

Description of three new species of *Geomonhystera* (Nematoda: Monhysterida)

V.G. Gagarin

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Geomonhystera longicaudata sp. n. from Israel is close to *G. australis* (Cobb, 1893), but differs in the shorter body, longer cephalic and labial setae, longer tail and absence of stomatal denticles. *G. media* sp. n. from the Ukraine and Australia is close to *G. mexicana* (Brzeski, 1993), but differs in the longer cephalic and labial setae, more posteriorly situated amphidial opening, and absence of stomatal denticles. *G. altaica* sp. n. from Russia is close to *G. longicaudata*, but differs in the shorter cephalic and labial setae and in the ratio vulva-anus distance to anal diameter. *G. australis* (Cobb, 1893), *G. breviseta* (Brzeski, 1993), *G. mexicana* (Brzeski, 1993), *G. longicaudata* sp. n., *G. media* sp. n., *G. altaica* sp. n. are very similar and form within the genus the *G. australis* species-group. A key to species of this group is given.

V.G. Gagarin, Institute of Inland Waters Biology, Russian Academy of Sciences, Borok, Yaroslavl Province, 152742, Russia.

The genus *Geomonhystera* was established by Andr assy (1981) for the nematodes of the family Monhysteridae, in which vulva is situated far behind the middle of the body ($V = 80\%$ or more). This genus included five soil inhabiting and several marine species. Brzeski (1993) described two morphologically very similar soil species of this genus. I describe below 3 new species of the genus from different regions of the world. The nematodes were extracted by a modified Baermann funnel method, relaxed by heat, fixed in cold TAF, processed to pure glycerine by a slow evaporation method and mounted on permanent slides.

Geomonhystera longicaudata sp. n. (Figs 1-4)

Holotype. ♀, Israel, Haif Nahal Oren, soil, 16.II.1999, slide no. 31, State Museum of Natural History, L'viv, Ukraine.

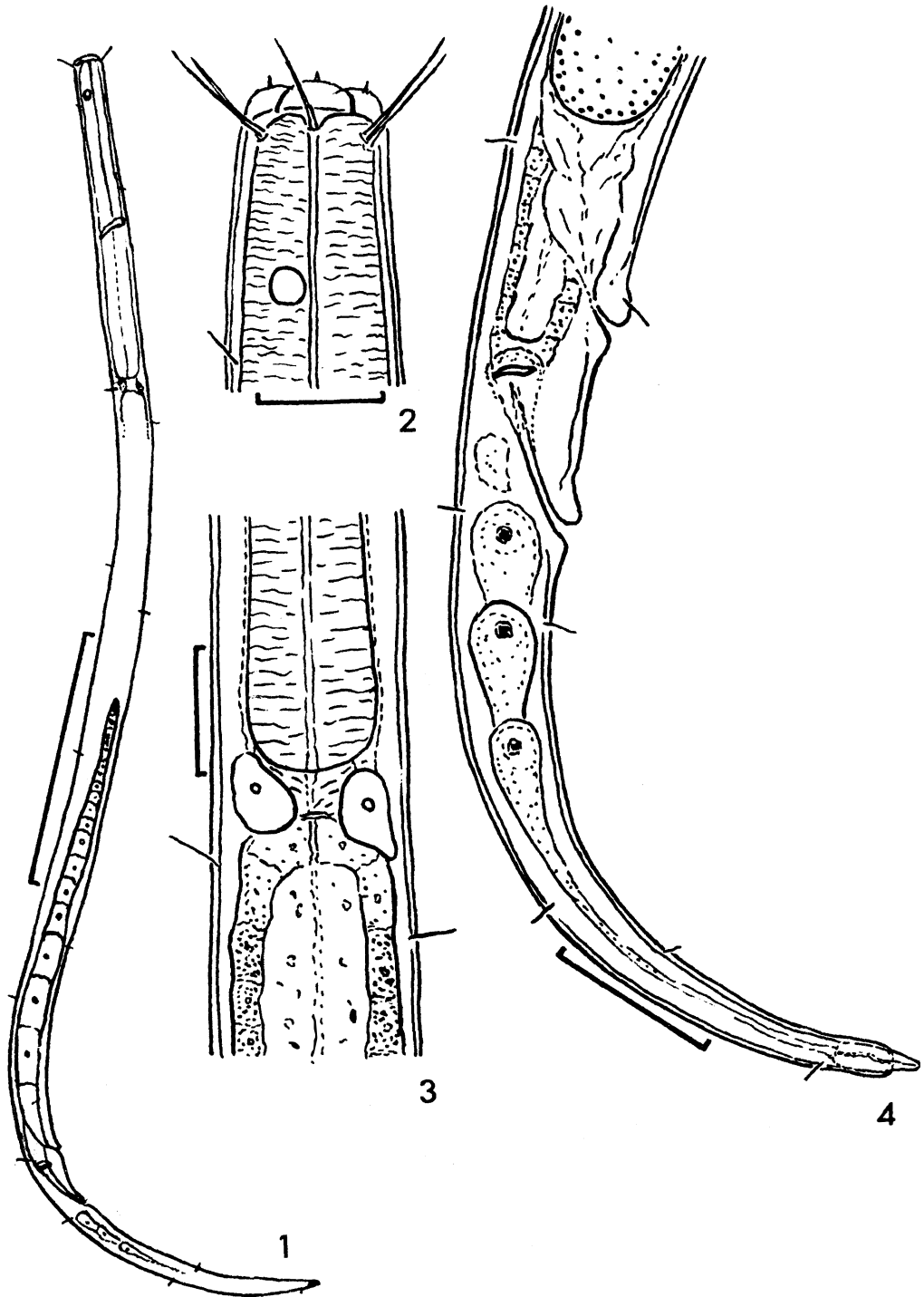
Paratypes. 2 ♀ collected with the holotype.

Measurements. See Table 1.

Description. Female. Body after fixation straight or strongly curved ventrally, more so in posterior part. Cuticle smooth; transverse striation absent. Thickness of cuticle slightly more than 1 μm . Somatic setae scattered along body, not numerous, 4.5-5.0 μm long. Crystalloid bodies absent. Front edge of labial region convex, not flattened. Labial region continuous with the rest of body, 12-14 μm wide and 2.5-3.5 μm high. Lips rounded, comparatively high. Inner labial sensilla setiform, 1.5 μm

long. Six outer labial setae 9-13 μm long, segmented. Four cephalic setae 6-10 μm long. A ring of perioral platelets surrounds the 3.0-3.5 μm wide mouth opening. Cheilostom wider than long, with prominently refractive lining. Remainder of stoma funnel-shaped, not demarcated from oesophageal lumen. Stomatal denticles absent. Amphidial fovea circular, 4.5-5.0 μm in diameter (25-30% of corresponding body width), its anterior margin situated at 1.1-1.4 labial region widths from anterior body end. Excretory pore and excretory glandular cell could not be detected. Oesophagus a muscular tube slightly expanded near posterior end and surrounded by nerve ring just anterior to the middle of oesophagus length. Cardia surrounded by three small cells and one or two coelomocytes. Anteriormost intestinal cells hyaline; outer zone of intestinal walls with many small granular inclusions. Rectum thick, anteriorly almost reaching vulva. Rectal valvae with distinct cuticularised lumen. Length of rectum 1.4-1.5 times anal-body width. Anterior anal lip bulging; anal opening a large slit. Ovary on right body side, comparatively short, with cells in one or two rows. Vagina short, anteriorly bent. Postvulval uterine sac absent. Vulval lips bulging; vulva a large slit. Tail usually arcuate ventrally. Three caudal glands arranged in tandem, terminating in a common chamber, which opens through spinneret. Spinneret plump, 2-3 μm long. Terminal and subterminal caudal setae absent.

Male unknown.



Figs 1-4. *Geomonhystera longicaudata* sp. n., holotype female. 1, general view; 2, cephalic end; 3, cardial region; 4, posterior end of body. Scales: 100 μ m (1), 20 μ m (4), 10 μ m (2, 3).

Table 1. Measurements of *Geomonhystera longicaudata* sp. n. (females; all measurements in μm).

Character	Holotype	Paratypes (n = 2)
L	633	742, 553
A	37	35, 35
B	4.8	4.8, 4.2
C	5.9	6.0, 5.6
c'	8.6	8.0, 7.0
V	78	79, 77
Oesophagus length	132	154, 133
Vulva – anus distance	29	31, 28
Tail length	108	123, 98
Labial region width	13	14, 12
Outer labial setae length	10	9, 13
Outer labial setae length in % of labial region width	77	90, 65
Anterior body end – amphid distance	17.0	20.0, 15.5
Anterior body end – amphid distance : labial region width	1.3	1.4, 1.1
Rectum length	20	22, 19
Rectum length : anal diameter	1.5	1.5, 1.4
Vulva – anus distance : anal diameter	2.1	2.1, 2.0
Tail length : vulva – anus distance	3.7	4.0, 3.5

Comparison. The new species is close to *G. australis* (Cobb, 1893), *G. breviseta* Brzeski, 1993 and *G. mexicana* Brzeski, 1993. It differs from the former in the shorter body (in *G. australis*, L = 759-1036 μm), longer tail (in *G. australis*, c = 6.6-8.5, c' = 5.2-6.8), longer outer labial setae (in *G. australis*, these setae 7-9 μm long, equal to 47-60% of labial region width), longer somatic setae and absence of denticles in the lumen of anterior oesophageal region. It differs from *G. breviseta* in the shorter body (in *G. breviseta*, L = 680-1028 μm), longer tail (in *G. breviseta*, c = 6.8-8.2, c' = 4.8-6.4), longer outer labial setae (in *G. breviseta*, these setae 4-9 μm long, equal to 25-45% of labial region width), absence of stomatal denticles and subterminal caudal setae. It differs from *G. mexicana* in the longer body (in *G. mexicana*, L = 499-604 μm), longer tail (in *G. mexicana*, c = 6.6-7.7, c' = 5.6-6.5), longer outer labial setae (in *G. mexicana*, these setae 5-6 μm long, equal to 25-45% of labial region width) and absence of denticles in the lumen of anterior oesophageal region (Brzeski, 1993).

Etymology. The species name means "having a long tail".

***Geomonhystera media* sp. n.** (Figs 5-8)

Holotype. ♀, **Ukraine**, L'viv, soil of a steppe meadow, 24.IX.2000, slide no. 32, State Museum of National History, L'viv, Ukraine.

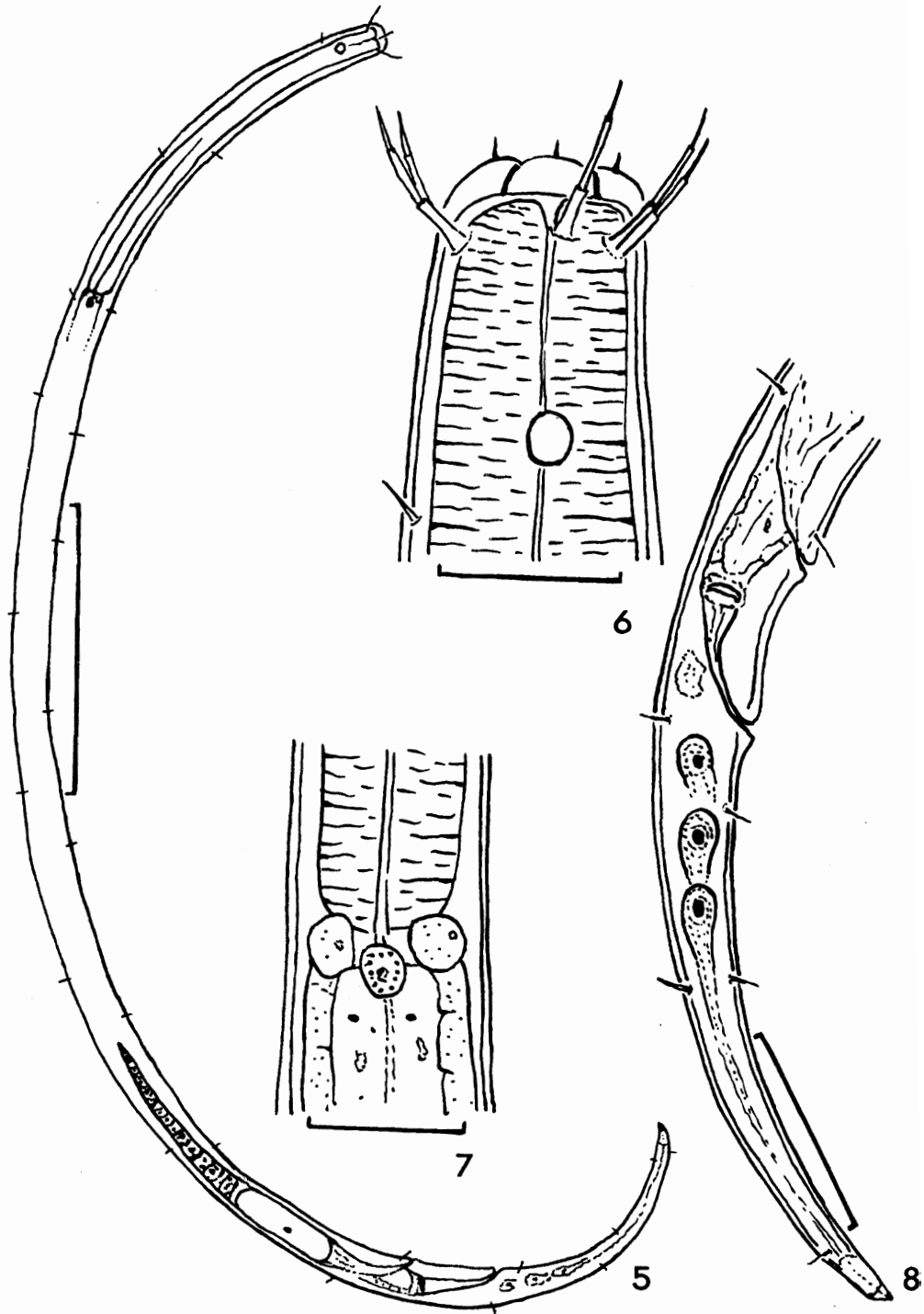
Paratypes. 10 ♀, collected with the holotype; 6 ♀, **Australia**, soil, 3.VIII.1998.

Measurements. See Table 2.

Description. Female. Body after fixation arcuate ventrally. Cuticle smooth; transverse striation absent. Thickness of cuticle in vulva region about 1 μm . Somatic setae scattered along body, not numerous, 3-5 μm long. Crystalloid bodies absent. Front edge of labial region convex. Labial region continuous with the rest of body, 11-13 μm wide and 2-3 μm high. Lips rounded, comparatively high. Inner labial sensilla thin, setiform, directed anteriorly, 1.0-1.5 μm long. Outer labial setae arcuate, 8-10 μm long; segmented. Four cephalic setae 6-8 μm long. Cheilostom wider than long, with prominently refractive lining. Remainder of stoma narrow, funnel-shaped, not demarcated from oesophageal lumen. Amphidial opening circular, 3-4 μm in diameter (25-30% of corresponding body width). Anterior margin of amphidial opening situated

Table 2. Measurements of *Geomonhystera media* sp. n. (females; all measurements in μm).

Character	Ukraine				Australia			
	holotype	paratypes (n = 9)		CV	holotype	paratypes (n = 6)		CV
		range	mean			range	mean	
L	601	545-636	593	4.93	504-634	591	7.70	
A	33	28-34	32	6.71	29-38	32	9.95	
B	4.4	4.1-4.7	4.4	4.33	4.4-5.0	4.7	4.54	
C	6.9	6.5-7.6	7.1	5.26	5.9-8.0	7.0	13.33	
c'	6.2	5.1-7.0	5.8	10.42	4.0-7.0	5.8	17.02	
V	81	80-82	81	9.19	77-84	80	2.65	
Oesophagus length	136	126-150	137	5.93	122-137	127	5.78	
Vulva-anus distance	25	25-28	27	3.49	25-34	30	9.36	
Tail length	87	77-98	84	8.49	67-101	86	16.03	
Labial region width	11.0	11.0-12.5	11.4	6.68	11.0-13.0	11.7	8.06	
Outer labial setae length	8.5	8.5-10.0	8.9	6.89	8.0-8.5	8.3	3.01	
Outer labial setae length in % of labial region width	77	68-90	78	8.20	67-72	69	2.00	
Anterior body end - amphid distance	12.5	12.5-17.0	14.8	9.57	11-14	13	9.59	
Anterior body end - amphid distance : labial region width	1.1	1.0-1.5	1.3	11.14	0.9-1.2	1.1	10.05	
Rectum length	21	19-21	20	4.08	17-22	19	8.99	
Rectum length : anal diameter	1.5	1.3-1.5	1.4	5.61	1.0-1.6	1.3	13.87	
Vulva - anus distance : anal diameter	1.8	1.6-2.0	1.9	7.21	1.8-2.3	2.0	9.75	
Tail length : vulva - anus distance	3.4	2.8-3.5	3.1	8.53	2.3-3.2	2.9	10.09	



Figs 5-8. *Geomonhystera media* sp. n., holotype female. 5, general view; 6, cephalic end; 7, cardial region; 8, posterior end of body. Scales: 100 μ m (5), 30 μ m (8), 10 μ m (6, 7).

at distance of 11-17 μm from anterior body end. Excretory pore and excretory glandular cell could not be detected. No denticles observed in the lumen of anterior oesophageal region. Oesophagus a muscular tube, sometimes slightly expanded posteriorly. Cardia surrounded by small cells and coelomocytes. Anteriormost intestinal cells hyaline, with distinct hyaline inner part. Rectum thick, anteriorly almost reaches vulva, 1.0-1.5 anal diameters long. Anal lips bulging. Vulva-anus distance 1.6-2.3 times anal diameter. Vulval lips strongly protruding. Vagina bent anteriorly; postvulval uterine sac absent. Female reproductive system monodelphic. Ovary on right body side, with oocytes at first in one, then in two rows. Usually one egg measuring 62-80 \times 17-20 μm , 3.4-3.6 maximum body diameters long. Tail tapering evenly; terminus with slender spinneret. Three caudal glands arranged in line, the anteriormost always situated posterior to anus. Terminal and subterminal caudal setae absent.

Male unknown.

Comparison. *G. media* sp. n. is close to *G. australis*, *G. breviseta*, *G. mexicana* and *G. longicaudata*. It differs from the former in the shorter body (in *G. australis*, $L = 759\text{-}1036 \mu\text{m}$), relatively longer oesophagus (in *G. australis*, $b = 4.9\text{-}6.2$), relatively longer outer labial setae (in *G. australis*, these setae equal to 47-60% of labial region width), longer somatic setae and absence of denticles in the lumen of anterior oesophageal region. It differs from *G. breviseta* in the shorter body (in *G. breviseta*, $L = 680\text{-}1028 \mu\text{m}$), longer outer labial setae (in *G. breviseta*, these setae 4-9 μm long, equal to 25-45% of labial region width), shorter rectum (in *G. breviseta*, rectum 27-42 μm long, 1.4-2.3 times the anal diameter), absence of subterminal setae at tail and denticles in the lumen of anterior oesophageal region. It differs from *G. mexicana* in the shorter outer labial setae (in *G. mexicana*, these setae 5-6 μm long, equal to 25-45% of labial region width), amphidial opening situated nearer to anterior body end (in *G. mexicana*, amphidial opening is situated at a distance equal to 1.2-1.8 labial region widths from anterior body end) and absence of denticles in the lumen of anterior oesophageal region. It differs from *G. longicaudata* in the thicker body (in *G. longicaudata*, $a = 35 = 37$), relatively shorter tail (in *G. longicaudata*, $c = 5.6\text{-}6.0$, $c' = 7.0\text{-}8.6$), ratios of tail length to vulva-anus distance (in *G. longicaudata*, 3.5-4.0) and vulva-anus distance to anal diameter (in *G. longicaudata*, 2.0-2.1).

Etymology. The species name means "middle".

Geomonhystera altaica sp. n.

(Figs 9-12)

Holotype. ♀, **Russia**, *Altai Republic*, Tunguk Town, valley of the Akkem River, soil, forest litter, 20.IX.2000, slide no. 34, State Museum of Natural History, L'viv, Ukraine.

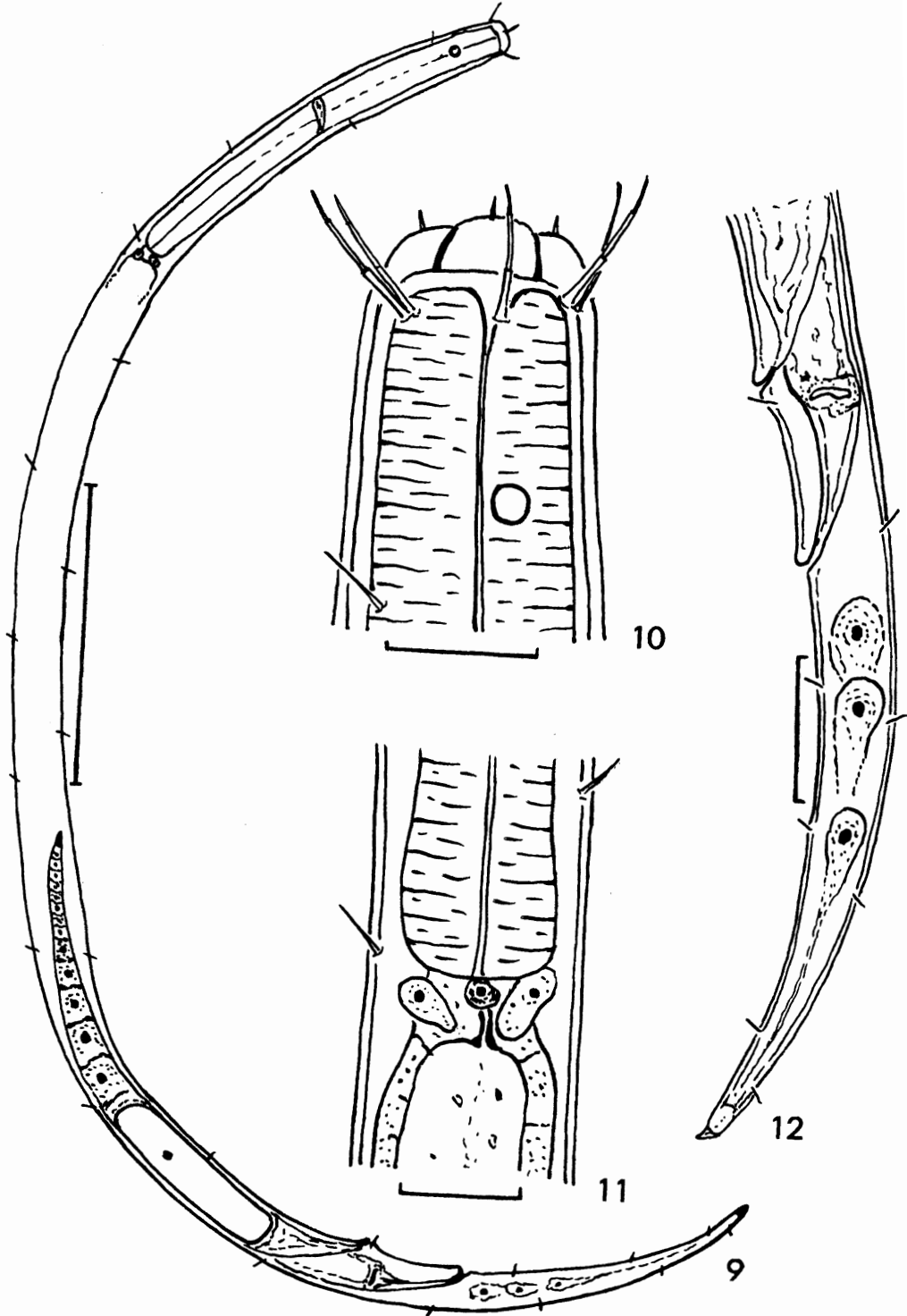
Paratypes. 9 ♀, collected with the holotype.

Measurements. See Table 3.

Description. Female. Body after fixation strongly curved ventrally, more so in posterior part. Cuticle smooth; transverse striation absent. Thickness of cuticle slightly more than 1.0 μm . Somatic setae scattered along body, not numerous, 3-4 μm long. Crystalloid bodies absent. Front edge of labial region convex. Labial region continuous with the rest of body, 13-14 μm wide and 3.0-3.5 μm high. Lips rounded, comparatively high. Inner labial sensilla setiform, about 1.5 μm long. Six outer labial setae 8.5-10.0 μm long, segmented. Four cephalic setae 6-8 μm long. A ring of perioral platelets surrounds the 2.5-3.0 μm wide mouth opening. Cheilostom wider than long, with prominently refractive lining. Remainder of stoma funnel-shaped, not demarcated from oesophagus lumen. Amphid opening circular, 4.5-5.0 μm in diameter (25-30% of corresponding body width). Anterior margin of amphid situated at distance of 1.2-1.5 labial region widths from anterior body end. Excretory pore and excretory glandular cell could not be detected. No denticles observed in the lumen of anterior part of oesophagus. Oesophagus a muscular tube slightly expanded near posterior end and surrounded by nerve ring just anterior to middle of oesophagus length. Cardia surrounded by three rounded cells and one or two coelomocytes. Anteriormost intestinal cells hyaline. Rectum thick, anteriorly almost reaching the vulva. Rectal valvae with distinct cuticularised lumen. Anterior anal lip bulging; anal opening a large slit. Ovary comparatively short, situated on right body side, with oocytes at first in the single row and then in two rows. Postvulval uterine sac absent. Vulval lips bulging, strongly protruded. Vagina short, anteriorly bent. Egg measuring 77-80 \times 17-20 μm . Tail usually arcuate ventrally. Three caudal glands arranged in tandem, terminating in a common chamber, which opens through spinneret. Spinneret plump, 2-3 μm long. Terminal and subterminal caudal setae not observed.

Male unknown.

Comparison. The new species is close to *G. australis*, *G. breviseta*, *G. mexicana*, *G. longicaudata* and *G. media*. It differs from *G. australis* in the shorter body (in *G. australis*, $L = 759\text{-}1036 \mu\text{m}$), longer outer labial setae (in *G. australis*, these setae 7-9 μm long, equal to 47-



Figs 9-12. *Geomonhystera altaica* sp. n., holotype female. 9, general view; 10, cephalic end; 11, cardial region; 12, posterior end of body. Scales: 100 μ m (9); 30 μ m (12); 10 μ m (10, 11).

Table 3. Measurements of *Geomonhystera altaica* sp. n. (females; all measurements in μm).

Character	Holotype	Paratypes (n = 9)		
		range	mean	CV
L	739	650-839	748	8.02
A	37	29-40	35	9.75
B	4.7	4.3-5.1	4.6	5.52
c	6.6	6.0-7.2	6.7	5.58
c'	6.7	6.0-7.3	6.8	5.72
V	80	79-82	81	1.02
Oesophagus length	158	150-179	164	4.95
Vulva – anus distance	35	28-38	33	10.73
Tail length	112	108-129	112	6.57
Labial region width	14	13-14	13.8	3.01
Outer labial setae length	10.0	8.5-10.0	9.6	6.70
Outer labial setae length in % of labial region width	70	65-70	69	2.63
Anterior body end – amphid distance	20	15-21	18	9.72
Anterior body end – amphid distance : labial region width	1.4	1.2-1.5	1.3	7.93
Rectum length	28	25-31	27	9.24
Rectum length : anal diameter	1.7	1.5-1.7	1.6	4.61
Vulva – anus distance : anal diameter	2.1	1.8-2.6	2.1	11.40
Tail length : vulva – anus distance	3.2	3.1-4.0	3.4	8.55

60% of labial region width), ratio of rectum length to anal diameter (in *G. australis*, 1.0-1.6) and vulva-anus distance to anal diameter (in *G. australis*, 1.4-2.0), longer somatic setae and absence of denticles in the lumen of anterior oesophageal part. It differs from *G. breviseta* in the shorter body (in *G. breviseta*, L = 680-1028 μm), comparatively shorter tail (in *G. breviseta*, c' = 4.8-6.4), longer outer labial setae (in *G. breviseta*, these setae 4-9 μm long, equal to 25-45% of labial region width), absence of subterminal setae at tail and denticles in the lumen of anterior oesophageal region. It differs from *G. mexicana* in the longer and thicker body (in *G. mexicana*, L = 499-604 μm and a = 26-31), longer outer labial setae (in *G. mexicana*, these setae 5-6 μm long, equal to 25-45% of labial region width), longer rectum (in *G. mexicana*, rectum 19-23 μm long) and absence of denticles in the lumen of anterior oesophageal part. It differs from *G. longicaudata* in the shorter tail (in *G. longicaudata*, c = 5.6-6.0, c' = 7.0-8.6), shorter outer labial setae (in *G. longicaudata*, these setae 9-13 μm long, 65-90% of labial region width), longer rectum (in *G. longicaudata*, rectum 19-22 μm long, 1.4-1.5 times as long as anal diameter) and ratio of vulva-anus distance to anal diameter (in

G. longicaudata, 2.0-2.1). It differs from *G. media* in the longer body (in *G. media*, L = 504-636 μm), longer rectum (in *G. media*, rectum 17-22 μm long, 1.0-1.6 times the anal diameter) and ratio of tail length to vulva-anus distance (in *G. media*, 2.3-3.5).

G. australis, *G. breviseta*, *G. mexicana*, *G. longicaudata*, *G. media*, and *G. altaica* form in the genus *Geomonhystera* an isolated species group with the following characters: cuticle not striated; somatic setae not numerous; outer labial setae segmented; amphid opening circular, situated 0.6-1.8 (mostly 1.0-1.5) labial region widths from anterior body end; rectum almost reaches the vulva, 1.0-2.3 times anal diameter; postvulval uterine sac absent; vulva-anus distance 1.4-2.6 times anal body width. Main characters of these species are given in Table 4.

Key to species of the *G. australis* group

1. Body length less than 650 μm 2
- Body length more than 650 μm 3
2. Outer labial setae 5-6 μm long, 25-45% of labial region width; amphidial opening situated 1.2-1.8 labial region widths from anterior body end *G. mexicana*

Table 4. Measurements of species of the *Geomonhystera australis* group (females; all measurements in µm; measurements of *G. australis*, *G. breviseta* and *G. mexicana* after Brzeski, 1993).

Characteristic	<i>G. australis</i>	<i>G. breviseta</i>	<i>G. mexicana</i>	<i>G. longicaudata</i>	<i>G. media</i>	<i>G. altaica</i>
L	759-1036	680-1028	499-604	553-742	504-636	650-839
A	30-39	29-37	26-31	35-37	28-38	29-40
B	4.9-6.2	4.2-5.1	4.4-5.1	4.2-4.8	4.1-5.0	4.3-5.1
C	6.6-8.5	6.8-8.2	6.6-7.7	5.6-6.0	5.9-8.0	6.0-7.2
c	5.2-6.8	4.8-6.4	5.6-6.5	7.0-8.6	4.0-7.0	6.0-7.3
V	80-85	81-84	80-82	77-79	77-84	79-82
Oesophagus length	132-178	139-208	110-123	132-154	122-150	150-179
Vulva – anus distance	28-40	29-43	20-31	28-31	25-34	28-38
Tail length	100-138	97-144	71-87	98-123	67-101	108-129
Labial region width	13-20	11-22	10.0-11.5	12-14	11-13	13-14
Outer labial setae length	7-9	4-9	5-6	9-13	8-10	8.5-10.0
Outer labial setae length in % of labial region width	47-60	25-45	25-45	65-90	67-72	65-70
Anterior body end – amphid distance	14-23	15-28	13-16	15.5-20.0	11-17	15-21
Anterior body end – amphid distance : labial region width	0.9-1.4	0.6-1.8	1.2-1.8	1.1-1.4	0.9-1.4	1.2-1.5
Rectum length	19-29	27-42	19-23	19-22	17-22	25-31
Rectum length : anal diameter	1.0-1.6	1.4-2.3	1.2-1.8	1.4-1.5	1.0-1.6	1.5-1.7
Vulva – anus distance : anal diameter	1.4-2.0	1.5-2.2	1.5-2.4	2.0-2.1	1.6-2.3	1.8-2.6
Tail length : vulva – anus distance	2.9-4.1	2.8-3.8	2.5-3.9	3.5-4.0	2.3-3.5	3.1-4.0

- Outer labial setae 8-10 μm long, 67-72% of labial region width; amphidial opening situated 0.9-1.4 labial region widths from anterior body end **G. media**
- 3. Outer labial setae 4-9 μm long; subterminal setae at tail present **G. breviseta**
- Outer labial setae 7-10 μm long; subterminal setae at tail absent 4
- 4. Tail longer: $c = 5.6-6.0$, $c' = 7.0-8.6$ **G. longicaudata**
- Tail shorter: $c = 6.0-8.5$, $c' = 5.2-7.3$ 5
- 5. Outer labial setae 7-9 μm long, 47-60% of labial region width; vulva-anus distance 1.4-2.0 times the anal diameter **G. australis**
- Outer labial setae 8.5-10.0 μm long, 65-70% of labial region width; vulva-anus distance 1.8-2.6 times the anal diameter **G. altaica**

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