

**COMPARISON OF THE TELOMERES AND GONOMACULAE
IN THE MALE GENITALIA OF NINE FAMILIES OF SYMPHYTA
(HYMENOPTERA: INSECTA)**

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ABSTRACT

The telomeres and gonomaculae of the male genitalia of nine families of Symphyta are compared. Those of Xyelidae represent the most primitive condition and those of the Cephidae are the most specialized and resemble those of the Apocrita.

KEY WORDS: Hymenoptera, Symphyta, Telomeres, Gonomaculae.

INTRODUCTION

A comparative study of the external male genitalia of Symphyta revealed that the presence of articulated telomeres and gonomaculae vary within the suborder. We have attempted to interpret the evolutionary significance of these structures by studying the representatives of nine families. No such study has been made on these structures.

MATERIAL AND METHODS

Dry specimens for the present studies were supplied by the Biosystematic Research Institute, Canada and the Zoological Survey of India, Calcutta. These were softened by immersing in 2% KOH for about six hours. Figures were drawn using a stereomicroscope fitted with an ocular grid.

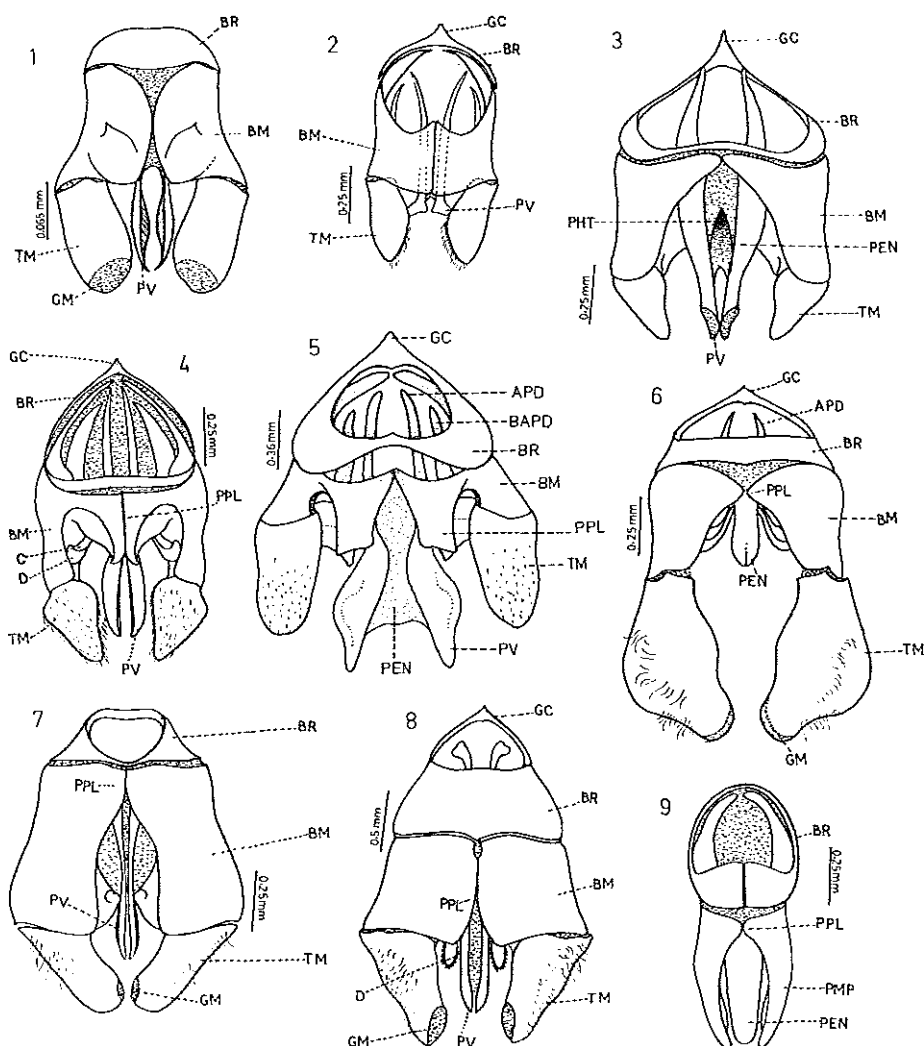


Fig. 1-9. Symphytan species, male genitalia of: 1. *Xyela bakeri* Konow (ventral view). 2. *Arge clavicornis* (F.) (ventral view). 3. *Zarae inflata* Norton (ventral view). 4. *Neodiprion abietis* (Harris) (ventral view). 5. *Tenthredo verticalis* Say (ventral view). 6. *Pamphilius luteicornis* (Norton) (dorsal view). 7. *Xiphydria mellipes* Harris (dorsal view). 8. *Sirex cyaneus* (F.) (dorsal view). 9. *Cephus cinctus* Norton (dorsal view). Abbreviations: APD — Apodeme; BAPD — Basal apodeme; BM — Basimere; BR — Basal ring; BVS — Basivolsella; C — Cuspis; D — Digitus; GC — Gonocondyle; GM — Conomacula; PEN — Penis; PHT — Phalotreme; PPL — Parapenial lobe; PV — Penis valve; TM — Telomere.

OBSERVATIONS AND DISCUSSION

Xyela bakeri Konow (Fig. 1) (Xyelidae) represents the most primitive condition of the male genitalia among Hymenoptera. The genitalia is of the strophandrious type, and each of the articulated telomeres (Cochlearia of Rohwer and Cushman, 1917, harpes of Ross, 1945 and gonostyles of Smith, 1970) bears a well developed gonomacula (Cupping disc of Snodgrass, 1941) at its distal tip. Ross (1937) reported that all the representatives of family Xyelidae possess the orthandrious type of male genitalia. Subsequently, Snodgrass (1941) reported that all xyelids do not possess orthandrious type. According to Snodgrass, *Xyela minor* Norton and *Pleroneura koebeleri* Rohwer (Xyelidae) do possess the strophandrious type of male genitalia with articulated telomeres bearing gonomaculae at their tips. A similar condition has also been described by Arora (1956) in *Xyela julii* (Brébisson) (Xyelidae). Thus the family Xyelidae is peculiar in having representatives with orthandrious (Normal) and strophandrious (Inverted) types of male genitalia.

With the xyelids forming the common stem, modifications occur in other groups depending upon the general orientation of genital components. One branch includes the members of superfamily Tenthredinoidea and the other branch is represented by the members of families Pamphiliidae, Cephidae, Xyphydriidae and Siricidae.

In the Tenthredinoidea, which includes *Arge clavicornis* (F.) (Fig. 2) (Argidae), *Zarae inflata* Norton (Fig. 3) (Cimbicidae), *Neodiprion abietis* (Harris) (Fig. 4) (Diprionidae) and *Tenthredo verticalis* Say (Fig. 5) (Tenthredinidae) the male genitalia is strophandrious and possesses articulated telomeres which lack gonomaculae. Similar condition has also been observed in *Pristiphora cincta* Newman, *Pachyprotasis versicolor* Cameron, *Pachyprotasis brunetti* Rohwer and *Tomostethus assamensis* Rohwer (Tenthredinidae) and *Cimbex americana americana* Leach (Cimbicidae). These observations are further substantiated by Crampton (1919), Bird (1926), Ross (1937), Reeks (1937), Snodgrass (1941), Arora (1953, 1956), Bracken (1961), Tait (1962), Wong (1963), Dhillon (1966, 1971) and Smith (1970).

The other branch is represented by *Pamphilius luteicornis* Norton (Fig. 6) (Pamphiliidae), *Xiphydria mellipes* Harris (Fig. 7) (Xiphydriidae) and *Sirex cyaneus* F. (Fig. 8) (Siricidae). They have the orthandrious male genitalia and possess articulated telomeres which are provided with well developed gonomaculae at their tips. A similar condition has also been observed in *Acantholyda maculiventris* (Norton) and *Cephalcia provancheri* (Huard) (Pamphiliidae). The works of Crampton (1919), Ross (1937), Snodgrass (1941), Arora (1956) and Rivard (1955), further substantiate these observations.

In relation to the modifications concerning these two features of the male genitalia the members belonging to the family Cephidae can be considered the most modified among all the symphytans. In *Cephus cinctus* Norton (Fig. 9) the genitalia is orthandrious, and the telomeres are present but are completely fused with the basimeres with no traceable line of fusion between them. The gonomaculae are also absent.

Taking into account all the characteristics of male genitalia, the cephids are found to be quite close to the apocritans. Similar observations have also been made by

Crampton (1919), Snodgrass (1941) and Arora (1956) on the different cephids studied by them.

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