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A PRELIMINARY REVISION OF THE PROXENETES GROUP
 (TRIGONOSTOMIDAE, TURBELLARIA). V

BY

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Proxenetes unidentatus nov. sp.

Fig. 18 A, 19; Pl. V, fig. F.

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The animals are linear, 0.8–1 mm long, and greyish-white in colour. The anterior part of the body is obtusely rounded and contains 2 black eyes. The pharynx lies at $2/3$ of the body length and is relatively small. The testes are elongate and extend caudally from the middle of the body; they lie dorsolateral to the pharynx. The vasa deferentia swell at their distal ends into large spermaducal vesicles, which discharge in the somewhat smaller muscular bulbus. The cuticular copulatory organ is 38–40 μ long and triangular in shape. It consists of a wide, open stylet, that distally closes directly into a duct, surrounded by a funnel-shaped cuticular mantle. The proximal part of the stylet is strongly recurved and its extreme tip is connected with the cuticular mantle. The upper margin of the cuticular mantle is obliquely placed and shows a slight curve. The mantle itself shows several folds and when squashed under a coverslip splits into at least 6 proximally coherent spines. Within the mantle two wedge-shaped free spines occur as well. The mantle sheaths $7/10$ – $4/5$ of the length of the stylet, leaving free its proximal end. The distal opening is wide. The vitellaria are elongate sacs, which extend from behind the eyes over $3/4$ of the body length, where they join the germaria. The receptaculum seminis is more or less bean-shaped and ca. 90 μ long. The bursal appendage consists of a double cuticular ring from which two separate parallel ducts arise. These ducts are at their basal part closely coherent, but after an abrupt bend they are well separated. Their total length is only 30 μ . The basal ring is obliquely funnel-shaped and drawn out at one side into a triangle. This triangle has convex sides and is bisected by a strong spine. A short spine strengthens the short wall of the basal ring. The upper ring is thickened and drawn out into 2 diametrically opposite, small spines, the shorter of which is reflexed, and the longer almost perpendicularly placed. The bursal canal is long and only widened at its very distal end, at the transition to the atrium genitale commune. This widening contains a very reduced spine

apparatus. The latter consists of a basal plate, which is 30–35 μ long, very narrow and ca. 20 μ high. On one long narrow side it is fringed with an oblong group of ca. 20 strongly refractive cuticular papillae, which seem to be arranged roughly into two rows. The second papilla is replaced by a 16 μ long, wedge-shaped spine with a recurved tip.

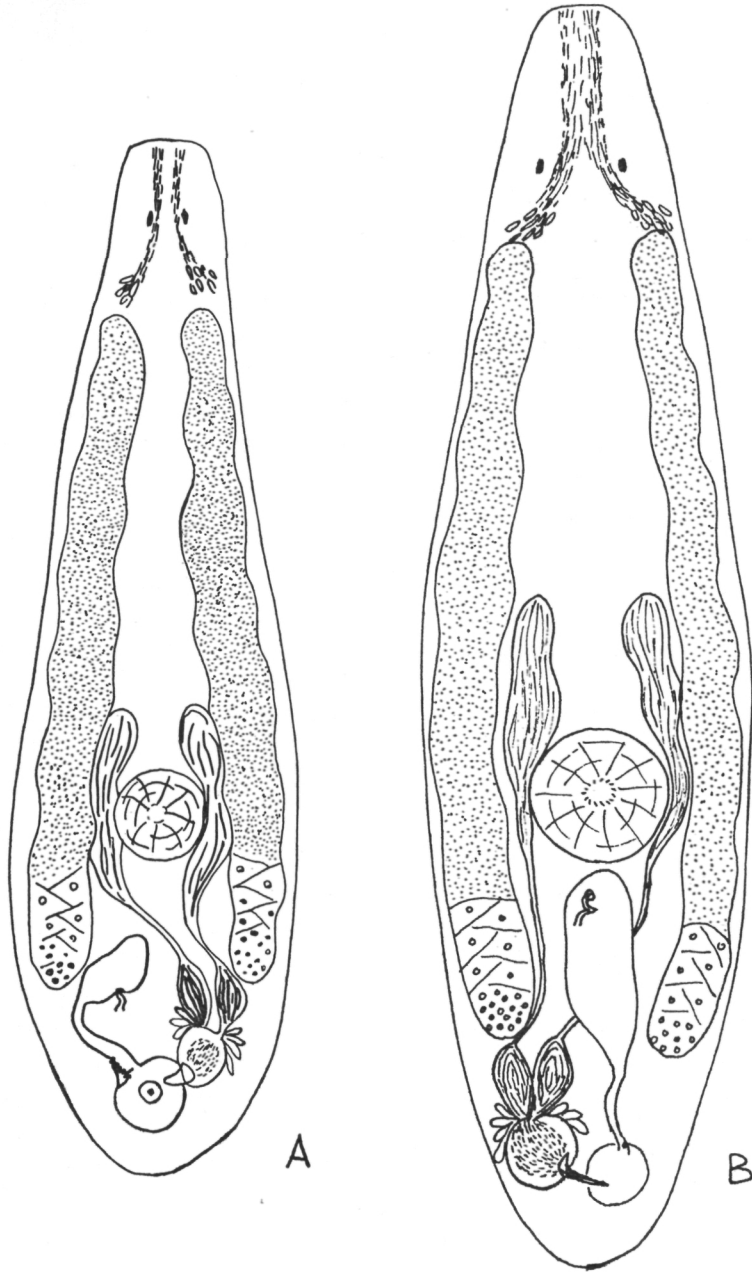


Fig. 18. A. *Proxenetes unidentatus* nov. sp., general view. — B. *P. simplex* Luther, 1948, general view.

LUTHER (1943) published drawings of a specimen of *Proxenetes flabellifer* with 1 spine in the distal end of the bursal canal (f. 39, 47, 51). This specimen, collected at Brännskär near Tvaerminne on the south-western coast of Finland, belongs in my opinion to *P. unidentatus*. LUTHER l.c. also recorded a specimen without a spine apparatus from Tvaerminne (f. 37, 45). The figures of that specimen are very similar to *P. unidentatus*, and I suppose that LUTHER has missed the very inconspicuous spine in

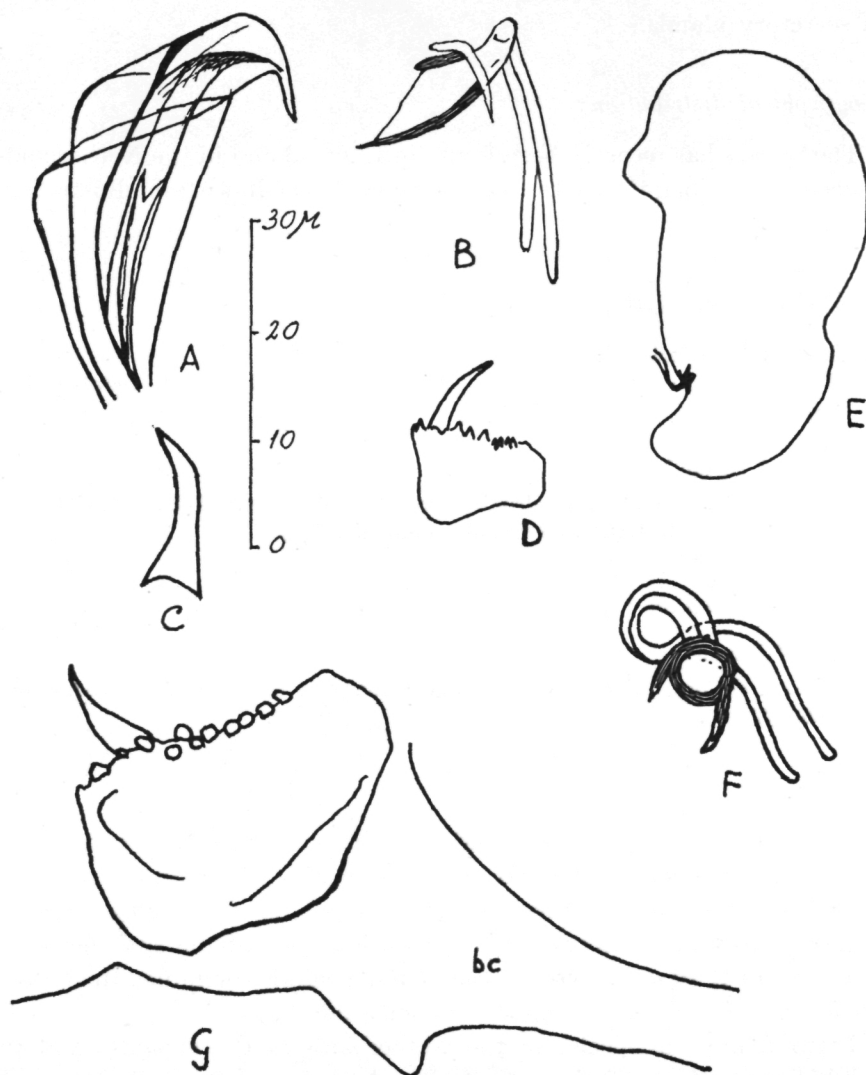


Fig. 19. *Proxenetes unidentatus* nov. sp.: A. Cuticular copulatory organ; B. and F. bursal appendage; C. spine; D. spine apparatus; E. receptaculum seminis with bursal appendage; G. spine apparatus at the distal end of the bursal canal (bc). (A-E after specimens from Aveton Gifford, Devon, F-G after a specimen from Verdrongen Zwarte Polder, Zeeuws Vlaanderen. The scale refers to A-C only, D-G were drawn free hand).

the distal end of the bursal canal. Although I found the spine quite easily in the first of two mature specimens, which I squashed under a coverslip, it took me a long time to find it also in the second one. The species is, however, sufficiently characterized by the shape and the size of the cuticular copulatory organ, the small size of the bursal appendage and the group of cuticular papillae, even if one fails to find the spine in the bursal canal. LUTHER l.c. has drawn in his fig. 37 (reproduced in his 1962 paper as fig. 20 A) the cuticular papillae, but he regarded them as secretory glands.

Geographical distribution:

The species has recently been found in England and in the Netherlands. It occurs also along the south coast of Finland, as follows from illustrations by LUTHER l.c.

Localities in the Netherlands:

Province of Zuid-Holland:

Voorne-Putten: 1. Oostvoorne, Groene Strand, salt-marsh, October 1964 (BILIO, personal communication).

Province of Zeeland:

Zeeuws Vlaanderen: 2. Verdrongen Zwarte Polder near Cadzand, salt-marsh, November 1964 (BILIO, personal communication).

Locality in England:

County of Devon:

Aveton Gifford, salt-marsh along the estuary of the river Avon, September 1964 (Type).

Ecology:

Proxenetes unidentatus was found in the mesohaline section of the river Avon in the muddy bottom of a mixed vegetation of *Puccinellia maritima* and *Glaux maritima*, together with *Macrostomum spirale* Ax, *Placorhynchus o. octaculeatus* and *Provortex pallidus* Luther. One of the specimens had a round egg of 20 μ diameter in the atrium genitale commune. In an other specimen I found the remains of a nematode.

BILIO found the species in the Netherlands in the euhaline and the polyhaline sections of the estuary. In both cases *P. unidentatus* was obtained from the lower part of the *Festuca rubra* vegetation, which corresponds more or less with the plant association *Artemisietum maritimae*. This habitat is situated above mean high-water level and is flooded in winter during springtides, and in summer only sporadically during stormy weather. As the eu- or polyhaline flood water reaches the habitat for a

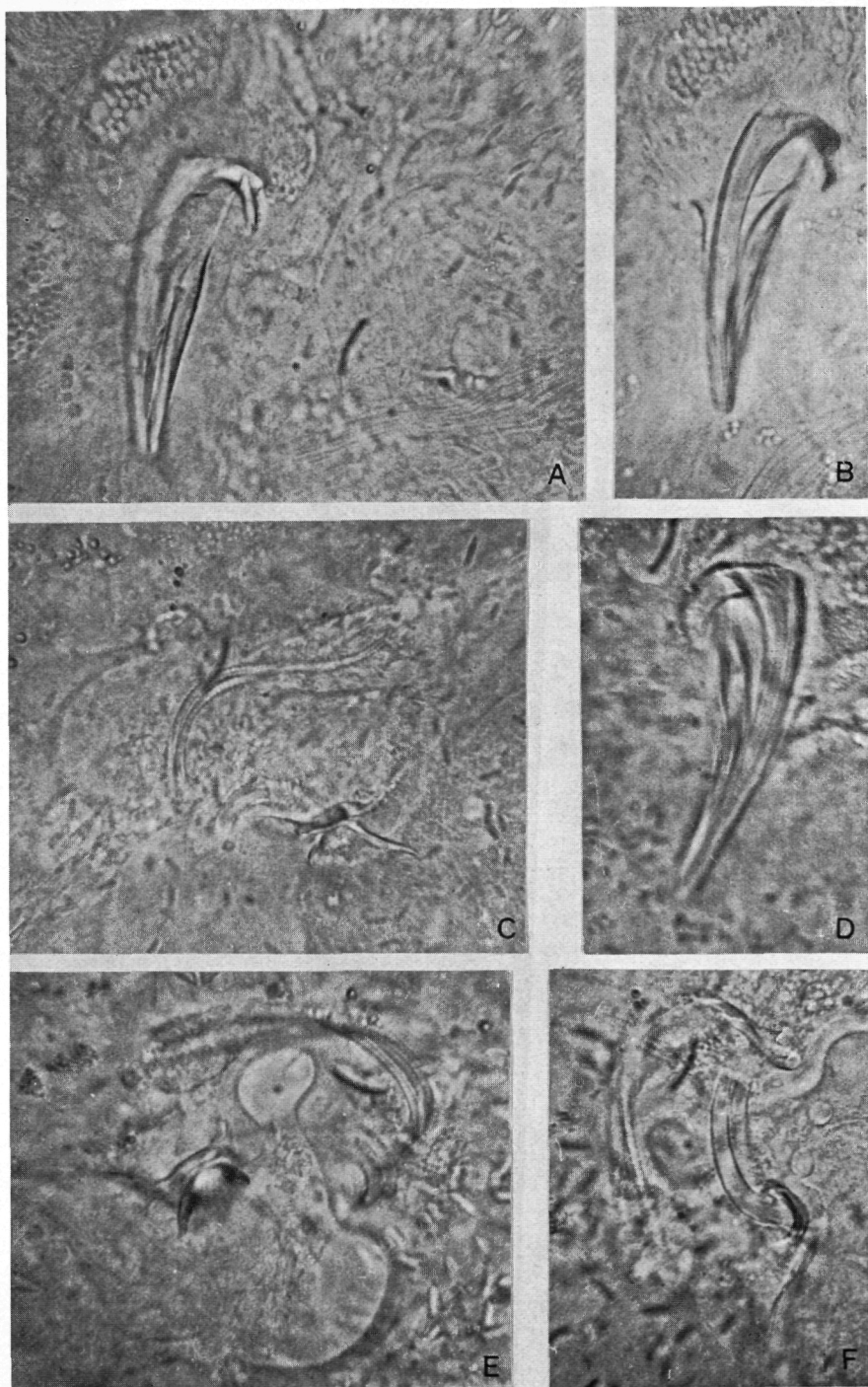


PLATE IV. *Proxenetes simplex* Luther, 1948.

A. Cuticular copulatory organ and to the right the muscular lump in the distal end of the bursal canal. B. Cuticular copulatory organ. C. Bursal appendage. D. Cuticular copulatory organ. E-F. Bursal appendages. (A-C after specimens from the Slack estuary near Ambleteuse, D-F after specimens from the Zwin, Zeewu Vlaanderen).

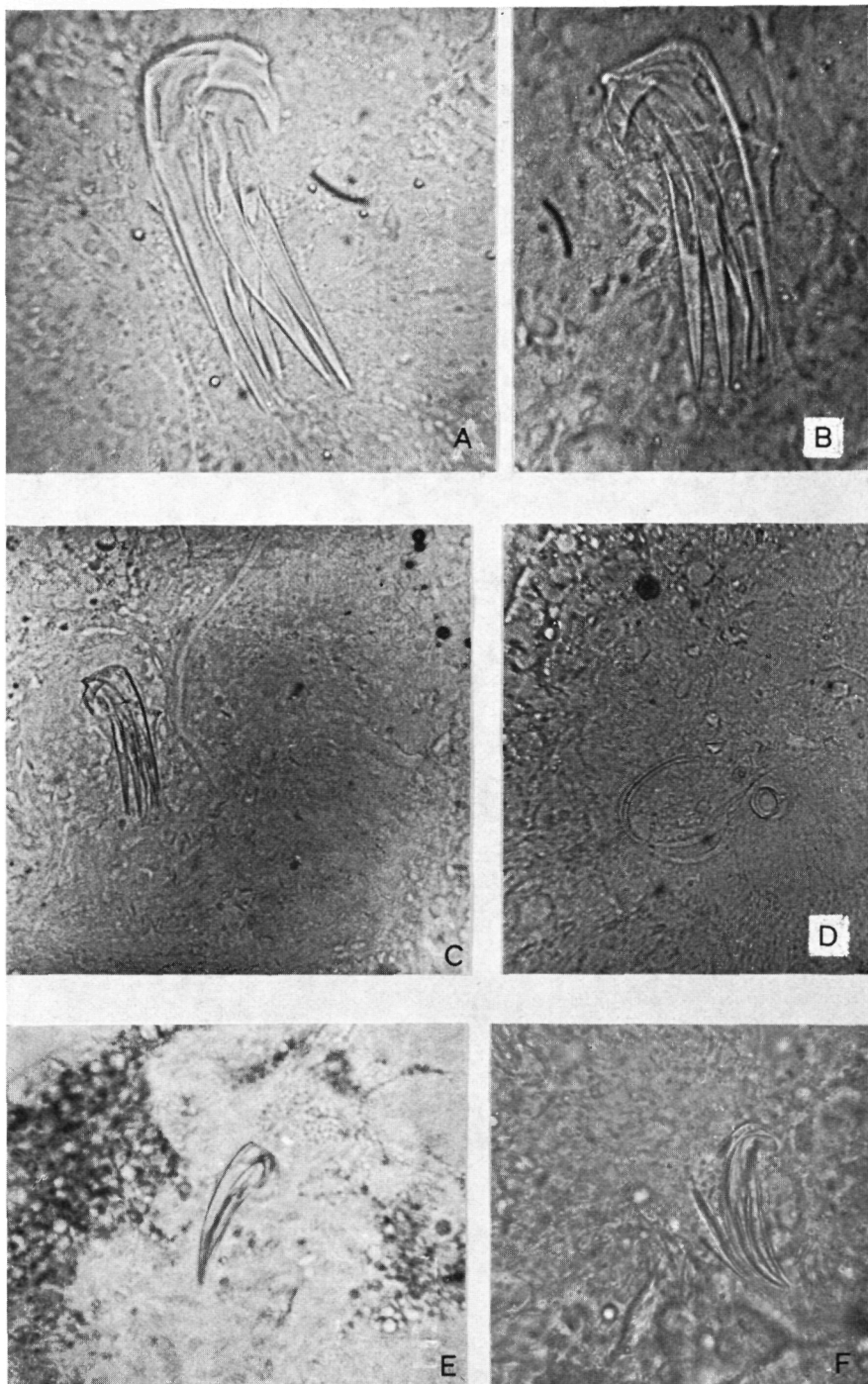


PLATE V. *Proxenetes simplex* Luther, 1948.

A-C. Cuticular copulatory organ, strongly squashed, so that the 4 spines have become clearly visible. D. Bursal appendage, without spiny processes. E. Cuticular copulatory organ.

Proxenetes unidentatus nov. sp.

F. Cuticular copulatory organ. (A-E after specimens from De Paal, Zeeuws Vlaanderen, F after a specimen from Aveton Gifford, Devon).

short time at longer or shorter intervals, dependent on the season, rain and evaporation play an important part in causing considerable fluctuations in salinity. The average salinity of the habitat must be considerably lower than that of the flood water.

The species is probably characteristic for brackish water, as its localities in Finland also have a low salinity.

Proxenetes simplex Luther, 1948

LUTHER, Act. Zool. Fenn. 55, 71-75, f. 98-105 (1948). — Fig. 18 B, 20-22; Pl. IV, V, fig. A-E.

The animals are oblong, 0.9-1.5 mm long, and white in colour. The anterior part of the body is truncate. The black eyes lie at $1/7$ of the body length. The pharynx lies at ca. $2/3-4/5$ of the body length. The testes are elongate and are situated in front of the pharynx. The vasa deferentia, before entering the large muscular bulbus of the copulatory organ, widen into very large, more than 100 μ long, spermaducal vesicles. The cuticular copulatory organ is slender and consists of a 52-62 μ long, slightly curved stylet, open at its proximal end, but soon becoming closed and gradually narrowing in distal direction. The proximal end is cut off straightly or is slightly emarginate and bent downward as a large hook. Distally the stylet is for $2/3-4/5$ of its length surrounded by an oblique, rather close-fitting, cuticular funnel, consisting of two very strong spines. Within the cuticular funnel two smaller, free spines occur. The proximal margin of this funnel is connected with the extreme tip of the proximal hook of the stylet. Among the figures of *P. uncinatus* in LUTHER's publication (1948) fig. 93 represents the copulatory organ of *P. simplex*. The shape of the copulatory organ is very similar to that of *P. angustus*. The vitellaria lie dorsolaterally and are elongate. At their caudal end they continue into the germaria. The receptaculum seminis is an elongate sac, which distally gradually narrows into the bursal canal. In the distal part of the bursal canal, instead of a spine apparatus, a small, muscular, club-shaped lump occurs. This lump measures ca. 15 μ . It is covered with a thin cuticular layer with some small spiny papillae. The bursal appendage, which is placed on an elevation of the outer wall of the receptaculum seminis, consists of a double ring, from which arise two separate, parallel ducts which only coil once. At their base within the ring these ducts are united with their walls. The basal part of the double ring is drawn out into 2 diametrically opposite, reflexed spines, of which the one is considerably longer than the other and often more or less triangular. Both spines lie along the basal part of the fused ducts. The upper part of the double ring shows a unilateral thickening, which is drawn out into 2 opposite, somewhat inflexed spines. I have found, however, specimens in which the ring is devoid of spines, but which in all other characters agree with *P. simplex* (fig. 21).

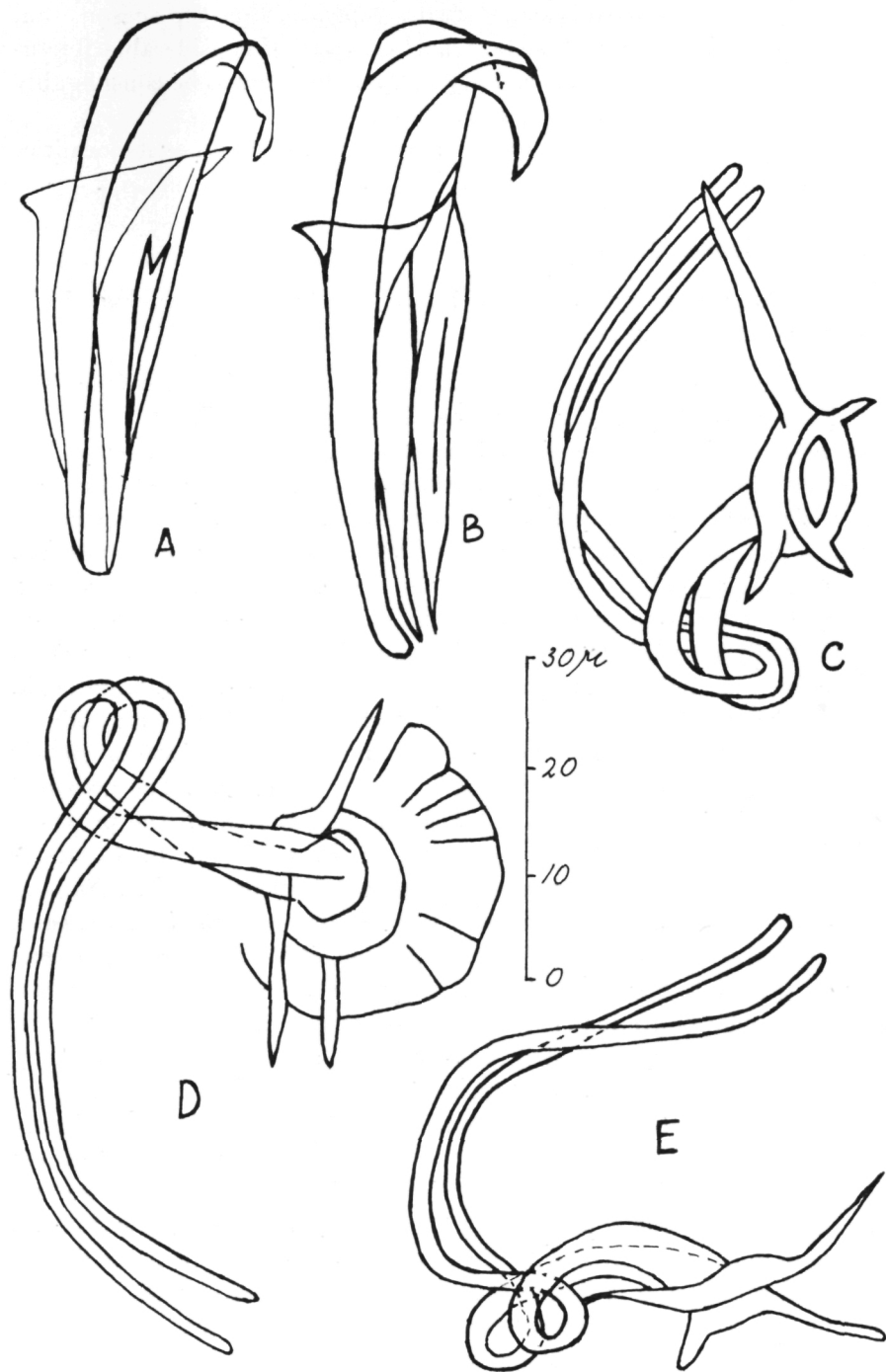


Fig. 20. *Proxenetes simplex* Luther, 1948: A-B. Cuticular copulatory organs; C-E. bursal appendages. (A-B, D-E after specimens from the Slack estuary near Ambleteuse, C after a specimen from the Zwin, Zeeuws Vlaanderen).

According to LUTHER (1948) the cuticular copulatory organ of *P. simplex* does not have spines. From squash preparations of Dutch specimens I have observed that the cuticular mantle consists of two large spines and contains two smaller ones. However, I think that a drawing of a theoretical section of my specimens would differ very little from LUTHER's drawings of his sectioned specimens (l.c. fig. 105). Further his drawings indicate that the copulatory organ of *P. simplex* is very slender. The presence of the slightly cuticularized muscular lump at the distal end of the bursal canal, which has been recorded by LUTHER and which I found in my squash preparations, convinced me that my material is identical with LUTHER's *P. simplex*.

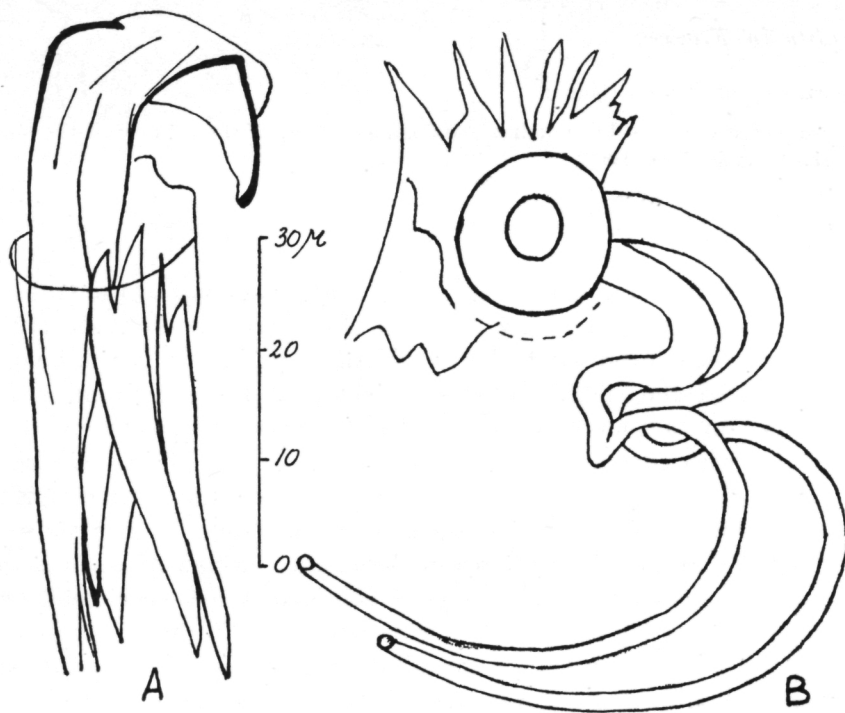


Fig. 21. *Proxenetes simplex* Luther, 1948: A. Cuticular copulatory organ; B. bursal appendage (after a specimen from De Paal, Zeeuws Vlaanderen).

Geographical distribution:

LUTHER described the species from the Gullmar Fjord along the Swedish west coast. BOADEN (1963) recorded it, without giving any description, from the coast of Anglesey (Wales). I have found the species in a few localities in the south-western part of the Netherlands (fig. 22) and once in the north of France.

Localities in the Netherlands:

Province of Zeeland:

St. Philipsland: 1. Salt-marsh along the Slaakdam, February 1962.

Tholen: 2. Stavenisse, salt-marsh, April and November 1963.

Noord-Beveland: 3. Wissekerke, small sandy salt-marsh east of the village, April 1963.

Zeeuws Vlaanderen: 4. International nature reserve "het Zwin" in the Dutch part, June 1963; 5. De Paal, salt-marsh, May 1963.

Province of Noord-Brabant:

6. Salt-marsh south of Bergen op Zoom, October 1964 (BILIO, personal communication).

Locality in France:

Department of Pas de Calais:

Ambleteuse, ca. 10 km north of Boulogne-sur-Mer, in the estuary of the small river Slack, May 1963.

Ecology:

Proxenetes simplex was first collected in the sublittoral of the Gullmar Fjord, on muddy and loamy bottoms (LUTHER, l.c.) BOADEN (1963) found the species in a sandy beach on Anglesey. In the Netherlands I have collected the species in several biotopes. Twice I found a few specimens on salt-marshes under flotsam near high-water-mark in association with *Uteriporus vulgaris*, *Coelogyropora schultzei* and *Monocelis lineata*. In the salt-marsh creek of Stavenisse, where the bottom consists of detritus-rich fine sand *P. simplex* is more numerous. It occurs also in fine mud. BILIO found the species in the muddy bottom of a salt-marsh pool near Bergen op Zoom. I myself collected a few specimens near De Paal, in a muddy salt-marsh creeklet containing a rich vegetation of *Enteromorpha* and diatoms. It coexisted with *Ptychopora westbladi* and *Mecynostomum auritum*. However, most specimens were obtained from pure or almost pure fine sand. In the mouth of the Zwin, the sea-inlet at the frontier between the Netherlands and Belgium, which is exposed to wave action, it is quite numerous and there it is associated with *Provortex tubiferus*, *Pogaina suecica* (Luther), *Promesostoma caligulatum* Ax and *P. marmoratum*. The three first-mentioned species are characteristic for fine sand. In the mouth of the Slack (France), where the ecological circumstances are rather similar to those in the Zwin, many specimens of *Proxenetes simplex* were found together with numerous *Provortex tubiferus*, *P. psammophilus* Meixner and *P. balticus* and a few specimens of *Promesostoma marmoratum* and *Coelogyropora* sp. Therefore, I think, that *Proxenetes simplex* is a characteristic species of the fine-sand bottoms, able to invade the adjacent muddy biotopes.

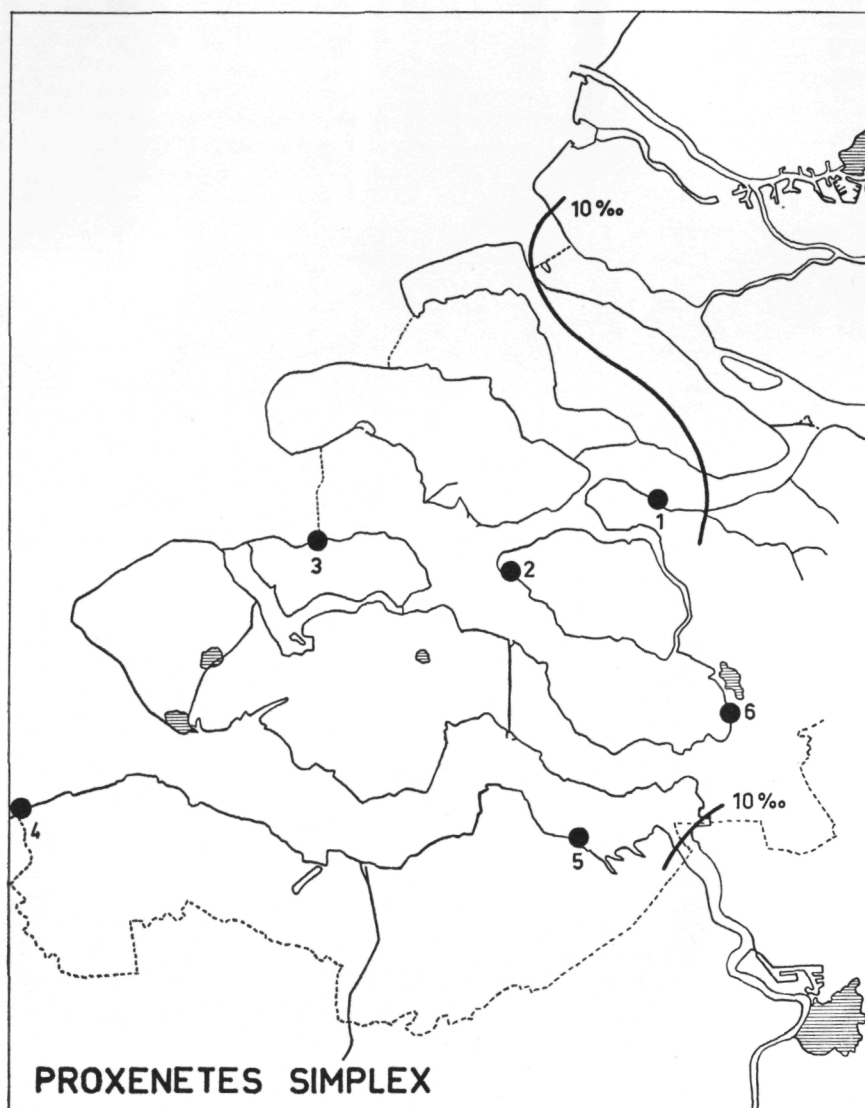
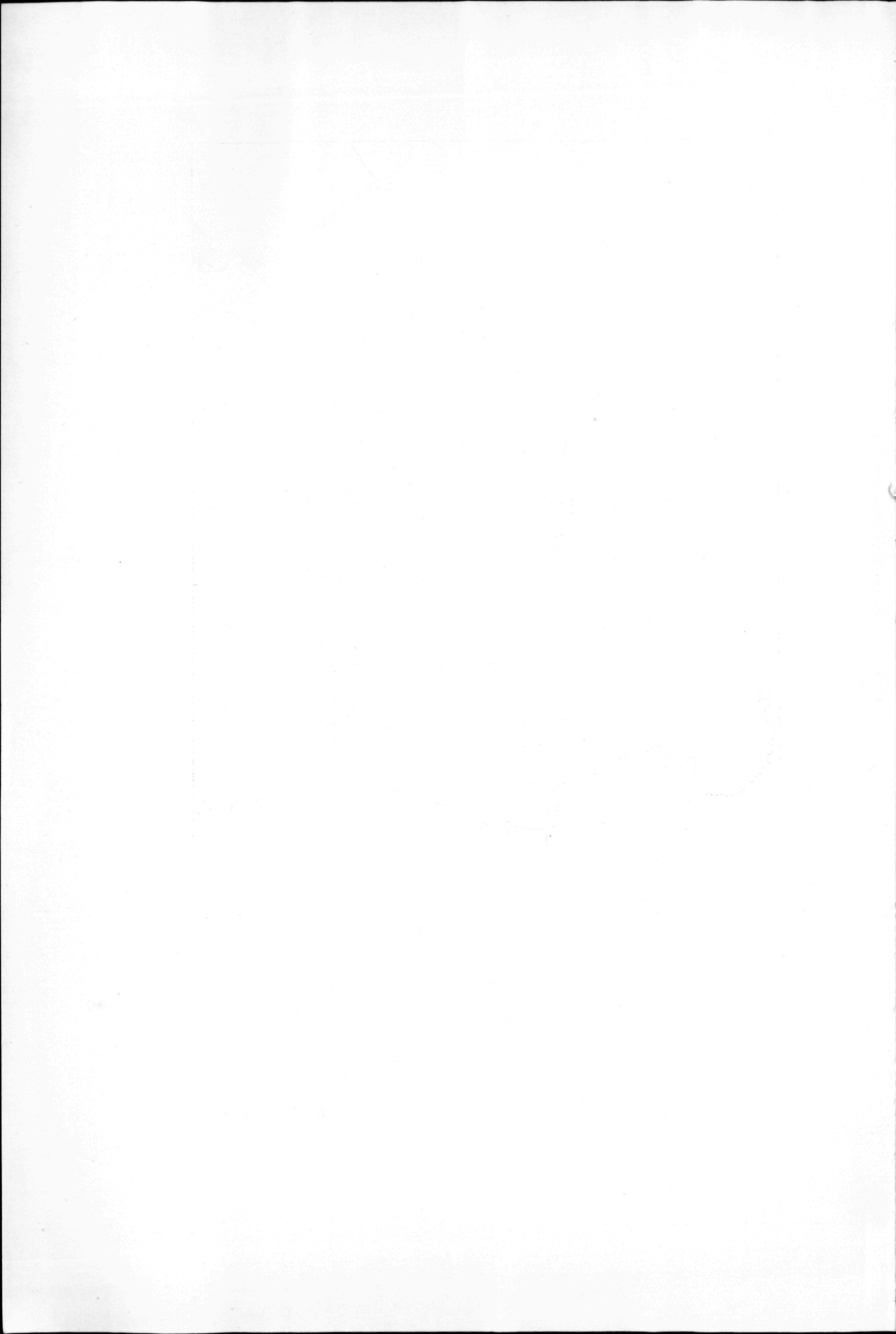


Fig. 22. Distribution of *Proxenetes simplex* Luther, 1948, in the south-western part of the Netherlands. The average annual isohaline of 10 ‰ Cl' at high tide is given.

In the Deltaic area the species occurs in the euhalinicum and in the polyhalinicum.

In the intestinal tract I found the remains of oligochaetes, nematodes and empty valves of diatoms.

(to be continued)





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