

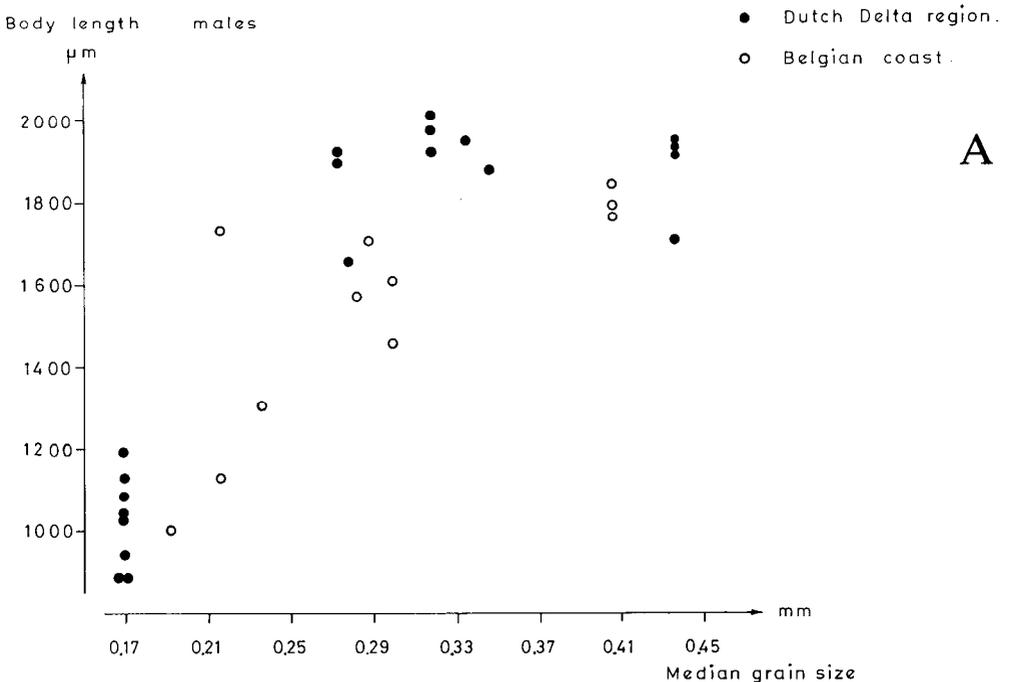
MONOPOSTHIA MIRABILIS Schulz, 1932 (Fig. 2-3, Plate 1)

The specimens of *M. mirabilis* from different localities in the Southern Bight of the North Sea differ in total body length, body width, head diameter, coarseness of the cuticular ornamentation and length of the gubernaculum. Even the juveniles can be distinguished by their habitus and the coarseness of the cuticular ornamentation.

In the Dutch Delta region, the specimens can be subdivided in two groups: the specimens belonging to the first group (Fig. 2 A-I, Plate 1 A-G) can be distinguished from the specimens of the second group (Fig. 3 A-G, Plate 1 H-N) by their smaller and more slender general habitus. The smaller form ($L\delta = 889-1189 \mu\text{m}$; gub. = $21-23 \mu\text{m}$) is present in stations characterized by a fine sandy substrate ($0.160 \text{ mm} < \text{Median of the sand fraction} < 0.200 \text{ mm}$) with 1.1 to 4.1 % silt, and more robust specimens ($L\delta = 1653-2005 \mu\text{m}$; gub. = $30-36 \mu\text{m}$) are found in eight stations, characterized by a medium sand sediment ($0.237 \text{ mm} < \text{Median} < 0.436 \text{ mm}$).

The hypothesis that two discrete habitat specific morphological groups exist was rejected because intermediate morphotypes of *Monoposthia mirabilis* were found in intermediate substrates from the Belgian coast. The morphological variation is continuous and seems to be correlated with an environmental gradient, which is best expressed by the median grain size, taking into account the sorting of the sediment and the amount of silt. For all the specimens studied of the Southern Bight (Dutch Delta region and Belgian coast), the body length is highly correlated with the median grain size of the sandfraction: for the males, $r = 0.7909$, $n = 31$ and for the females $r = 0.8821$, $n = 26$ (Fig. 1).

Up to now, *M. mirabilis* has been described from several localities. *Monoposthia mirabilis* was first described by Schulz (1932). He found one male with a body length of 1800 μm and a gubernaculum length of 40 μm . Allgen (1935) found 5 males and 2 females of *M. mirabilis*, described as *M. longiseta*, in a substrate consisting of sand and shells. Measurements are 1320 μm for the male and 1150 μm for the female. Allgen (1959) mentioned more specimens (14 $\delta\delta$ and 33 ♀♀) of *M. mirabilis*, still described as *M. longiseta*. Measurements are 1088 and 1275 μm respectively. Gerlach (1953) found 2 small males, 887 and 1015 μm long, in a sandy beach of Italy. The specimens (4 $\delta\delta$ and 3 ♀♀) described by Luc and De Coninck (1959) are bigger than the holotype ($L\delta = 2016 - 2660 \mu\text{m}$ and $L\text{♀} = 1450 - 2143 \mu\text{m}$; gubernaculum = 40 μm). The *M. mirabilis* male of the East coast of North America, described by Wieser and Hopper (1967) measures 1600 μm . The gubernaculum is 38 μm long.



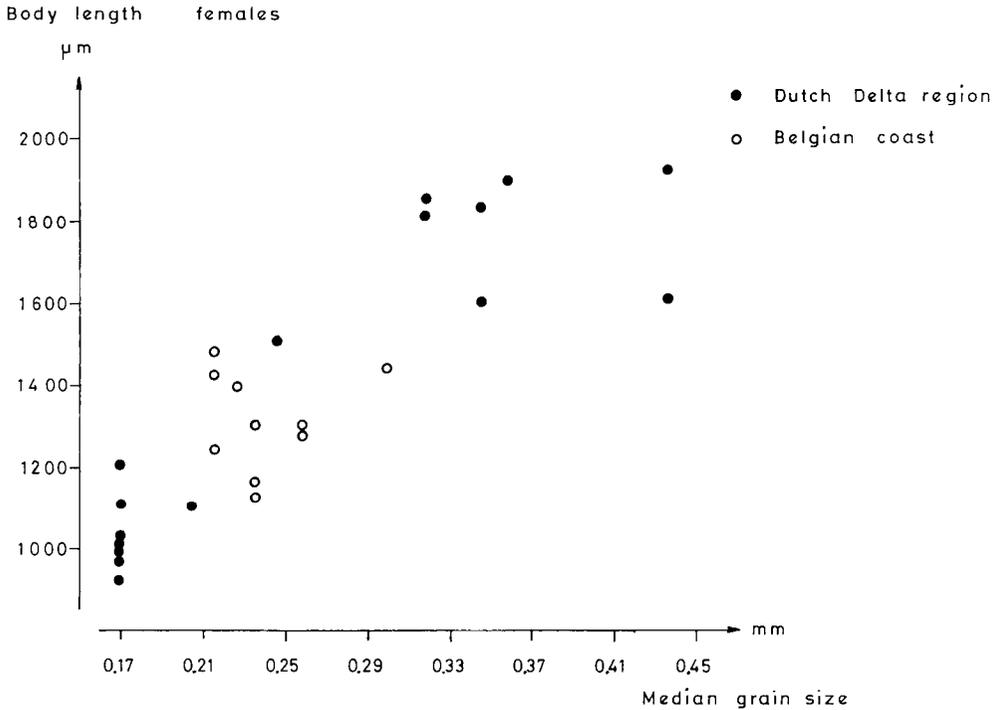


Fig. 1 - Correlation of body length with median grain size : A. *Monoposthia mirabilis* males, B. *M. mirabilis* females.

TABLE 1 - Measurements of *Monoposthia mirabilis* (in μm).

	MALES N = 31	FEMALES N = 26
	X (MIN - MAX)	X (MIN - MAX)
L	1 494 (889 - 2 005)	1 353 (943 - 1 935)
l.tail	109 (70 - 166)	107 (62 - 135)
w.max	32 (23 - 47)	37 (26 - 45)
l.pharynx	175 (74 - 234)	182 (134 - 299)
w.cardia	30 (22 - 39)	35 (24 - 43)
l.bulb.post.	41 (31 - 55)	45 (32 - 59)
l.bulb.ant.	21 (19 - 36)	24 (19 - 31)
w.head.post.	17 (14 - 22)	19 (14 - 23)
w.head.ant.	13 (10 - 16)	13 (10 - 16)
l.ceph.set.	15 (13 - 19)	15 (11 - 19)
w.cut.ring.	2.5 (1.8 - 3.5)	2.5 (1.8 - 3.5)
w.vulva		36 (23 - 44)
gub.	33 (21 - 36)	
a	38.2 (32.3 - 45.1)	45.3 (36.4 - 52.3)
b	7.2 (5.7 - 8.3)	8.7 (6.8 - 14.4)
c	13.7 (10.9 - 15.4)	13.6 (10.9 - 16.2)

L = length ; w = width ; max = maximum ; bulb = bulbus ; cut = cuticula ; ceph = cephalic ; set. = setae ; gub = gubernaculum ; ant = anterior ; post = posterior.

REDESCRIPTION

Extreme size range of the discriminative morphological characters are given special attention. Measurements are presented in table 1.

Males

Body cylindrical, slightly narrowing anteriorly from the cardia and more so posteriorly from just before the cloacal opening (Plate 1 C - L). The body is ventrally flattened over a distance of two anal body diameters in front of the attenuated caudal region when the tail is curved (Fig. 3 F). Tail conical.

Cuticle (Fig. 2 D - E, 3 E) coarsely annulated (3 and 4 annuli per 10 μm resp.); the annulation starts at the level of the cephalic setae. Only the tip of the tail is not annulated. The first two body rings are enlarged and demarcate the head region (Fig. 2 B, 3 A). The second ring is higher (5 - 8 μm) than the first one (3 - 5 μm). V - shaped structures (costae) are present from head end to cloacal opening; they are arranged in 6 longitudinal rows (Fig. 2 H). In the pharyngeal region the annuli have an anteriorly directed margin; the costae are posteriorly directed. The direction of the annuli margins and the costae changes posteriorly from the pharyngeal region, between the 80th and the 90th bodyring (Fig. 2 E, 3 E). The longitudinal differentiation is also present on the two cephalic rings, although the costae are no longer recognizable. The annuli contain very small vacuoles. These are less obvious in the smaller specimens because of the smaller cuticular rings.

The six internal labial sensilla are papilliform. The six external labial sensilla (3 μm) are setiform. Four cephalic setae (11 - 19 μm , according to body size) are situated at the anterior border of the cephalic capsule. No subcephalic setae. Somatic setae are present over whole body. The amphideal fovea (12 % of the c.h.d.) is circular and situated on the second head annule. The corpus gelatum is sometimes extruded (Fig. 3 A). Buccal cavity large and deep (21 & 28 μm resp. for the small and the large form), strongly sclerotized and surrounded by pharyngeal muscles. A large solid dorsal tooth and two small ventrosublateral teeth are present. Additional very small denticles can be observed in the anterior part of the buccal cavity. The anterior part of the pharynx is very muscular and forms a stomatal bulb. The dorsal pharyngeal gland opens close to the dorsal tooth. The terminal pharyngeal bulb is very prominent and consists of two equal compartments. The lumen is strongly cuticularized, especially in the posterior bulb. No ventral gland and no excretory pore observed. Nerve ring at 60 % of the pharynx. Cardia (Fig. 2 A) very small. Intestine with low wall cells and broad lumen.

Dioecious, with outstretched testes, both on the right side of the intestine. Sperm cells large (2 μm \varnothing), oval structures. Spicules absent; gubernaculum stout, strongly sclerotized. Its proximal part is enlarged with an anteriorly and a posteriorly directed protrusion. Distal part anteriorly directed and hook-like (Fig. 2 F, 3 F - G). Body annuli, anterior to cloacal opening, modified in a cuticular plate with a posteriorly directed hook. Three preanal supplements are situated on this ventral

plate. The two body annuli behind the cloacal opening are also modified and possess two ventrally directed projections. The anterior cloacal lip bears a stout seta.

Tail with three caudal glands ; spinneret 5 - 7 μm long.

Females

Only differences with the male are mentioned : somatic setae less numerous than in the male. Amphideal fovea (Fig. 2 C, 3 C) circular, larger than in the male (27 % of the c.h.d.). Monodelphic and prodelphic with reflexed ovary situated at the left side of the intestine (Fig 2 I).

TAXONOMIC AND ECOLOGICAL SIGNIFICANCE

Vincx (1986) discussed the intraspecific variation of some nematode species from the Southern Bight of the North Sea ; *Neochromadora paramunita* Boucher, 1976 was synonymized with *N. munita* Lorenzen, 1972 because the two morphotypes of males, with as main difference the number of preanal supplements, can be found in the same population. The females and juveniles cannot be subdivided in two types since transition forms occur. Most of the species of the *Sabatieria pulchra*-group (Platt, 1985) are considered as different ecophenotypes because they show only minor differences and because they are found in the same geographic range, although in different habitats. For *Paracyatholaimus occultus* Gerlach, 1956 differences in the cuticular ornamentation are mentioned by Riemann (1966) and Lorenzen (1972). Different morphotypes apparently occur, but transition forms also exist.

All the stations of the Southern Bight, where specimens of *M. mirabilis* are present, are characterized by a well-sorted sandy substrate with a maximum of 7 % silt. Well-sorted sandy substrates (with Md > 0.125 mm) are inhabited by a true interstitial fauna, which lives in the pores. The fauna of silt and poorly-sorted silty sand is characterized by more burrowing species (McIntyre & Murison, 1973 ; Wieser, 1959). In well-sorted sediments the mean diameter of the interstices is approximately 30 to 40 % of the mean particle diameter. Pore space is correlated with particle size. Only a silt/clay content of 7 % or more should be sufficient to fill the interstices between the larger particles (Crisp & Williams, 1971). In the samples studied, the smaller morphotypes of *M. mirabilis* are present in substrates with a smaller median grain size *i.e.* smaller interstices.

The morphological variation among sites is probably due to the effects of the microenvironment on a plastic phenotype. Phenotypic plasticity in invertebrates is well known and frequently a source of taxonomic confusion (Bynum, 1980). In a study on the physical environment of interstitial organisms, and their response to it, Crenshaw, 1980 (mentioned by Vogel, 1983) emphasizes that the most important parameter for an animal, living in interstitial spaces, is shear stress. When selecting a site, an organism probably picks the right shear stress rather than some grain size.

In a coarser silt-free substrate, interstitial living nematodes can be washed out of the sediment more easily. Ward (1973) noticed that those families and genera provided with a heavily sculptured cuticle (*e.g.* *Monoposthia* spp.) were almost invariably associated with the coarser silt-free sediments. He proposed that the

elaborate cuticular ornamentation found in *Monoposthia* may serve a dual purpose : as a protection against mechanical damage and to provide a purchase during progression through the larger interstices of coarse sediments. The presumed advantage to the animals of a more robust body is that a robust animal is stronger than a gracile animal and has a coarser cuticle which serves as a better protection against the washing out of the sediment.

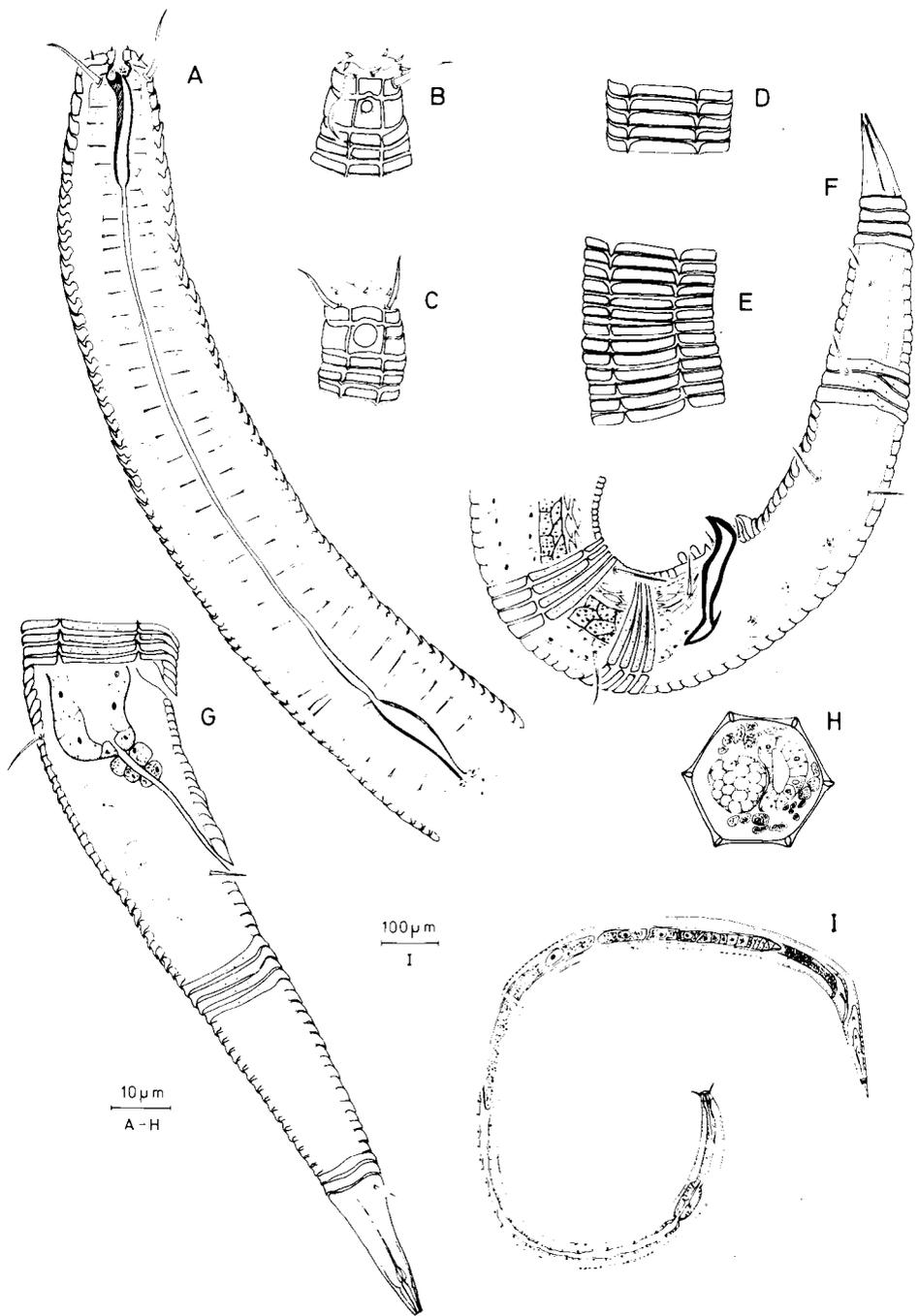


Fig. 2 - *Monoposthia mirabilis*: group I "small type". A. ♂ Pharyngeal region; B. ♂ Head end; C. ♀ Head end; D. Cuticle in pharyngeal region; E. Cuticle in pharyngeal region, with change in orientation of V-markings; F. ♂ Tail; G. ♀ Vulvar region and Tail; H. ♂ Cross section at mid-body; I. ♀ Habitus.

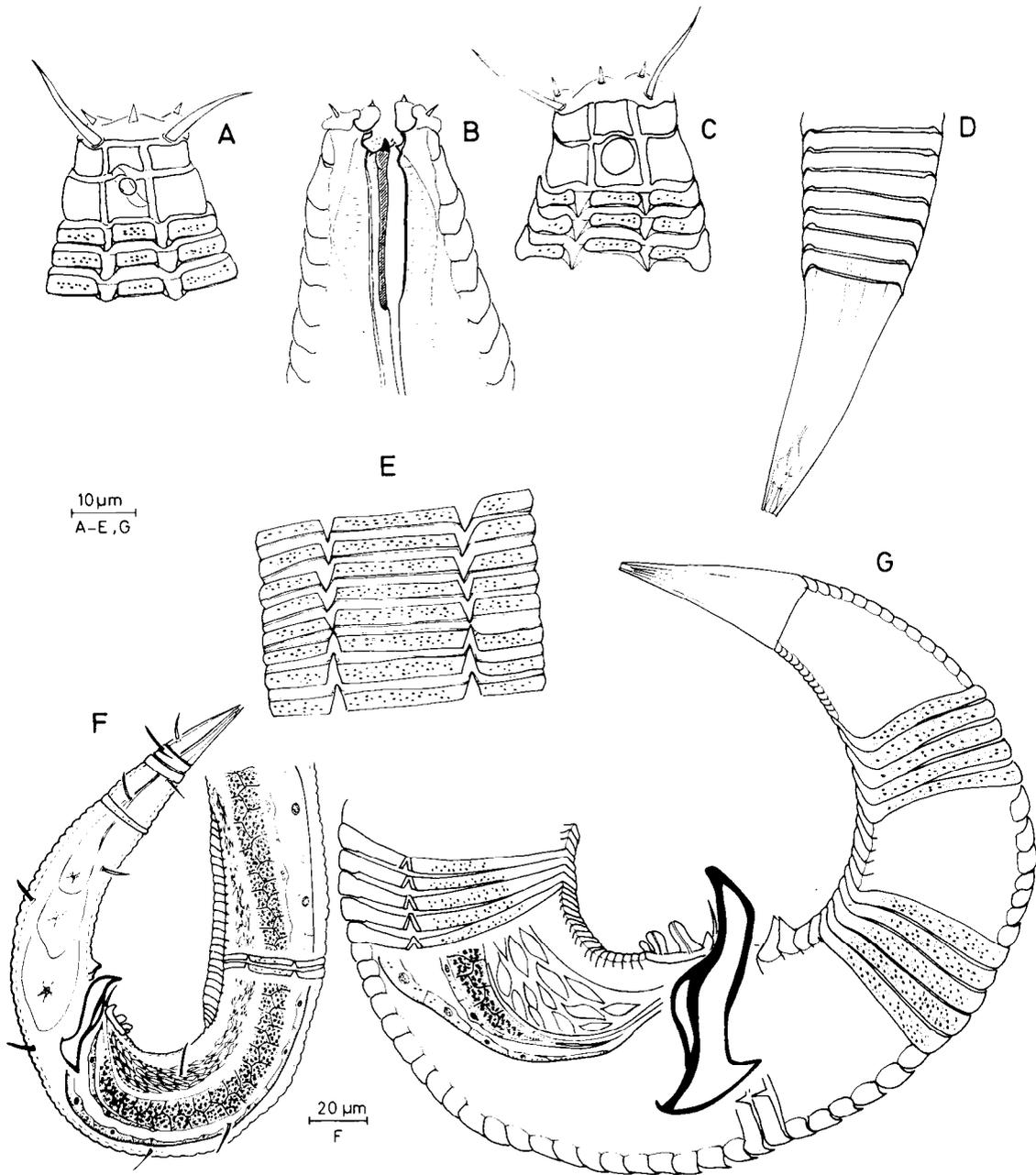


Fig. 3 - *Monoposthia mirabilis*: group II "large type". A. ♂ Head end, surface view; B. ♂ Head end; C. ♀ Head end, median view; D. ♂ Tail end; E. ♂ Cuticle in pharyngeal region; F. ♂ Posterior end; G. ♂ Tail region.

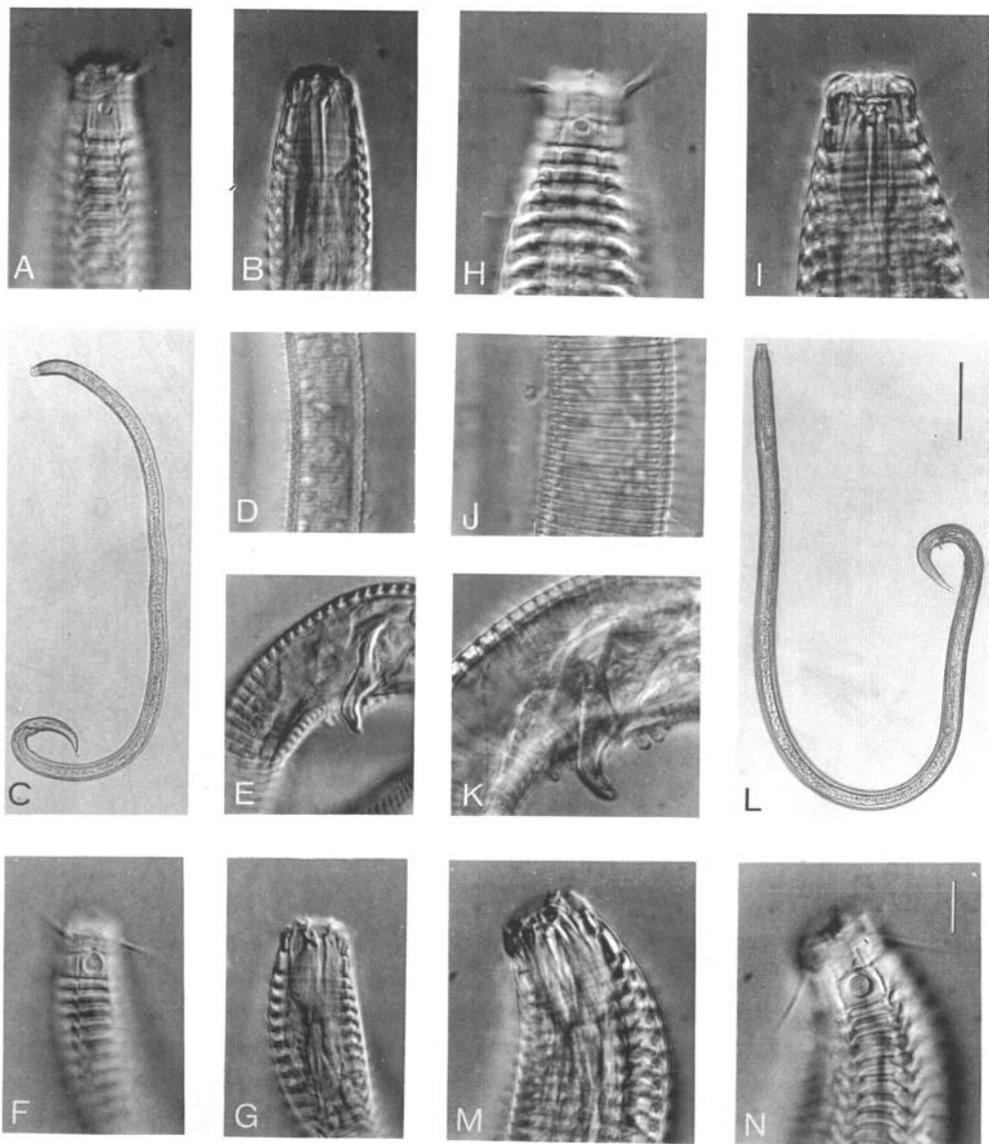


PLATE 1 - *Monoposthia mirabilis* A - G : "small type"; H-N : "large type".

A, H. ♂ Head end, surface view; B, I. ♂ Head end; C, L. ♂ Habitus; D, J. Mid region, surface view; E, K. ♂ Copulatory apparatus; F, N. ♀ Head end, surface view; G, M. ♀ Head end.

(Scale bar is 10 μ m, except in C & L, where it is 200 μ m).