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A SPECIES OF HAPLOPHTHALMUS NEW TO BRITAIN

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INTRODUCTION

Members of the genus Haplophthalmus are small (<5 mm in length) poorly-pigmented soil-dwelling isopods with pronounced longitudinal ridges on the tergites. The situation regarding the identity, nomenculature and validity of species within the genus is, to say the least, confused. In this article we attempt to unravel some of this confusion and describe the features that enable the three species which are now known to occur in Britain and Ireland to be identified.

BRITISH KEYS TO SPECIES OF HAPLOPHTHALMUS

Both Edney (1954) and latterly Sutton et al (1972) have relied mainly on tergal ornamentation in their keys to Haplophthalmus in Britain. In Sutton et al (1972), the key on page 88 states the following;

Sub-Family Haplophthalminae

Key to Genus Haplophthalmus

1. Ridges on dorsal surface of pereionites usually with 3-4 teeth (fig. 22A); any projections close to mid-line on 3rd pleonite very feeble — Haplophthalmus danicus

   Ridges on dorsal surface of pereionites usually with more than 4 teeth (fig. 22C); prominent pair of projections on 3rd pleonite — Haplophthalmus mengei

In the guide to French terrestrial isopods by Vandel (1960), Haplophthalmus danicus is the only species described without prominent projections on the 3rd pleonite. However, Vandel describes at least five species of Haplophthalmus which do have prominent projections on the 3rd pleonite, and whose general morphology is similar to the species Haplophthalmus "mengei" of British authors. There were thus two possibilities. First, the species we have been calling Haplophthalmus mengei in Britain was not in fact this species but was one of the others described by Vandel (1960). Second, there may have been more

than one species 'hiding' within records for Haplophthalmus "mengei" submitted to the Non-Marine Isopod Survey Scheme.

We therefore set out to study these possibilities by re-examining specimens of Haplophthalmus in our own reference collections, and those of Arthur Chater, Gordon Corbet, Paul Harding, Eric Philp and Adrian Rundle, from a wide range of sites in Britain and Ireland. These specimens were compared with the descriptions of species of Haplophthalmus given in the most recent European publications (Table 1).

CHARACTERS USED TO IDENTIFY HAPLOPHTHALMUS SPECIES

Three main characters have been used by European authors to separate different species of Haplophthalmus. First, tergal ornamentation, second, the arrangement of spines and structure of the 7th pereiopods (legs) of males and third, the structure of the endopodites of the 1st pleopods of males (which are on the posterior ventral surface and are used for sperm transfer to the females during mating).

1) Tergal ornamentation

a) Validity

Vandel (1960) makes considerable use of the arrangement of ridges and the shape of projections on the dorsal surface of the pereionites and pleonites for the identification of species of Haplophthalmus, and even provides a key (p. 360) for the identification of females based on this feature. However, he states in his introduction to the key to females that tergal ornamentation does not enable "une détermination absolument certaine".

b) Conclusions based on examination of British material

We have found considerable within-species variation in the tergal ornamentation of the pereionites between individuals from the same site and populations which are clearly of the same species (based on male 7th pereiopods and genitalia) from different sites. On the 3rd pleonite, the absence of prominent projections was a reliable character on which to separate Haplophthalmus danicus from other members of the genus in almost all specimens examined. However in a small number of Haplophthalmus danicus, these projections were quite large and in a small number of Haplophthalmus "mengei", they were quite small. This had led to mis-identification of the species in four cases. We conclude therefore that tergal ornamentation is not a completely reliable specific character to use, at least until the variability within and between populations of the same species has been quantified, preferably by scanning electron microscopy.

2) 7th pereiopods (legs) of males

a) Validity

The arrangement of spines and structure of the 7th (last) pair of legs of males is usually species-specific. Although this is a much more reliable character than tergal ornamentation, we have still found within-species variation in the presence or absence of particular spines and their arrangement. This even extends to differences between the right and left legs of the same individual. Presumably, spines may be broken off, bend, or fail to form properly during hardening of the new cuticle after moulting. It is therefore best to examine both 7th legs of individual males and to examine more than one specimen if these are available. The orientation is also critical and the same leg appears quite different depending on whether the internal or external face is being examined.

b) Conclusions based on examination of British material

The specimens of Haplophthalmus which we examined could be split into three distinct groups.

GROUP 1 - Haplophthalmus danicus (Budde-Lund 1880)

The structure and arrangement of spines on the 7th pereiopods of all male in this group were identical with illustrations of Haplophthalmus danicus given by the European authors listed in Table 1. The structure and arrangement of spines is distinctive (Fig. 1a, b) and is a reliable feature on which to separate Haplophthalmus danicus from other species of Haplophthalmus.

GROUP 2 - Haplophthalmus mengei (Zaddach 1884)

The structure and arrangement of spines on the 7th legs of males in this group agreed closely with diagrams of Haplophthalmus perezi in Vandel (1960)(= Haplophthalmus mengei of subsequent authors, see Table 1), the most characteristic features being the position of spine X on the internal face of the carpus near to its junction with the propodus, and the "swollen" appearance of the spines on the ventral side of the propodus (Fig. 2). These specimens had therefore been correctly named and were definitely Haplophthalmus mengei (Zaddach 1884).

GROUP 3 - Haplophthalmus NEW TO BRITAIN (N.T.B.)

The structure and arrangement of spines on the 7th legs of two male specimens of Haplophthalmus "mengei" collected in 1964 from Wytham Wood near Oxford by Stephen Sutton, were definitely not the same as those of Haplophthalmus mengei in Group 2 described above, although they did possess prominent projections on the third pleonite. There were three consistent differences (Fig. 2). First, spine X was positioned much closer to the main

group of spines on the distal end of the carpus. Second, the spines on the ventral side of the propodus were thin and never appeared "swollen". Third, the distal end of the carpus possessed a distinct "bulge" which projected externally. This feature is obvious in a binocular microscope when the 7th legs of males are viewed "end on" while still attached to the woodlouse.

We visited Wytham Wood on two occasions during early March 1987 and managed to collect about 30 specimens of Haplophthalmus N.T.B. from what appears to be a thriving population under rotting wood and boulders on the banks of the stream which flows into the Duck Pond at SP 460 075. More male specimens of this species were also discovered in collections of Haplophthalmus "mengei" made from two sites near Maidstone in Kent by Eric Philp and Gordon Corbet in 1985 and 1986 respectively, and from a site in Bedfordshire between Luton and St. Albans by Adrian Rundle in 1977. Records to date suggest that Haplophthalmus N.T.B. favours wetter habitats than Haplophthalmus mengei.

Examination of all the male specimens of Haplophthalmus N.T.B. from the Kent, Oxford and Bedfordshire sites showed that the arrangement of spines on the 7th pereiopods of the males was, like the tergal ornamentation, subject to some variation. This variation was sufficient to allow Haplophthalmus N.T.B. to be keyed out to at least five species of Haplophthalmus based on drawings of the 7th male pereiopods given by European authors (Table 1). Difficulties with using the structure of the 7th pereiopods as a specific character are further compounded by the unfortunate practice of these authors of omitting spines from their drawings if they believe them not to be of diagnostic importance. We therefore had specimens which were definitely not Haplophthalmus mengei but which could have been any one of several species described by European authors (Table 1). The final feature which had to be examined to attempt a firm identification was the structure of the male 1st and 2nd pleopods.

3) 1st and 2nd pleopods of males

a) Validity

In terrestrial isopods, the paired pleopods on the posterior ventral surface are each composed of an 'internal' (endopodite) and 'external' (exopodite) structure. In males, the 1st and 2nd pleopods are modified to form structures for the transmission of sperm to females during copulation. The structure of the 1st and 2nd pleopodal endo- and exopodites of males are invariably species-specific and their examination is the definitive method of confirming the identity of a species (although they are difficult to examine without dissection, particularly in small species; it also means that females of a few species are difficult or impossible to identify).

Vandel (1960) relied on subtle differences in the appearance of the 1st pleopodal endopodites of males to separate several of the species in his "groupe mengei" (see Table 1). However, care should be taken when erecting new species based on very subtle differences in the appearance of these structures as they are liable to swell or contract depending on the mounting medium used for microscopical examination. The method of preservation of the animal is also important; a freshly-killed woodlouse contains a considerable amount of water which will force thin areas of the cuticle to rupture if the isopod is placed straight into water-free, spirit-based solutions.

b) Conclusions based on examination of British material

In Haplophthalmus danicus, the endopodite of the first pleopod of males is very distinctive with a pointed tip (Fig. 1c). In Haplophthalmus mengei, the tip of the 1st pleopodal endopodite of males is also pointed (Fig. 3), appearing "arrow-like" when viewed laterally on intact specimens. However, the tips of the 1st pleopodal endopodites of all the male specimens of Haplophthalmus N.T.B. examined were much more swollen than that of either Haplophthalmus danicus or Haplophthalmus mengei (Fig. 3) and on current knowledge appears to be a reliable character to use to separate it from Haplophthalmus mengei.

IDENTIFICATION OF HAPLOPHTHALMUS SPECIES IN BRITAIN

The absence of prominent projections on the 3rd pleonites is usually sufficient to separate Haplophthalmus danicus from the other species, although the 7th male pereiopods should be checked for certain identification. Species with prominent projections can be provisionally identified by viewing the woodlouse from the side in a binocular microscope. The pleopods of males tend to curl away from the body when the woodlice are preserved in 70% alchohol and the distinction between the "arrow-like" 1st pleopods of Haplophthalmus mengei, and the much more "finger-like" 1st pleopods of Haplophthalmus N.T.B., is easy to see (Fig. 3). Certain identification should be made by careful examination of the spines on the carpus and propodus of the 7th legs of males, and for the presence of the prominent "bulge" on the carpus of Haplophthalmus N.T.B. (Fig. 2).

ASSIGNING A SPECIFIC NAME TO HAPLOPHTHALMUS N.T.B.

Assigning a name to the new British species proved to be problematical. Four species in Vandel (1960) have a relatively broad tip to the 1st male pleopodal endopodite and all have similar male 7th pereiopods, namely Haplophthalmus mengei (= H. montivagus of Gruner, 1966), H. meridionalis, H. provincialis (which includes three subspecies) and H. teissieri. Although further work is required before a firm conclusion can be reached, it does seem possible that these four 'species' are

conspecific. Assigning a specific name to Haplophthalmus N.T.B. must therefore be postponed until a comprehensive review has been conducted of all the species of Haplophthalmus described to date.

CONCLUSIONS

Three species of the genus Haplophthalmus are now known to occur in Britain. Haplophthalmus danicus (Budde-Lund 1880) has probably been correctly identified in the vast majority of cases and the species appears to be widespread in southern England and Wales but is scarce in northern England, Scotland and Ireland (Fig. 4). Haplophthalmus mengei (Zaddach 1884) is probably widespread in Ireland, Wales, north and west England and on Scottish coasts, but appears on current (albeit limited) information to be rare in south-east England where it may be restricted to coastal sites (Figs. 5, 6). A species of Haplophthalmus NEW TO BRITAIN (N.T.B.) is now known to occur in West Kent, Bedfordshire and Oxfordshire (Fig. 7). It has not been possible to assign a specific name to this species pending a review of the Genus. Haplophthalmus N.T.B. seems to prefer damper habitats than Haplophthalmus mengei and should be searched for, particularly in wet deciduous woodland in south-east England.

ACKNOWLEDGEMENTS

We are grateful to Arthur Chater, Gordon Corbet, Paul Harding, Eric Philp and Adrian Rundle for the loan of specimens and to Dr. C. Gibson (Warden) and Mr. B.E. Rivers (Oxford University Land Agent) for permission to sample in Wytham Woods.

REFERENCES

DOMINIAK, B (1961). Badania nad Rownonogami (Isopoda, Crustacea) z Rodzaju Haplophthalmus Schobl. W. Polsce. Badan. fizjogr. Pol. zachod., 8, 7-22.

EDNEY, E.B. (1954). British Woodlice. (Synopses of the British Fauna, no. 9), London, Linnean Society.

GRUNER, H.E. (1966). Die Tierwelt Deutschlands: Krebstiere oder Crustacea. 5: Isopoda, vol. 2. Jena: Fischer.

HARDING, P.T. & SUTTON, S.L. (1985). Woodlice in Britain and Ireland : Distribution and Habitat. Huntingdon, Institute of Terrestrial Ecology.

SUTTON, S.L., HARDING, P.T. & BURN, D. (1972). Key to British Woodlice. London: Ginn.

VANDEL, A. (1960). Isopodes terrestres (Premiere Partie). (Faune de France no. 64). Paris: Lechevalier.

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Table 1 : Synonymy of Haplophthalmus species in some of the most recent European publications.

AUTHOR(S)	SPECIES NAME		
EDNEY (1954)	H. danicus Budde-Lund 1879	H. mengei Zaddach 1884	-
VANDEL[1] (1960)	H. danicus Budde-Lund 1879	H. perezi Legrand 1942	H. mengei Zaddach 1884
DOMINIAK (1961)	H. danicus Budde-Lund 1879	H. mengei Zaddach 1884	H. legrandi n. nov.
GRUNER[2] (1966)	H. danicus Budde-Lund 1880	H. mengii Zaddach 1884	H. montivagus Verhoeff 1941
SUTTON et al (1972)	H. danicus Budde-Lund 1879	H. mengei Zaddach 1884	-
HARDING & SUTTON (1985)	H. danicus Budde-Lund 1880	H. mengei Zaddach 1884	-
HOPKIN & ROBERTS (This paper)	H. danicus Budde-Lund 1880	H. mengei Zaddach 1884	-

[1]Vandel includes another seven species in his "groupe mengei". Four of these (H. meridionalis, H. provincialis (split into three sub-species), H. teissieri, H. transiens) are separated from his H. perezi and H. mengei by very subtle differences in the arrangement of spines on the 7th pereiopods and tips of the 1st pleopodal endopodite of males.

[2]Gruner includes one other species H. mariae (Strouhal 1953) which is very distinctive and is unlikely to have been confused with other species in the genus.

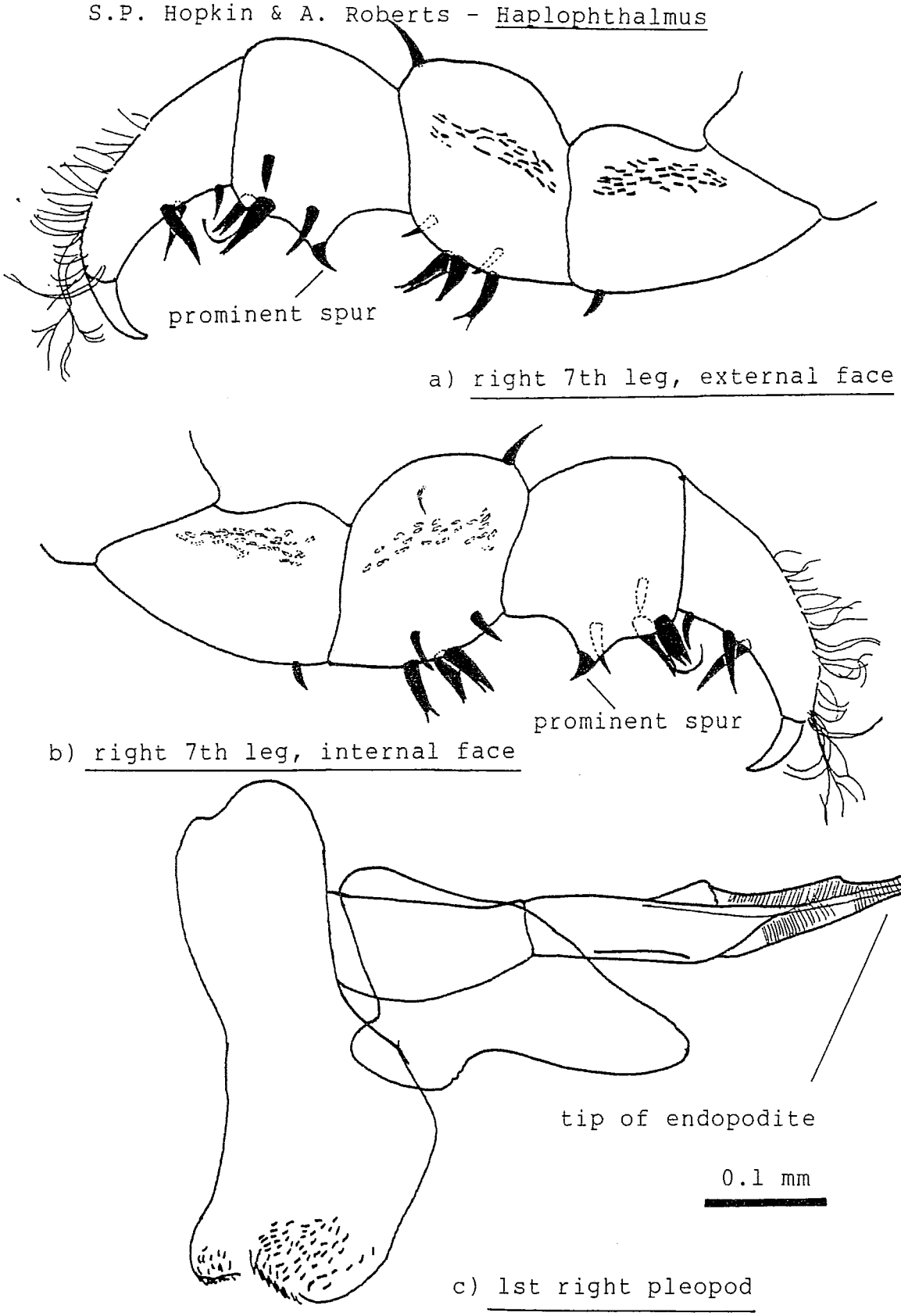


Fig. 1 : Haplophthalmus danicus, male from Moor Copse, Berks. (SU 635 740, 12/6/86). a) Right 7th leg external face. b) same leg, internal face. c) 1st right pleopod. All to same scale X200.

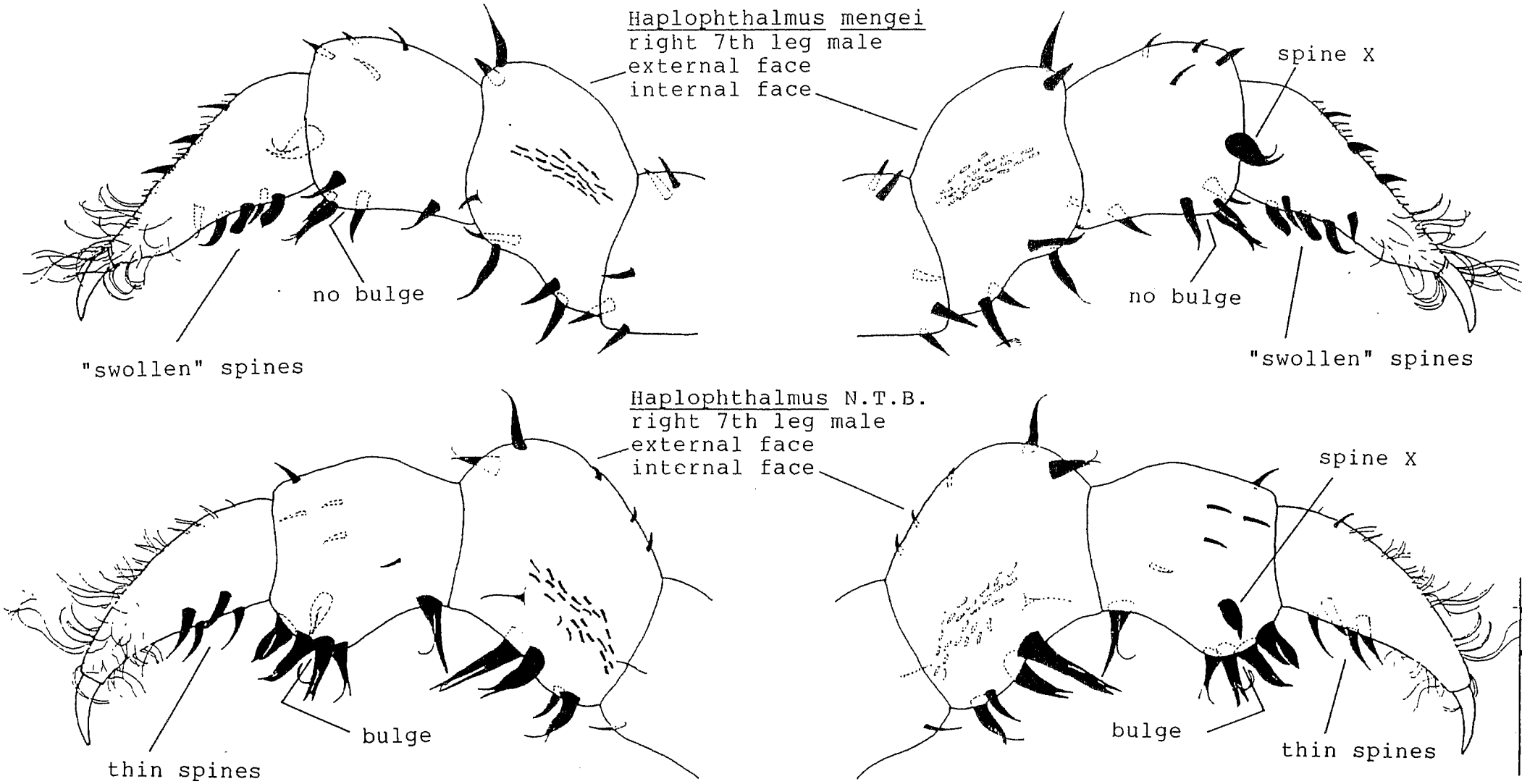
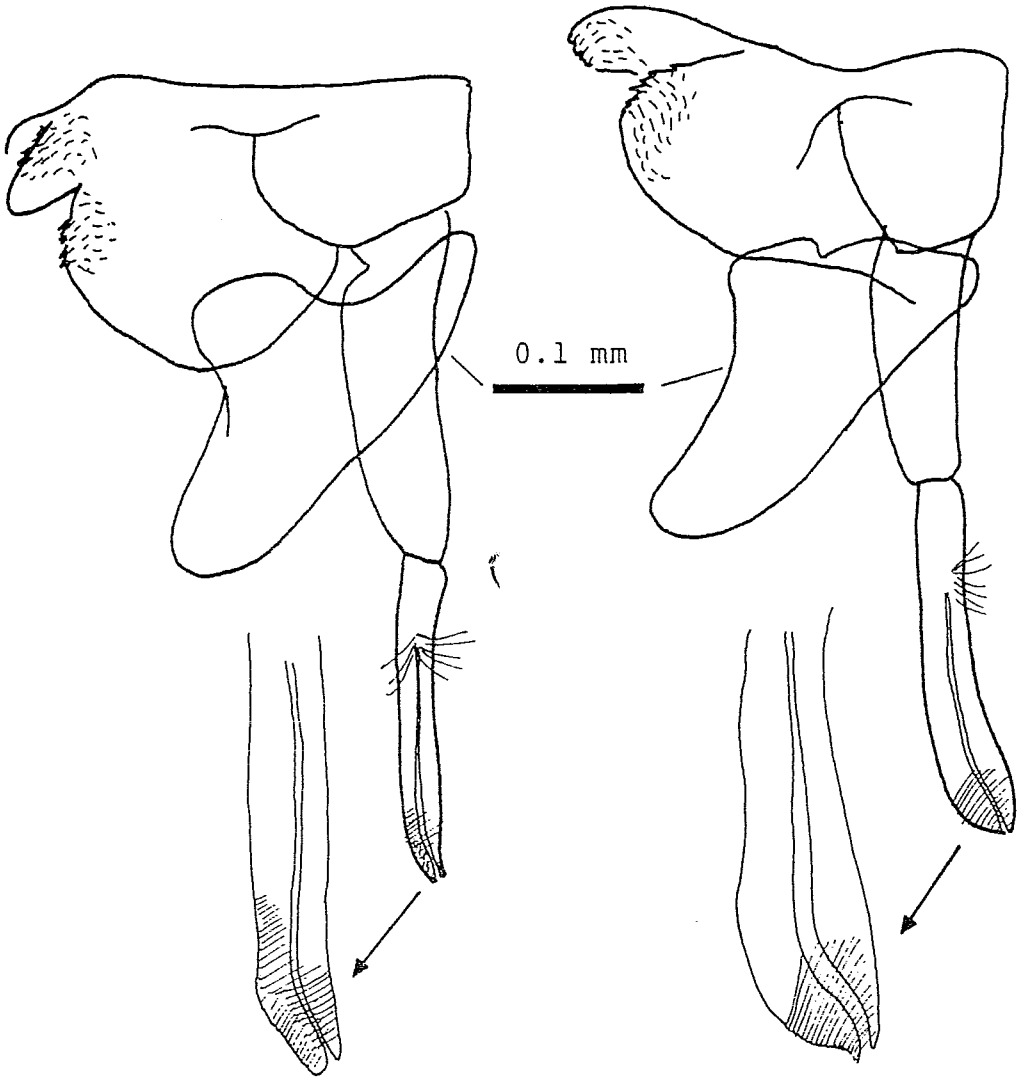


Fig 2 : Internal and external faces of the same 7th right leg from a specimen of Haplophthalmus mengei from St. Bees beach, Cumbria (NX 958 118, 3/8/86) and Haplophthalmus N.T.B. from Wytham Wood near Oxford (SP 460 075, 10/3/87). All to same scale X280



Haplophthalmus mengei	Haplophthalmus N.T.B.
tip of endopodite thin and "arrow-like"	tip of endopodite swollen and "finger-like"

Fig. 3 : 1st pleopods from the right side of the same specimens of Haplophthalmus mengei and Haplophthalmus N.T.B. illustrated in Fig. 2. Both pleopods X200 (tips X400).

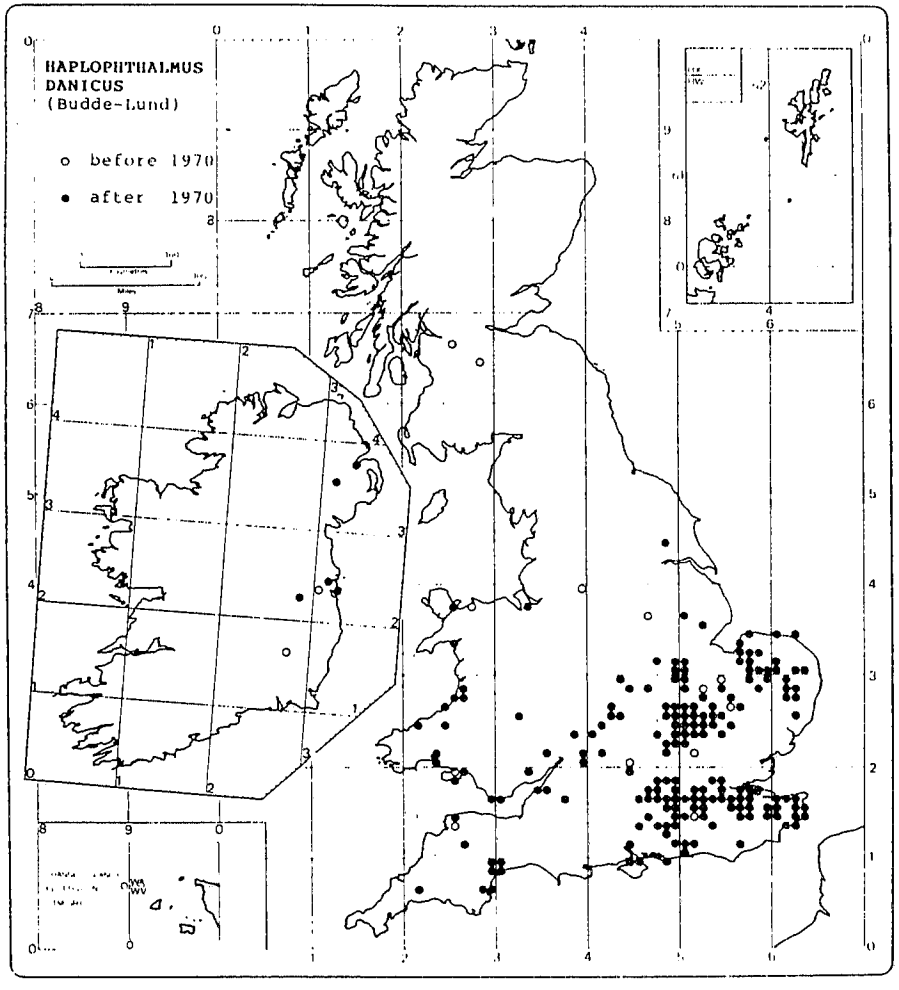


Fig. 4 : Records received to March 1987 of Haplophthalmus danicus.

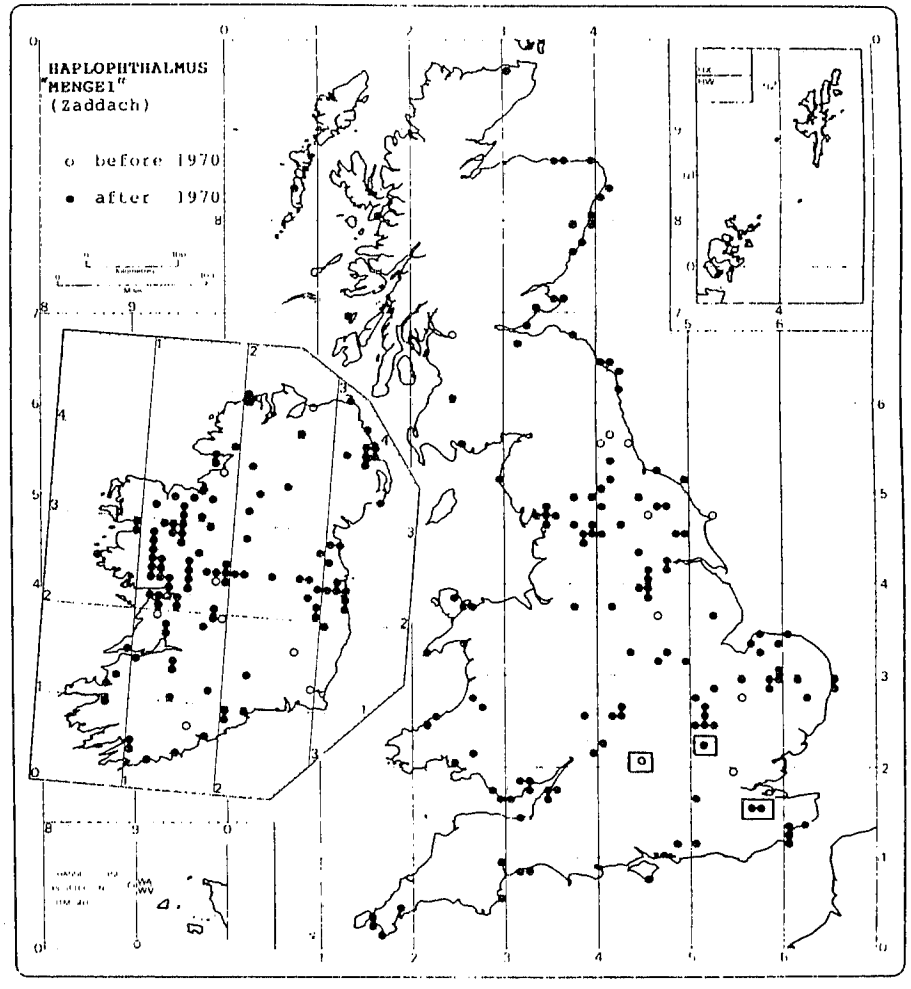


Fig. 5 : Records received to March 1987 of Haplophthalmus "mengei". The three boxes enclose records now known to be of Haplophthalmus N.T.B.

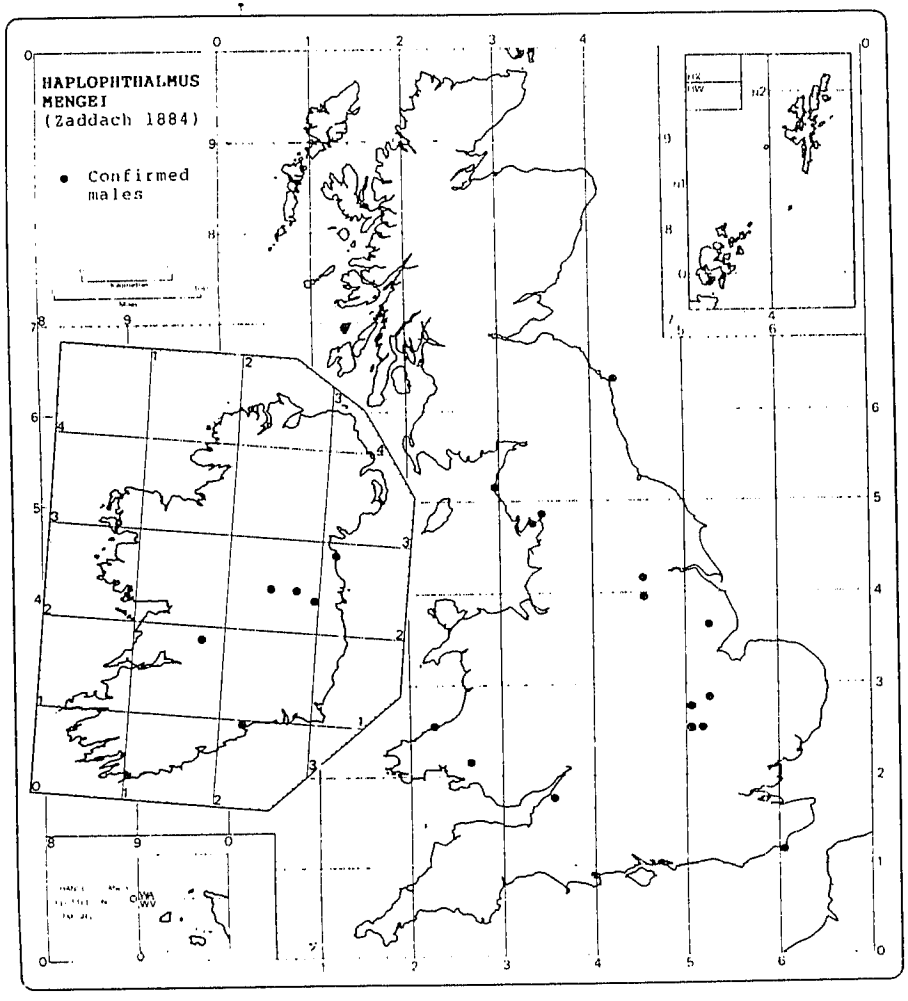


Fig. 6 : Confirmed records of Haplophthalmus mengei based on examination of male 7th pereiopods (legs) and genitalia.

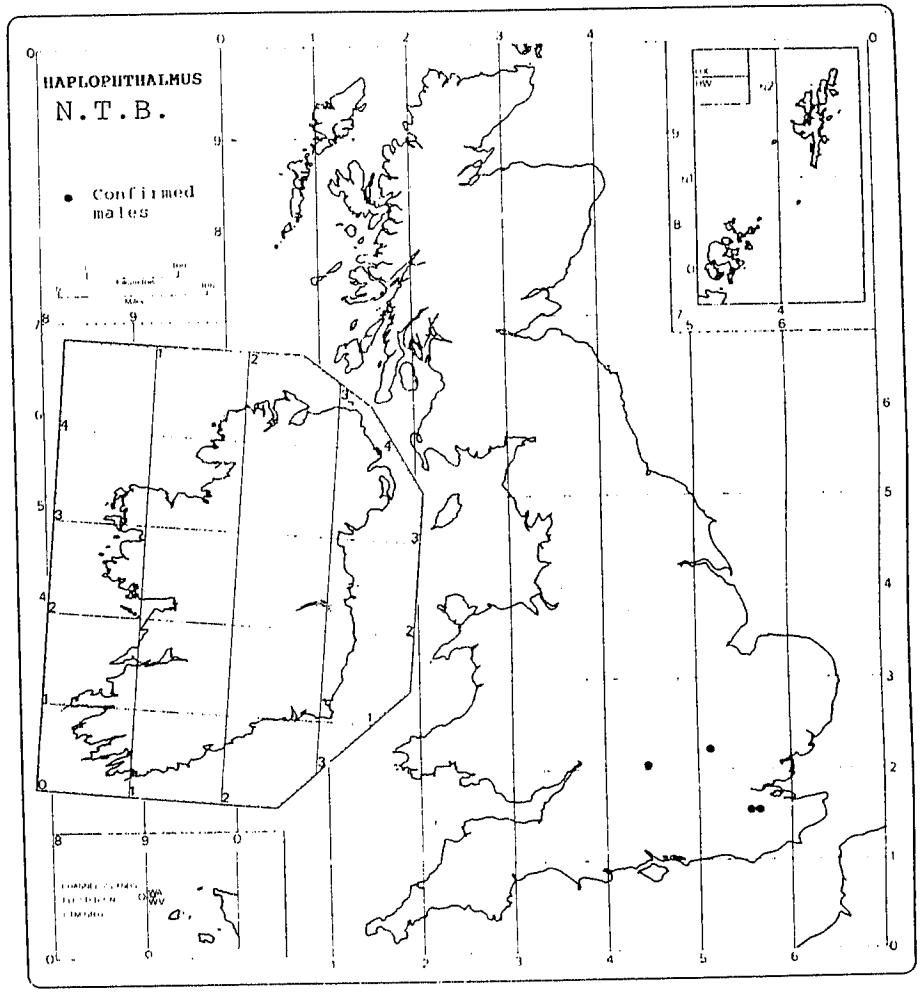


Fig. 7 : Confirmed records of Haplophthalmus N.T.B. based on examination of male 7th pereiopods and genitalia.