top view, those segments are rounded. However, in lateral view, the tergites are oval in outline (as in MNP female).
3. The number of spines on carinae of four posterior femora is more than in MNP female and much similar to *Phryganistria virgea*.
4. The preopercular organ is a pair of distinct, slender spines which are straight and longer than in MNP female, almost as in *Phryganistria virgea*.
5. Reference to page 273, fig. 190 (Hannemann & Conle 2008), capitulum and micropylar plate of egg are similar to *Phryganistria virgea* and *Phryganistria heusii* (Hennemann & Conle, 1997). But these are also a little different from *Phryganistria grandis* Rehn, 1906 and *Phryganistria virgea*.

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Among these three, considering the length of operculum, only the species *Phryganistria virgea* seems closer to these females from Shillong.

Therefore, based on distribution and structural details, it may be presumed that the Shillong females are somewhat in the intermediate of MNP female and *Phryganistria virgea*.

Comment

The MNP female along with other females provided several strong variations. Absence of flattened shape of abdominal segments and the egg structure are particularly very distinctly different from the typical one. The authors initially had an impression of this variation as a new species and intended to name as *Phryganistria rotundatolobata* which is withheld till further information.

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