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Possible phoretic association between mallophagan and flea ectoparasites of the badger, *Meles meles* (L.)

An adult female badger was found in a comatose condition in the Wirral Country Park in June 1979; it subsequently died and was examined at the University of Liverpool Veterinary Field Station. The animal was infested with a total of 754 chewing lice, *Trichodectes melis* (Fabricius). Other ectoparasites found were: ticks—larvae, nymphs and adult females of *Ixodes canisuga* Johnston (total 128), plus one engorged adult female *I. hexagonus* Leach; mesostigmatic mites (83, species undetermined) and six fleas, all female *Paraceras melis melis* (Walker), to one of which a *T. melis* was firmly attached. The two insects were processed as one and mounted on a slide, still in association (Figs. 1, 2). The mandibles of the louse are seen grasping the left fore tarsus of the flea.

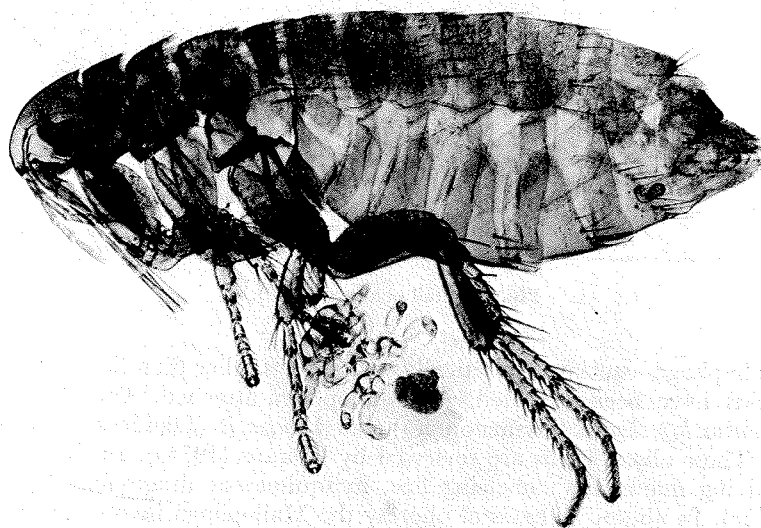


Fig. 1. *Trichodectes melis* attached to left fore tarsus of *Paraceras melis* ($\times 24$).

Thompson (1934) was the first to record this particular flea-louse relationship in material he examined from a badger collected in the Crimea. Smit (1953) found the same species of louse attached to a female badger flea of a different species (*Chaetopsylla trichosa* Kohaut) collected in Denmark in 1939. In both cases attachment was to the tibiae of the fleas and it is possible that processing of the present specimens resulted in movement of the louse to its more distal position.

In 1973, Thompson published records of *T. melis* and *P. melis* recovered from four badgers in the Midlands and South of England. In three of these cases the ectoparasites were together in collecting tubes but remained unattached until alcohol was added when some of the lice attached themselves to the legs of fleas during a brief struggle for survival.

These observations led Thompson to conclude that the relationship was unnatural. In the case reported here fleas and lice were placed in separate tubes of alcohol immediately after removal from the host (as were also the ticks and mites), thus precluding the possibility of later attachment. The critical test to establish if lice are carried by fleas in natural conditions, suggested by Smit (1953), does not yet seem to have been done. This requires releasing 'clean' fleas for a few hours onto a recently killed, louse-infected badger and later re-examining the fleas for attached lice.



Fig. 2. Detail of above ($\times 50$).

Many Mallophaga associate phoretically with insects other than fleas. Over 30 species of hippoboscids have been collected with Mallophaga attached. There are also single records of *Bombus hyperboreus* (Hymenoptera) and *Vanessa io* (Lepidoptera) carrying bird Mallophaga. These observations are reviewed by Kierans (1975a). In the few records of phoresy involving mammalian chewing lice, mosquitoes or dragonflies act as carriers, Kierans (1975b). In almost all cases of phoresy the Mallophaga involved are Ischnocera, not Amblycera—perhaps because the mandibles of the former are better suited to grasping arthropod limbs or integument (Kierans, 1975a).

High proportions of hippoboscid flies have been found carrying lice—more than 40% in one study (Corbet, 1956), hence the association seems of considerable importance in the dispersal of at least some Mallophaga which parasitize birds. If a host animal dies the relatively immobile ischnocerans are likely to perish with it unless assistance is provided in locating a new host. Phoresy secures this advantage for individual lice but there may also be genetic advantage for the species in the wide dispersal accomplished by this means. It seems probable that *T. melis* has developed a similar survival mechanism to that adopted by related mallophagans.

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