

## FREE-LIVING MARINE NEMATODES FROM KII PENINSULA. II<sup>1)</sup>

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*With Text-Figures 1-2 and Tables 1-2*

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Free-living marine nematodes of the family Oncholaimidae constitute an outstanding group because of their abundance in diverse marine environments. They have the characteristic morphological features, such as well-developed buccal cavities and the unique structure known as "Demanian system". The Demanian system, which was found in *Adoncholaimus fuscus* (Bastian, 1865) first by de Man (1886), is a tubular organ connecting ovaries with the intestine (and, often, the exterior of the body). Up to the present, this system has been found in mature females of various genera of Oncholaimidae, but no such a system has been known outside this family. Unfortunately, different names have occasionally been applied for the same structure (see Rachor, 1969, p. 91); this terminological disunity is one of the major causes for the delay and confusion of the taxonomy within the family (see Lorenzen, 1981). Recently, Belogurov & Belogurova (1977-1978) gave a series of analyses on the Demanian system and the systematics of oncholaimids. They distinguished five types of Demanian systems by the structure and number of structural elements; i.e., 1) viscosioid, 2) postviscosioid, 3) adoncholaimoid, 4) pseudoadoncholaimoid, and 5) oncholaimoid types (Belogurov & Belogurova, 1977a).

In the present paper, as the second report from my serial work on the marine nematode fauna of Kii Peninsula (see Yoshimura, 1980), two new species of oncholaimids, each belongs to the genus *Metoncholaimus* Filipjev, 1918 and *Meyersia* Hopper, 1967, are described. The terminology by Hopper (1967) is applied in the descriptions of Demanian systems. The terminology introduced by Belogurov & Belogurova (1977a) will be also applied to indicate the type of a Demanian system typical to each genus. Specimens were fixed in 5% formaline and were transferred to pure glycerine prior to microscopical observations. The type specimens are deposited in the Seto Marine Biological Laboratory.

### *Metoncholaimus filispiculum* n. sp.

(Fig. 1 and Table 1)

Specimens Examined: 7 males and 4 females collected from sand in the intertidal

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zone at Hatake-jima Island, Tanabe Bay, near the Seto Marine Biological Laboratory. Holotype; 780526Z-VI-3 (male,  $L=6640\ \mu\text{m}$ ), allotype; 780526Z-VI-2 (female,  $L=5760\ \mu\text{m}$ ).

Description: Measurements are shown in Table 2. The body is long and its cuticular surface is smooth. The head is truncated, with ten cephalic setae, of which longer

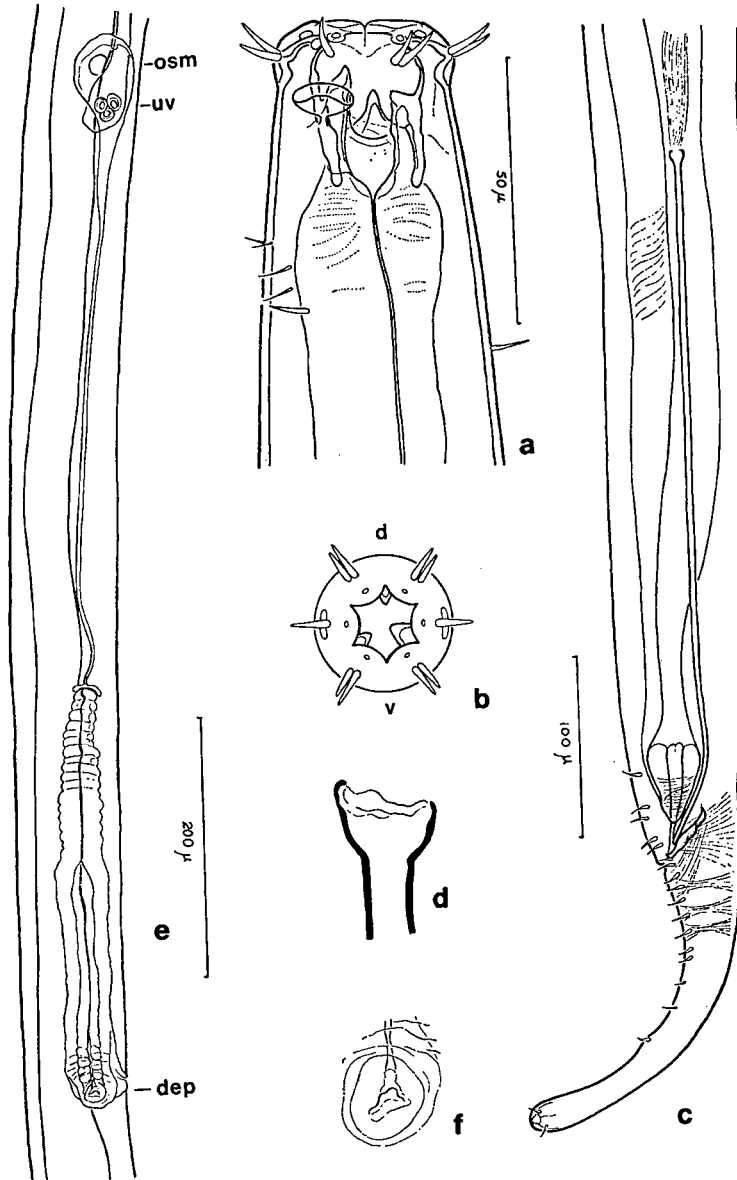


Fig. 1. *Metoncholaimus filispiculum* n. sp. a) Head of male (holotype). b) A diagrammatic view of the anterior end. c) Tail of male (holotype). d) The proximal end of a spicule. e) Demanian system (from osmosium to exit pores) of female. f) Demanian exit pore (slit). Abbreviations: d; dorsal side, dep; demanian exit pore, osm; osmosium, uv; uvette, v; ventral side.

Table 1. Measurements of *Metoncholaimus filispiculum* n. sp.

MALES								FEMALES				
L	5954	6080	6310	6329	6500	6580	6640*	L	5580	5729	5760**	6001
eso	620	645	640	597	646	649	675	eso	627	636	607	571
hd	32	33	32	34	31	32	34	hd	29	30	33	32
bd	66	65	84	72	78	85	87	bd	75	68	75	79
cd	40	43	41	44	40	40	43	ad	38	40	42	42
mbd	82	88	102	104	93	107	121	vd		72	87	92
nr	323	346	330	322	332	329	352	nr	326	317	325	307
ep	104	103	148	118	129	140	160	ep	126	149	123	148
t	175	171	182	177	175	183	196	t	197	199	185	189
spic	415	411	463	433	415	453	430	V		3248	3290	3655
gub	32	31	42	31	34	35	33	G <sub>1</sub>			940	1476
S <sub>1</sub>	1214	1104	1301	1229	1239	1176	1143					
a	72.6	69.1	61.9	60.9	69.9	61.5	54.9	a		79.6	66.3	65.2
b	9.6	9.4	9.9	10.6	10.1	10.1	9.8	b	8.9	9.0	9.5	10.5
c	34.0	35.6	34.7	35.8	37.1	36.0	33.9	c	28.3	28.8	31.2	31.8
								Vu (%)		56.7	57.1	60.9

\* Holotype, \*\* Allotype.

Abbreviations for tables. L: Body length. hd: Head diameter. bd: Body diameter at the level of the base of oesophagus. cd: Cloacal diameter (in males). ad: Anal diameter (in females). mbd: Maximal body diameter (in males). vd: Vulval diameter. nr: The distance of the nerve ring from the anterior end. ep: The distance of the excretory pore from the anterior end. t: Tail length. spic: Spicule length. gub: Gubernaculum length. S<sub>1</sub>: The distance of the first testes from the anterior end. V: The distance of vulva from the anterior end. G<sub>1</sub>(or G<sub>2</sub>): The length of the anterior (or posterior) gonad. (All the measurements are in micra.) a, b, c, Vu(%); De Man's ratio.

ones attain 10  $\mu$ m in length, while four submedian setae are slightly shorter than those. Each lip bears a minute labial papilla. The buccal cavity is well developed, and is about twice as long as wide (31–35  $\times$  16–18  $\mu$ m). There are three teeth, of which the left subventral one is the largest and the other two are almost equal in length, about 2/3 of the former. Fig. 1b shows a diagrammatic view of the anterior end (the upper side in the figure is the dorsal). The amphids lie 13–16  $\mu$ m posterior to the anterior end, or on the level of the tips of the two shorter teeth, and they are 10–12  $\mu$ m wide, or about 1/3 of the corresponding head diameter. The posterior part of the buccal cavity has a few perforations in its wall. The oesophagus is almost equal in breadth through its length, and is surrounded by the nerve ring at about 50% of its length. The excretory pore, followed by an only weakly swollen ampulla and a very short terminal duct, opens 103–160  $\mu$ m (or more than 3 times the cephalic body diameter) posterior to the anterior end. The ventral gland extends far posterior, 180–215% of the oesophagus length from the anterior end.

Males: The testes begins at about 1/5 of the body length from the anterior end, near the base of the ventral gland. Spicules are thin and much elongated, 2.2–2.5 times the tail length. The gubernaculum is small and covers the spicule around its

dorsodistal portion only. The anterior region of the cloaca has neither special modification such as "half-lemon shaped mound" (cf. *M. demani* (Zur Strassen, 1894) sensu Filipjev, 1918), nor precloacal pores. There are 14 to 17 pairs of long genital setae around the cloaca (5–6 precloacal, 8–11 postcloacal). There are no precloacal supplements. The rectal region is heavily cuticularized. The tail is cylindrical and curved, and there is a low mound on its ventral side at about 2/3 of the tail length from the cloaca. A pair of subventral terminal setae and a pair of subdorsal subterminal setae are present (see Fig. 1c, d).

Females: As in other species of *Metoncholaimus*, the female has only one ovary, situated anterior to the vulva and reflexed at 16.3–24.6% of the body length (monodelphic; prodelphic). Three eggs, which measure 172–217 × 62–72  $\mu\text{m}$ , were found in a uterus of the largest specimen (L=6001  $\mu\text{m}$ ). From the posterior part of the uterus extends the ovarian efferent, then it is connected with the principal efferent via uvette, which consists of three circular cells. Shortly before the uvette, there is a osmosium which connects the intestine with the enteric efferent. The principal efferent is 446–647  $\mu\text{m}$  long, leading to two exit ducts which are surrounded by the moniliform glands (227–311  $\mu\text{m}$  long) and open to the exterior via two exit pores, each on subdorsal side of the body. The exit pores are situated 748–923  $\mu\text{m}$  anterior to the anus, or 4.0–4.8 times the tail length, having a shape of a folded slit (see Fig. 1f). Scytalia were not observed. The whole Demanian system lies to the right of the intestine. The tail is cylindrical and only slightly curved. The terminal and subterminal setae are like those in males, but there are no genital setae around the anus.

Diagnostic Characters: The excretory pore lies at more than 3 times the head diameter long posterior to the anterior end. The spicules measure more than 400  $\mu\text{m}$  in length, or 2.2–2.5 times the tail length. The rectal region of the matured male is heavily cuticularized. The male has 14–17 pairs of genital setae. The two subdorsal exit pores of the Demanian system are situated 4.0–4.8 times the tail length anterior to the anus.

Remarks: The Demanian system of the oncholaimoid type (Belogurov & Belogurova, 1977a) is characteristic only for monodelphic genera of oncholaimids. This type has all the structural elements in the postvulval region; made up of one osmosium, one enteric efferent, and two or more exit ducts and exit pores (sometimes the exit pores are absent). Belogurov & Belogurova (1977a) distinguished 4 variants (variants A to D\*) in this type, by the number and structure of exit ducts and pores. The Demanian system of *Metoncholaimus* is the variant B; two exit ducts and two exit pores are present, the exit ducts are surrounded by moniliform glands.

In 1960, Chitwood presented a key to the species of *Metoncholaimus*, which included two species with short spicules (i.e., *M. brevispiculum* Mawson, 1957 and *M. thysanourais* Mawson, 1958), although he emphasized the necessity of a revision of the genus. Wieser & Hopper (1967) excluded these two species because they regarded

\* The Russian characters, A, B, C, and D, which were originally used by Belogurov & Belogurova, are translated into Roman characters, A, B, C, and D, respectively.

the presence of elongated spicules as one of the characteristics of *Metoncholaimus*. Gerlach & Riemann (1973–1974) also favored the latter view and enumerated 14 species in this genus. Warwick (1977) reexamined *Oncholaimus scanicus* (Allgén, 1935), which does not have elongated spicules, but has the Demanian system comparable to that of *Metoncholaimus*. Besides, there were two remarkable features, the presence of precloacal ventral pore in the male and the presence of scytalium in the female, which had been found in *Metoncholaimus pelor* Hopper, 1967. So he replaced it in *Metoncholaimus*. He also included *M. brevispiculum* Mawson, 1957 and *M. thysanourais* Mawson, 1958 again because they have paired lateral exit pores of the Demanian system. But, according to Belogurov & Belogurova (1977a), the presence of two dorsolateral exit pores is not restricted to *Metoncholaimus*. Therefore the taxonomic position of these two species will be determined after other characters such as spicules and the Demanian system itself are examined more precisely.

Among the 15 valid species, *M. longiovum* Chitwood, 1960 is most related to the present species, but is distinguished from the latter in that males have shorter spicules and fewer genital setae than the latter. Now, the genus *Metoncholaimus* has 16 valid species, including the present new species; and a new key to species is suggested.

#### Key to the species of *Metoncholaimus*

- 1 ( 6) Female with only one Demanian exit pore
- 2 ( 3) Demanian exit pore opens on level of anus, dorsally  
..... *M. simplex* Wieser & Hopper, 1967
- 3 ( 2) Demanian exit pore situated more than one tail length preanally
- 4 ( 5) Excretory pore anterior to base of stoma  
..... *M. murphyi* Inglis, 1966
- 5 ( 4) Excretory pore posterior to base of stoma  
..... *M. haplotretos* Mawson, 1958
- 6 ( 1) Female with two Demanian exit pores
- 7 ( 8) Excretory pore anterior to base of stoma  
..... *M. anthophorus* (Ssaweljev, 1912)
- 8 ( 7) Excretory pore posterior to base of stoma
- 9 (10) Spicules 750  $\mu\text{m}$  (or 4.5 tail lengths) long  
..... *M. antarcticus* (Linstow, 1896)
- 10 ( 9) Spicules less than 500  $\mu\text{m}$  (under 3 tail lengths) long
- 11 (18) Demanian exit pores less than one tail length preanally
- 12 (13) Gubernaculum absent  
..... *M. albidus* (Bastian, 1865)
- 13 (12) Gubernaculum present
- 14 (17) Male tail bears conoid ventral papillae
- 15 (16) Demanian exit pores ordinally shaped; spicules 246  $\mu\text{m}$  (or 4/3 tail length) long  
..... *M. pristiurus* (Zur Strassen, 1894)

- 16 (15) Demanian exit pores slit-shaped; spicules 175–180  $\mu\text{m}$  (or less than one tail length) long  
 ..... *M. scissus* Wieser & Hopper, 1967
- 17 (14) Male tail does not bear conoid papillae; spicules 382–447  $\mu\text{m}$  long  
 ..... *M. demani* (Zur Strassen, 1894)
- 18 (11) Demanian exit pores more than one tail length preanally
- 19 (20) Gubernaculum absent; conoid ventral papillae of male tail present  
 ..... *M. intermedius* Wieser & Hopper, 1967
- 20 (19) Gubernaculum present; conoid ventral papillae of male tail absent
- 21 (26) Precloacal pore present; spicules less than 200  $\mu\text{m}$  long
- 22 (23) Demanian exit pores 0.29 mm preanally  
 ..... *M. scanicus* (Allg n, 1935)
- 23 (22) Demanian exit pores more than 1 mm preanally
- 24 (25) Demanian exit pores approximately midway between vulva and anus; it is in the shape of a transverse slit  
 ..... *M. pelor* Hopper, 1967
- 25 (24) Demanian exit pores one-third the distance between vulva and anus; it is in the shape of a longitudinal slit  
 ..... *M. amplus* Hopper, 1967
- 26 (21) Precloacal pore absent; spicules more than 200  $\mu\text{m}$  long
- 27 (28) Demanian exit pores two tail lengths preanally; spicules 287  $\mu\text{m}$  long  
 ..... *M. uvifer* Wieser, 1959
- 28 (27) Demanian exit pores more than three tail lengths preanally
- 29 (30) Male genital setae 24 pairs; spicules 306  $\mu\text{m}$  long  
 ..... *M. longiovum* Chitwood, 1960
- 30 (29) Male genital setae 14–17 pairs; spicules 411–463  $\mu\text{m}$  long  
 ..... *M. filispiculum* n. sp.

*Meyersia japonica* n. sp.

(Fig. 2 and Table 2)

Specimens Examined: 4 males and 5 females collected from sand in the intertidal zone at Hatake-jima Island. Holotype; 790811B-V-4 (male, L=6214  $\mu\text{m}$ ), allotype; 790811B-V-2 (female, L=6295  $\mu\text{m}$ ).

Description: Measurements are shown in Table 2. The body is thick and long. The cuticular surface is smooth with sparsely distributed minute setae. The head is rather round and provided with a circle of ten cephalic setae, of which four submedian ones are a little shorter than the other six (12–13  $\mu\text{m}$  long). Each lip bears a minute labial papilla. The buccal cavity is 2.0–2.9 times as long as wide (65–74  $\times$  24–33  $\mu\text{m}$ ). There are three teeth, of which the two subventral ones are equal in length, while the dorsal one is small and measures only half of the formers. Fig. 2b shows a diagrammatic view of the anterior end (the upper side in the figure is

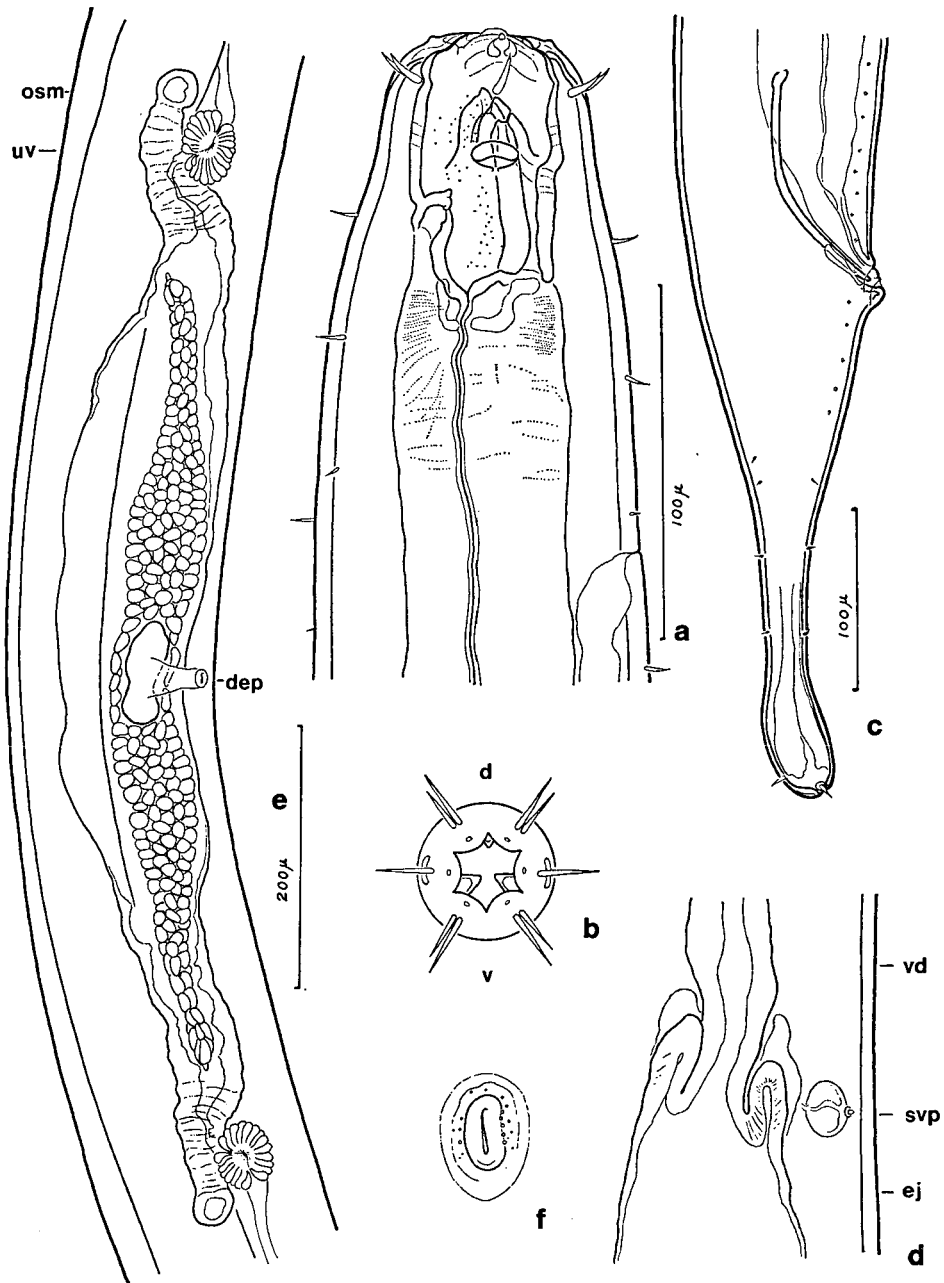


Fig. 2. *Meyersia japonica* n. sp. a) Head of male (holotype). b) A diagrammatic view of the anterior end. c) Tail of male (holotype). d) The posterior end of vas deference and the most anterior subventral papilla of male (holotype). e) Demanian system of female (allotype). f) Demanian exit pore. Abbreviations: d; dorsal side, dep; demanian exit pore, ej; ejaculatory duct, osm; osmosium, svp; subventral minute papilla, uv; uvette, v; ventral side, vd; vas deference.

Table 2. Measurements of *Meyersia japonica* n. sp.

MALES					FEMALES					
L	5160	6214*	6670	7495	L	5600	5890	5895	5914	6295**
eso	906	945	906	1131	eso	863	897	976	895	946
hd	52	54	56	61	hd	54	54	58	63	64
bd	118	145	146	153	bd	136	116	135	147	145
cd	87	100	108	114	ad	81	84	114	102	101
mbd	128	149	185	161	vd	140	159			157
nr	418	435	393	431	nr	333	376	424	374	406
ep	172	145	223(?)	153	ep	150	162	159		171
t	267	293	266	315	t	299	303	284	302	316
spic	130	141	151	141	V	3080	3240		3281	3479
gub	19	26	28	22	G <sub>1</sub>	1007	982	857	1083	1065
S <sub>1</sub>	1438	1201	1055	1272	G <sub>2</sub>	1063	1144	825	991	1003
a	40.3	41.7	36.1	46.6	a	40.0	37.0			40.1
b	5.7	6.6	7.4	6.6	b	6.5	6.6	6.0	6.6	6.7
c	19.3	21.2	25.1	23.8	c	18.7	19.4	20.8	19.6	19.9
					Vu (%)	55.0	55.0		55.5	55.3

\*Holotype, \*\*Allotype.

the dorsal). The wall of the buccal cavity has numerous minute perforations. The amphids lie 34–36  $\mu\text{m}$  posterior to the anterior end, at the middle between the tips of the two subventral teeth and the dorsal tooth. They are 13–16  $\mu\text{m}$  wide, or about 1/5 of the corresponding head diameter. The anterior part of the oesophagus is colored light brown, and the oesophagus is surrounded by the nerve ring a little anterior to the middle of its length. The excretory pore opens 145–172  $\mu\text{m}$  (or 3 times the cephalic body diameter) posterior to the anterior end, and followed by an only weakly swollen ampulla and a very short terminal duct. The ventral gland ends at the level or shortly behind the oesophagus base.

Males: The testes extends from about the anterior 1/5 of the body length. Spicules are curved and with a weak notch at 40–50% of its length from the proximal end of it. The distal part of the spicule is smooth. The gubernaculum is weakly developed and covers the spicule only dorsally. There seems to be no precloacal pores as described in *M. major* Hopper, 1967. There are no precloacal supplements either, while on subventral lines anterior and posterior to the cloaca, there are minute papillae. The region with these papillae extends anteriorly to the level of the posterior end of the vas deference (Fig. 2d). The tail is conical in its anterior half, then it is cylindrical and the tail tip is slightly swollen. There are a pair of subventral terminal setae and a pair of subdorsal setae shortly before them (Fig. 2c).

Females: Ovaries are paired, opposed and reflexed at 14.5–18.3% and 14.0–19.4% of the body length anterior and posterior to the vulva respectively (didelphic; amphidelphic). Up to three eggs were found in a uterus. The Demanian system, consisting of two subparts, lies symmetrically, anterior and posterior to the vulva.



The two uvettes (58–60  $\mu\text{m}$  wide) are located 666–798  $\mu\text{m}$  apart from each other. The exit pore opens to the right of the vulva, and it is in the shape of a longitudinal slit, somewhat whirled clockwise (Fig. 2f). Uvettes consist of balloon-shaped cells. Shortly distally to uvettes are osmosia which lead to the intestine (Fig. 2e). The body of the female decreases its breadth just behind the posterior end of gonad, and further, gradually attenuates toward the anus. The shape and size of the tail is like that of the male, besides there are no subventral minute papillae.

**Diagnostic Characters:** The amphids lie at the middle between the longer subventral buccal teeth and the shorter dorsal one. The excretory pore lies at 3 times the head diameter long posterior to the anterior end. The spicules measure 130–150  $\mu\text{m}$  in length, or half the tail length. The distal end of the spicule is smooth. Gubernaculum is only weakly developed and without the dorsal apophysis. The uvettes are 666–798  $\mu\text{m}$  apart from each other. The exit pore of the Demanian system is a longitudinal slit, somewhat whirled clockwise.

**Remarks:** The Demanian system of the adoncholaimoid type is symmetrical with all the structural elements; 2 osmosia, 2 uvettes, 2 ovarian and 2 enteric efferents lying symmetrically to the vulva. There are two variants, and *Meyersia* has that of variant A; there are one exit duct and one exit pore which opens on the right to the vulva.

The genus *Meyersia* was established by Hopper (1967) and hitherto four species are known. The present species is very similar to *M. major* in the shape and size of the Demanian system, but is different from the latter in the shape of spicules, and in the absence of dorsal apophysis of gubernaculum and precloacal pores in males.

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