

STRUCTURE AND FUNCTION OF THE MALE GENITALIA OF
THE BADGER LOUSE, *TRICHODECTES MELIS* (FABRICIUS)
(PHTHIRAPTERA: ISCHNOCERA: TRICHODECTIDAE)

BY C.H.C. LYAL

The way in which the male external genitalia of lice function is largely unknown. Copulation has been observed in a few species (Sikora & Eichler, 1941, Schmutz, 1955), but the published accounts dwell more on the relative positioning of the male and female than on the operation of the genitalia. This paper is an attempt to redress the balance by describing the copulation of a species of trichodectid mammal louse, *Trichodectes melis*. However, this species cannot, unfortunately, be taken as "typical" of lice or even of members of its family, as the male genital structure of Trichodectidae is very variable, and the modes of operation must be equally diverse (Lyal, 1985). The description of genitalic functioning below is therefore likely to be applicable only to those species with similar morphology to *Trichodectes melis* (*T. canis*, *T. pinguis* and *T. vosseleeri*). Terminology is applied according to Snodgrass (1935) and Lyal (1983, 1986).

In general the male genitalia of lice comprise a pair of parameres, a pair of mesomeres, a more-or-less sclerotised "basal apodeme" and an eversible endophallus. In most or all species the endophallus is permanently partially everted and fused to the inner faces of the parameres and mesomeres. The parameres lie laterally or ventrally to the endophallus and may be fused together, and the mesomeres lie laterally or dorsally to the endophallus and also may be fused (Lyal, 1983, 1986). During copulation the endophallus generally everts into the female genital chamber. Spermatophores (and a sclerotised transfer apparatus) are found in only a few lice, and not in Trichodectidae; the species dealt with in this paper thus transfers free sperm.

In *Trichodectes melis* the mesomeres are apparently absent and the genitalia comprise a basal apodeme with broad lateral struts, a pair of half-cylindrical, pointed parameres, and a spiculate, fully-eversible endophallus (fig. 1). The ventral longitudinal margin of the paramere is virtually straight basally and deeply concave distally, whilst the dorsal margin is shallowly convex basally and shallowly concave distally; when at rest the parameres form a tapering cone with the ventral margins overlapping basally and the dorsal margins not meeting. This dorsal gap between the parameres is closed by a faintly-sclerotised tongue-shaped plate probably derived either from the endophallus membrane or the mesomeres. The endophallus is permanently everted for about half the length of the parameres and fused to them, except from along the dorsal and ventral midlines where fusion ceases submarginally (fig. 2). The width of the endophallus membrane uniting the parameres is greater

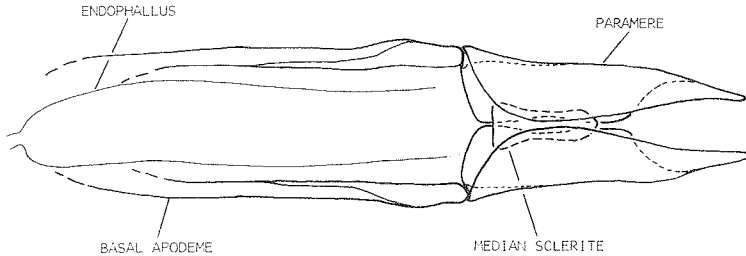
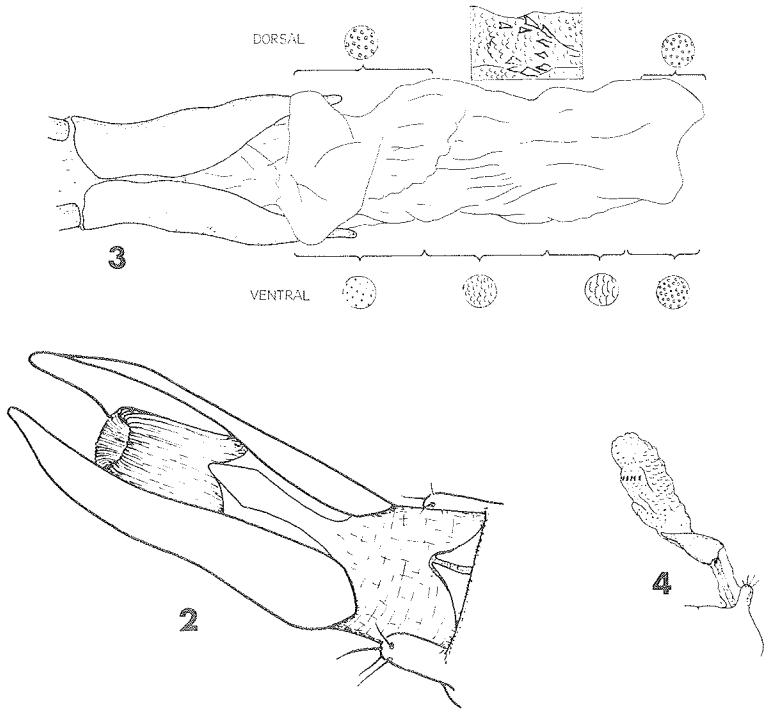


Fig. 1. *Trichodectes melis* male genitalia, dorsal, with terms used in this study. Junction of endophallus and parameres, and spiculation of endophallus, omitted for simplicity.

apically than basally, allowing divergence of the apices of the parameres during copulation whilst controlling the degree of that divergence.

Copulation has been observed twice in *T. melis* during the course of this study. In both cases the insects adopted a "back-to-back" position. This was unexpected, the normal position for ischnoceran lice being with the dorsum of the male adjacent to the venter of the female (Werneck, 1936; Sikora & Eichler, 1941; Schmutz, 1955). The "back-to-back" position was assumed in both cases as the insects came into contact through fortuitous positioning on adjacent hairs. On coming into contact, the male clasped the female around the thorax-abdomen constriction with his antennae which, as in most male Trichodectidae, are specially modified for this purpose (Lyal, 1985). The apex of the male abdomen protruded slightly posterior to that of the female and curved dorsad. As the abdomen curved the genitalia were partially extruded, the apices of the parameres lying together, and the articulation between the basal apodeme and the parameres flexed so that the parameres were directed antieriad, parallel to the long axis of the male. The male then commenced side-to-side "searching" movements of the tip of the abdomen, terminating when the male genitalia were in line with the female genital opening. The means by which the male sensed this positioning are not known; had the insects been in the more "normal" position noted above, the long setae present in two tufts posteriorly on sternum IX of the male (fig. 2) would probably have contacted the female abdomen first and so been able to sense the position. Elongate setae or pseudostyli (Lyal, 1985) are present on the end of sternum IX in many Trichodectidae. As the searching movement ceased the male increased the curvature of the abdomen, directing the genitalia into the female subgenital chamber (the space between the subgenital lobe and the postgenital sterna). At this point the parameres were fully closed against one another, forming a cone as described above. Were the endophallus not protected by this conical "capsule" formed by the parameres and the dorsal sclerite it would probably be damaged by this movement, as the female subgenital lobe of *T. melis* is fringed with spines, and the postgenital sterna are also spinous. After



Figs 2-4. *Trichodectes melis* male genitalia: - 2, Dorso-lateral aspect, partially extruded from abdomen; 3, Showing endophallus artificially everted, ventral aspect, with details of endophallus ornamentation dorsally and ventrally; 4, With endophallus artificially everted and genitalia extruded from abdomen, showing position of row of spines on endophallus.

the "capsule" passed between the subgenital lobe and the postgenital sterna the parameres opened and the endophallus everted. The precise placement of the endophallus could not be observed, but some conclusions can be drawn following dissection of specimens of both sexes. The endophallus probably everts to a balloon shape, but this cannot be observed in living specimens; in dead specimens the endophallus collapses but when artificially everted it appears as a crumpled cylinder (fig. 3). Even accounting for the distortion caused in artificial eversion, the endophallus appears too long to fit completely in the female genital chamber. Thus, when everted, some of the membrane must lie between the subgenital lobe and the postgenital sterna, the parameres having been slightly withdrawn by the male. The spines of the postgenital sterna are all directed posteriad, so the endophallus, if it presses down on the spines, should not be damaged. The endophallus is covered in chitinous spiculation, with a row of heavy spines dorsally (fig. 3, 4). The spicules presumably press against the sides of the female genital

chamber providing an anchor, but the presence of the row of spines suggests that a similarly specialised structure should be present in the female for these to act against. The most likely structure is the thickened vulval margin, and pressure of the spines against this would further limit accidental movement once copulation had commenced. Kéler (1938) comes to the same conclusion, but it is unclear from his work whether or not this is based on observation of copulation.

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May 15th, 1985.

New county records for Stenus butrintensis Smet. (Col., Staphylinidae). — I can add the following localities for *Stenus butrintensis* Smet. which was added to the British list by Allen (1978 *Entomologist's mon. Mag.*, 113: 63), where he recorded it from 5 counties:

EAST SUSSEX: Piltown Pond, iv-v.1978 (J.A. Owen); Rye Harbour, v.1978 (J.A. Owen); High Cross Lake near Uckfield, 7.iv.1981 (P.J. Hodge). NORTH SOMERSET: Berrow golf course, 3.iv.1981 (P.J. Hodge). ISLE OF WIGHT: Red Cliff, Sandown, 11.iv.1983 (P.J. Hodge).

All my specimens were found in the stems of *Typha latifolia* L.

I thank Prof. J.A. Owen for allowing me to include his records. — PETER J. HODGE, 8 Harvard Road, Ringmer, Lewes, East Sussex, BN8 5HJ; *March 24th*, 1985.

[While the extremely similar and closely related *S. pallitarsis* Stephens is very widely distributed in the British Isles, being found virtually throughout Ireland as well as to the very north of Scotland, *S. butrintensis*, on present evidence at least, appears to be confined in the British Isles to southern Britain, where it has now been found in most counties from Somerset east to Essex. P.M.H.]

Ditta hibernica (Carpenter) (Thysanura, Machilidae) in South Wales. — Individuals of this species were found amongst stones of a derelict drystone wall in the valley of the Afon Alun, a branch of the Ogmor, in Glamorgan (SS 912757), 25.ix.1983. The valley is well-wooded, with oak, ash, field maple and hazel, and the wall in question was shaded. Delany (1954, *Handbk Ident. Br. Insects*, 1(2)) summarised the known British distribution of this bristletail up to that date, and does not mention S. Wales. I know of no subsequent reports from the Region. The site is, I believe, on Carboniferous Limestone, and the situation is thus very similar to areas of the Cotswold Hills in Gloucestershire where the species abounds. — K.N.A. ALEXANDER, Biological Survey Team, National Trust, Spitalgate Lane, Cirencester, Glos. GL7 2DE; *February 26th*, 1985.