STUDIES ON THE STRUCTURE OF MALE GENITALIA OF POEKILOCERUS PICTUS (ORTHOPTERA: ACRIDOIDEA: PYRGOMORPHIDAE)

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The generic name of the 'ak-grasshopper' is being very frequently used incorrectly in the sub-continent. This appears to be because of adoption of generic name *Poecilocerus* by Lefroy and Howlett (1909), Kirby (1914), Fletcher (1919) and others. The genus was first named by Audinet-Serville as *Poekilocerus* in 1831 but detailed description was not available until 1938. Burmeister (1838) incorrectly emended it to *Poecilocerus*. The use of the latter name should, therefore, be abandoned (invalid according to present rules of zoological nomenclature).

The structure of the male genitalia of *Poekilocerus pictus* (Fabricius, 1775) has been studied by Latif *et al.* (1959) but the description lacks many structural details. It is because of this fact that the description of the phallus of *Poekilocerus pictus* is being presented here in a revised form. The terminology followed here is mainly that of Roberts (1941), Dirsh (1956) and Eades (1961). Latif *et al.* (1959) used Dirsh's terminology but their description as well as their figures 43 and 44 are erroneous. The terms suprazygoma, pseudoarch, basal thickening, ventral longitudinal and ventral transverse thickenings are used here for the first time.

The phallic complex of *Poekilocerus pictus* is a heavily sclerotized bulb-like organ which is located within the genital chamber. It is covered over dorsally, partly by the paraprocts and epiproct, and partly by the pallium, and latero-ventrally by the ninth sternum which forms the sub-genital plate. The phallic complex is composed of three distinctive parts: the epiphallus, ectophallus and endophallus.

The epiphallus (Figs. 1 & 4) is a strongly sclerotized structure and is located on the dorsal surface of the ectophallus. It is attached towards its distal and lateral boundaries with the dorsum of the cingulum by the ectophallic membrane and pallium respectively. It is bridge-shaped and is composed of lateral plates (LP) which are connected with one another by a narrow median plate, the bridge (B). Both the anterior and posterior margins of the latter bear a median process. The lateral plates are directed posteriorly and do not possess externo-lateral expansions. The lateral plates bear a pair of large projections at their antero-lateral (AP)

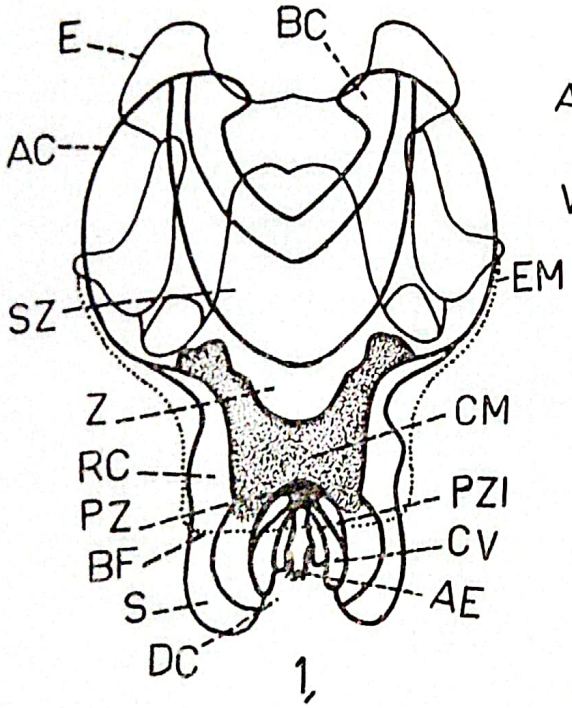
margins which are constricted basally. A pair of small hook-like processes (L)—posterior projections of Dirsh (1956)—are situated on the posterior ends of the lateral plates. These structures are, in fact, the lophi which are anteriorly directed and upcurved, their apices being acute. A pair of elongated club-shaped structures (A)—dorso-lateral appendices of Dirsh (1956)—are attached submarginally to the posterior parts of the anterior projections and are closely applied to the lateral plates. Their apices do not extend as far as the bases of the lophi. Roberts (1941) and Dirsh (1956) indicated the possibility that these may be homologous with the oval sclerites of other acridoids. The term "appendices" is preferred here as the word "Oval" is scarcely appropriate for these sclerites. The anconae of other acridoids is entirely wanting.

The ectophallus (Figs. 1, 2 & 3) of *Poekilocerus pictus* is differentiated into ectophallic membrane and sclerotized cingulum.

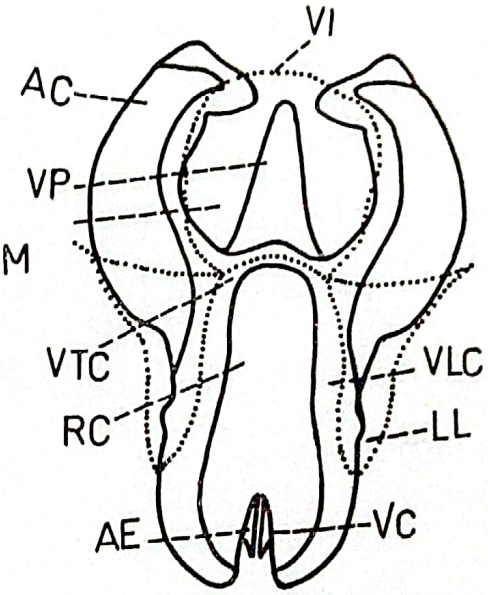
The ectophallic membrane (EM) is composed of two layers: an inner, thin, and an outer, thick membrane, which partly encloses the aedeagus. The thin layer is joined to the suprazygoma and rami and extends to the distal dorsal part of the cingulum. In this region it becomes reflexed to form the basal fold (BF) which partly covers the valves of the cingulum and the aedeagus. The outer ectophallic membrane runs antero-dorsally as far as the epiphallus. The mesal and lateral parts of the membrane are attached to the posterior margins of the epiphallic bridge and lateral plates. The outer and inner layers of the ectophallic membrane extend laterally on either side of the cingulum to form the lateral lobes (LL) which are bilobed and joined to the rami. The ectophallic membrane also develops a thin pouch-like invagination, the ventral infold (VI) which covers the anteroventral part of the cingulum. The ventral infold forms a triangular ventral process (VP) with rounded apex which does not extend as far as the base of the cingulum.

The cingulum is strongly sclerotized and capsule-like. It is pear-shaped, broad at base, narrow distally with a sharp constriction in the middle. The cingulum entirely envelopes the endophallus.

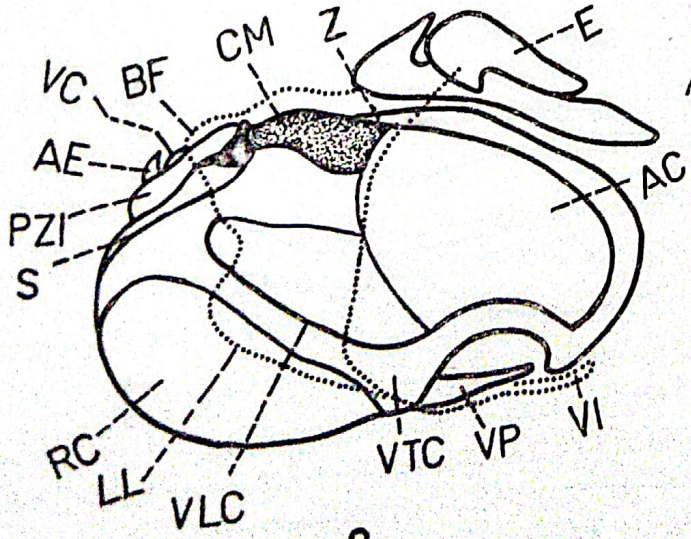
The zygoma (Z) of *Poekilocerus pictus* is large and bears a median lobe. It carries at its proximal end a dorsal suprazygomal plate (SZ) to which the inner layer of ectophallic membrane is attached. Latif *et al.* (1959) showed that the zygoma is a "transverse bar"—a condition which is never observed in pyrgomorphs. Besides, they are silent about the presence of suprazygoma. The zygoma and the rami together enclose a membranous area, the central membrane (CM). A


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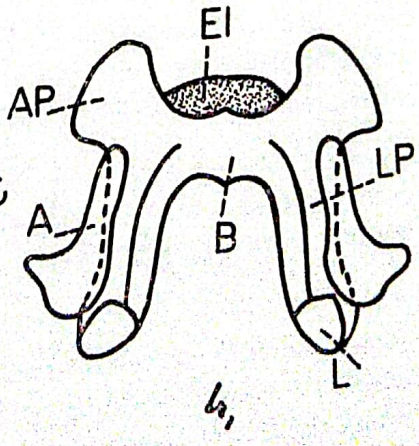
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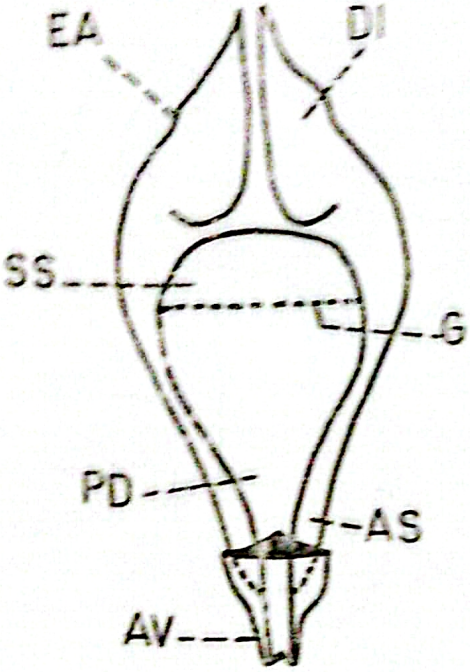
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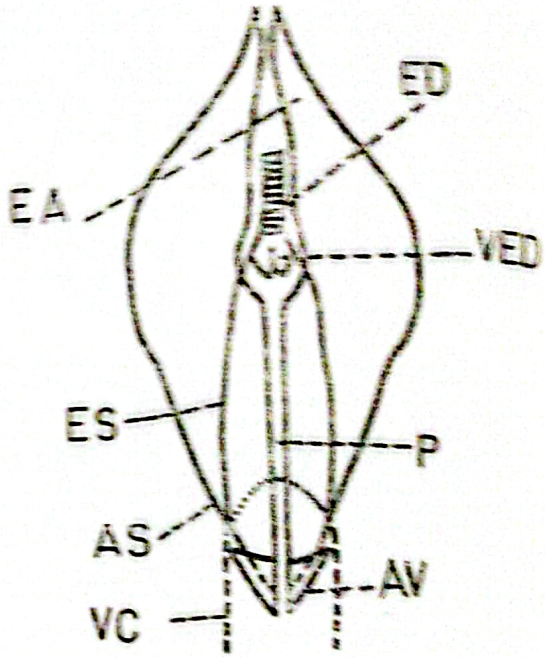
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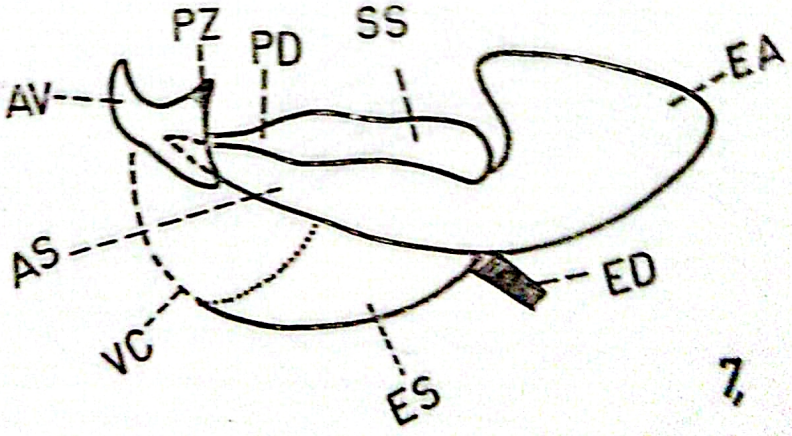
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small transverse sclerite, the pseudoarch (PZ) is developed in the distal part of the central membrane close to the base of the suprarami. It forms an inflection (PZI) laterally, and carries dorsally a pair of valves of the cingulum (CV). Latif *et al.* (*l.c.*) overlooked presence of the central membrane, the pseudoarch and its inflection. They have showed that the valves of the cingulum are developed by the rami on the ventral side of the cingulum. It may be mentioned that the valves of the cingulum are dorsally placed and never ventral in position.

The apodemes of the cingulum (AC) extend anteroventrally from the zygoma as broad plates which are produced antero-ventrally into points. The apodemes are incurved and their apices are not widely separated ventrally. The basal thickening (BC) extends around the apodemes, along the anterolateral region of the cingulum and is continued across the rami as ventral longitudinal thickenings (VLC). The latter develops a transverse thickening (VTC) at the base of the ventral process.

The rami of the cingulum (RC) extend laterally and posteriorly from the zygoma and each is divided into a dorsal small supraramus and a large, ventral part, the ramus of the cingulum. These are excised ventrally and, together with the endophallic membrane, form a slit-like opening, the ventral cleft (VC) which extends dorsally as dorsal cleft (DC) between the valves of the cingulum.

The endophallus (Figs. 5, 6 & 7) of *Poekilocerus pictus* is differentiated into endophallic sclerite, spermatophore sac and ejaculatory sac.

Each endophallic sclerite is divided into a basal, flared endophallic apodeme (EA), and an apical, rod-like aedeagal sclerite (AS). The endophallic apodemes form a dorsal inflection (DI) which does not cover the spermatophore sac. The aedeagal sclerites are undivided and their acute apices are enveloped by the aedeagal valves (AV). The lateral plates and gonopore process of other groups are absent.

The spermatophore sac (SS) occupies a dorsal position in relation to the aedeagal sclerites and distally forms the phallotreme duct (PD). Latif *et al.* (1959) did not show its presence in *Poekilocerus pictus*.

The ejaculatory sac (ES) lies ventral to the aedeagal sclerites. The spermatophore sac and ejaculatory sac communicate with one another through a slit-like connection which marks the position of the primary gonopor (G). The phallotreme duct joins the aedeagal sclerites of the corresponding sides but a ventral union is lacking. Thus the phallotreme (P), instead of being terminal, forms a slit-like

ventral opening which is continuous with the ventral opening of the ejaculatory sac. Latif *et al.* (1959) observed that "the edges of the ventral slit-like opening are continuous with the ectophallic membrane". The phallotreme is, in fact, continuous with the ventral opening of the ejaculatory sac rather than the ectophallic membrane which does not come any where near it.

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