

## ABDOMINAL BAND VARIATIONS IN *EPISYRPHUS BALTEATUS* (DIPTERA: SYRPHIDAE)

V.C. Kapoor, V.K. Kohli, and Ashwani Kumar<sup>1</sup>

**Abstract.** Large numbers of specimens of *Episyrphus balteatus* collected from various localities in northern India from September 1981 to June 1984 showed marked abdominal variations. When compared with normal specimens of the species, the variable specimens could be easily separated into 5 distinct groups or forms. However, the male terminalia of all these forms did not show specific differentiation.

*Episyrphus balteatus* (Degeer) is the most dominant and widespread of the 11 species of *Episyrphus* Matsumura & Adachi found in the Oriental Region. It is abundant throughout the Ethiopian and Australian regions as well and is continually increasing its range, though it has not yet reached the New World. It is very important economically as an effective predator of aphids.

*Episyrphus balteatus* is one of the most variable species of Syrphidae and because of this it is sometimes difficult to segregate specimens. Brunetti (1923) mentioned that Indian and European specimens of this species show marked variations in the abdomen. Other studies include Smith (1955), who described similar abdominal variations in *Chrysotoxum* Meigen. Also, Stuckenberg (1954), while revising the African species of *Paragus* Latreille, found extreme variations in coloration and size of specimens of *P. serratus* (Fabricius); upon examining the male genitalia of different color forms, he discovered a complex of 7 species within *P. serratus* sensu lato. Nayar (1968) described abdominal band variations in *Eristalis tenax* (Linnaeus) and suggested that the individuals are especially prone to such anomalies.

To obtain specimens for analyzing the range of such abdominal band variations in the Indian specimens of *E. balteatus*, we collected from various localities in northern India from September 1981 to June 1984, obtaining 190 specimens. By studying the abdominal patterns, we were able to easily segregate the specimens into 6 distinct morphological groups. The groups were so well defined that the male and female specimens of each group could be easily paired. The following is a brief description of the normal abdominal band pattern followed by the 5 morphological variations we determined.

### Normal form

♂ (Fig. 1). Abdomen almost linear, broader at hind margin of 2nd segment; a black stripe on hind margin of 1st segment joined to inverted black triangular marking at middle of 2nd segment by a broader median stripe, giving appearance of an anchor; 3rd segment with a

1. Department of Zoology, Punjab Agricultural University, Ludhiana-141004, India.

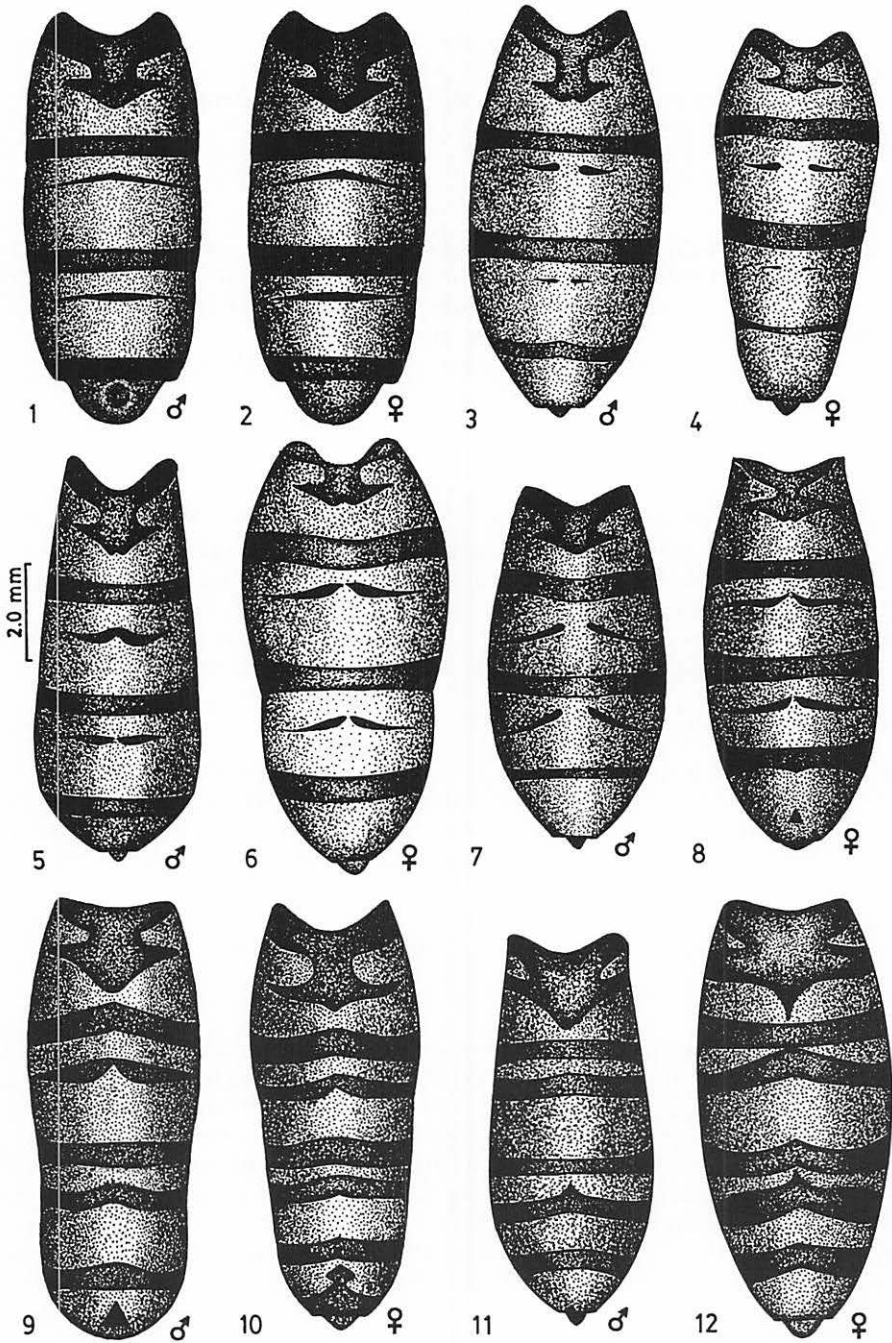


FIG. 1-12. Abdominal band variations in *E. balteatus*: 1-2, normal form; 3-4, form A; 5-6, form B; 7-8, form C; 9-10, form D; 11-12, form E.

narrow transverse line, slightly broader at middle; 4th segment similarly marked; hind marginal band uniformly wide and reaching side margins in 2nd, 3rd, and 4th band; 5th segment with an indistinct small black spot above middle.

♀ (Fig. 2). Abdominal markings similar to ♂ but much more extensive.

### *Variations*

#### **FORM A**

♂ (Fig. 3). Anchor-shaped marking of 2nd segment joining to concave basal band of 1st segment. Basal band of 2nd segment slightly broader at margins; 3rd and 4th segments with very obscure markings in upper middle portions. Basal marking of 3rd uniform, but slightly pointed in center in 4th; 5th segment without any marking.

♀ (Fig. 4). Banding pattern similar to ♂ except marking in 4th segment almost indistinct and basal band thin, slightly broader at margins.

#### **FORM B**

♂ (Fig. 5). Basal concave band of 1st segment continues up to middle of 2nd segment. Basal band at hind margin uniform in width; 3rd segment with a thin band notched at center and not reaching lateral margins; uniform concave band at hind region of 3rd segment; 4th segment with markings similar to 3rd but narrowly separated at middle; 5th segment wholly brownish without any distinct marking.

♀ (Fig. 6). Markings more or less similar to ♂ except basal bands, which are narrow in middle of 1st segment, slightly concave in 2nd and somewhat uniformly concave in 4th.

#### **FORM C**

♂ (Fig. 7). Median longitudinal stripe joining basal transverse band of 1st segment with inverted triangular marking of 2nd segment, small and broad; basal band more or less uniform in width, gently convex posteriorly; 3rd and 4th segments with narrow markings on each side pointing upward towards center but not confluent; basal band of 4th broader at margins; 5th segment without any marking.

♀ (Fig. 8). Very similar to ♂ except markings in 3rd segment slightly confluent medially and blackish triangular mark present in lower middle of 5th segment.

#### **FORM D**

♂ (Fig. 9). Second segment with extensive triangular marking, its basal angles almost reaching lateral margins, joined with 1st segment band by a small but broad stripe; hind margin with a transverse band prominently arched, a point in middle; 3rd segment with prominent band deeply notched posteromedially, narrowing towards margin; basal band transverse and almost uniform in 3rd segment; 4th segment with a notched marking similar to that in 3rd and a basal band broader at middle and margins; 5th segment with a triangular mark in middle.

♀ (Fig. 10). First segment with broad basal band, joined to axe-shaped marking of 2nd segment, lateral extensions of 2nd segment sharp and slightly curved, almost reaching margins; last segment with a peculiarly dome-shaped broad band.

#### **FORM E**

♂ (Fig. 11). Anchorlike marking on 2nd segment broad; lateral angles touching margins and covering most of segment area; a uniform transverse band at base; 3rd and 4th segments with a continuous band medially, pointed upward; basal band in 4th segment somewhat convex.

♀ (Fig. 12). Markings like ♂ except bands broader and ground color with brownish tint, not yellowish.

Superficially, i.e., based on the abdominal characters, it seemed to us that there was a clear case for the presence of a *balteatus*-complex similar to Stuckenberg's (1954) *P. serratus*-complex. To clarify our assumptions, we examined the male terminalia of specimens from all these forms. We found no major morphological distinction between the normal and variable forms described above. From this study it is evident that care should be taken in describing new species on the basis of mere morphological differentiation. If male terminalia had not been considered important characters in segregating syrphid species, each of these 5 forms could have been easily designated as a distinct species.

*Acknowledgments.* The authors are thankful to Prof. S.S. Guraya, Head of the Zoology Department, Punjab Agricultural University, Ludhiana, for providing working facilities and to Indian Council of Agricultural Research for financing the project (no. 1-3/80-PP) under which the present work has been carried out.

### LITERATURE CITED

- Brunetti, E. 1923. *The fauna of British India including Ceylon and Burma*. Taylor & Francis, London.
- Nayar, J.L. 1968. Abdominal band-variations in *Eristalis tenax* (Linn.) (Diptera: Syrphidae). *Pan-Pac. Entomol.* **44**: 125-29.
- Smith, K.G.V. 1955. Abdominal teratology in the genus *Chrysotoxum* Meigen (Diptera: Syrphidae). *Entomol. Mon. Mag.* **91**: 224-26.
- Stuckenberg, B.R. 1954. The *Paragus serratus* complex, with descriptions of new species (Diptera: Syrphidae). *Trans. R. Entomol. Soc. Lond.* **105**: 393-422.