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Research article

Description of a new terrestrial mermithid, *Aethemermis orientalis* n. gen., n. sp. (Nematoda: Mermithidae) from northwest of Iran

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Abstract

During a survey conducted to study on the mermithid fauna in northwest of Iran, a population belonging to an unknown genus of the group was discovered from the sediments of the Kahaq area in Maragheh County. *Aethemermis orientalis* n. gen., n. sp. is described and illustrated as a new member of the Mermithidae family, based on morphological and morphometrical characters. The new genus is characterized by six cephalic papillae; absence of lip papillae; a cuticle with prominent cross fibers; a rounded-conoid head; eight hypodermal cords at mid-body; mouth slightly shifted ventrad; vulva a transvers slit; vagina short, straight and barrel-shaped, distal portion of the vagina sclerotized; spicules paired, separate, slightly curved to straight and longer than body width at cloaca; tail in both sexes short, with bluntly rounded terminus in females and slightly less rounded in males and without appendage, however post-parasitic juveniles with appendage. The new genus is morphologically compared with *Heleidomermis*. Currently, the new genus is monotypic.

Key words: Morphology, Morphometrics, New species, Taxonomy.

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توصیف جنس جدیدی از مرمیتیدهای خاک‌زی، *Aethemermis orientalis* n. gen., n. sp. (Nematoda: Mermithidae) از شمال غرب ایران

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چکیده

در طی بررسی که با هدف مطالعه فون نماتدهای mermithid در شمال غرب ایران انجام شد، جمعیتی متعلق به جنس ناشناخته از نماتدهای فوق از رسوبات منطقه‌ی کهق در شهرستان مراغه جمع‌آوری گردید. عضو جدیدی از نماتدهای خانواده Mermithidae با نام *Aethemermis orientalis* n. gen., n. sp. بر اساس مشخصات ریخت‌شناختی و داده‌های ریخت‌سنجی توصیف می‌گردد. جنس جدید دارای شش پاپیل سری؛ فاقد پاپیل لبی؛ پوست با شیارهای متقاطع مشخص؛ سر گرد تا مخروطی؛ دارای هشت کورد هیپودرمی در سراسر بدن؛ منفذ دهان اندکی مایل به سمت شکمی؛ شکاف تناسلی عرضی؛ واژن کوتاه، مستقیم، بشکله‌ای شکل و قسمت انتهایی آن اسکروتی؛ آلت نرینه جفت، مجزا از هم، تاحدی خمیده تا مستقیم و بلندتر از عرض بدن در ناحیه کلواک؛ دم در هر دو جنس کوتاه، با انتهای گرد در افراد ماده و تاحدی گرد در افراد نر و بدون زائده، اما دم لارو پس از مرحله انگلی دارای زائده. جنس جدید از نظر ریخت‌شناسی با جنس *Heleidomermis* قابل مقایسه است. در حال حاضر، جنس جدید فقط یک گونه دارد.

واژه‌های کلیدی: آرایه‌بندی، ریخت‌سنجی، ریخت‌شناسی، گونه جدید.

Introduction

Mermithids are obligate parasites of invertebrates. Most have been found to parasitize insects, although they also occur in spiders, crustaceans, leeches, and molluscs (Rusconi *et al.* 2020). In Iran, mermithids received little attention before 2024, and the knowledge of the Iranian mermithid fauna is significantly limited. In fact, only two species have previously been documented from the country, a terrestrial species, *Hexameris albicans* (Siebold 1848) Steiner 1923 (by Nikdel *et al.* 2011) and an aquatic species, *Romanomermis culicivorax* Ross & Smith 1976 (by Zaim *et al.* 1988). However, over the past two years, our team at the University of Tabriz has described and documented four species: *Hexameris zirabi* Vazifeh, Niknam, Camino & Abootalebi, 2024; *Skrjabinomermis pirnaimi* Abootalebi, Niknam, Vazifeh, Camino & Shaaf Gorashi, 2024; *Iranimeris singular* Niknam, Vazifeh, Camino & Ahmadi, 2025 and *Oesophagomermis* sp. Vazifeh, Niknam & Camino, 2025.

During our regular surveys of mermithid nematodes in northwest of Iran, a new species representing a new genus of the family Mermithidae Braun, 1883 was recovered from sediment samples collected in the region. In this paper *Aethemermis orientalis* n. gen., n. sp. is described and characterized based on morphological and morphometrical data.

Materials and methods

Nematode collection and extraction

Sediment samples were collected from the Kahaq region, Maragheh, East Azarbaijan province, Iran. The tray method (Whitehead & Hemming 1965) was used for extraction of nematodes from the samples. The collected nematodes were processed to anhydrous glycerin according to De Grisse (1969), mounted on glass slides and their morphological and morphometric characters studied.

Light microscopy

Photographs were taken using a DP50 digital camera attached to an Olympus BX41 light microscope equipped with differential interference contrast (DIC). Raw photographs were edited using Adobe® Photoshop® CS.

Drawings were made using CorelDRAW® software version 12.

Results

Aethemermis n. gen.

Material examined

Five females, four males and six post-parasitic juveniles from one location and habitat, were in acceptable condition.

Genus description

Six cephalic (head) papillae; no lip papillae; cuticle with prominent cross fibers; head rounded-conoid; eight hypodermal cords at mid-body; mouth slightly shifted ventrally; amphids cup-shaped and located behind cephalic papillae; vulva a transvers slit; vagina short, straight and barrel-shaped, distal portion of the vagina sclerotized; eggs large and spherical; spicules paired, separate, slightly curved to straight and longer than body width at cloaca; genital papillae arranged in three rows, one row at mid body (14-22 in numbers) and two sub-ventral rows (29-38 in numbers) starting far anterior from the spicules head and continue up to tail end. Two more rows of the papillae (12-18 in numbers) resulted from bifurcation of the mid-body row and started from just anterior to cloaca and ended at the tail tip; tail in both sexes short without appendage, with bluntly rounded terminus in females and less rounded in males. Post-parasitic juveniles with appendage on tail tip.

Relationships

Based on the morphological characters such as having six cephalic papillae; amphids cup-shaped; spicules paired and parallel, the new genus comes close to *Heleidomermis* Rubstov, 1970. *Aethemermis* n. gen. differs from *Heleidomermis* by its cuticle with prominent cross fibers (*vs* smooth and lacking noticeable cross fibers), vulval opening transverse slit (*vs* circular), tail short (*vs* long), tail of post-parasitic juvenile with (*vs* without) appendage, spicules longer (*vs* shorter than body width at cloaca), medial row of male genital papillae bifurcates anterior to cloaca (*vs* not so) and terrestrial (*vs* aquatic) nematode (according to Poinar & Mullens 1987; Poinar & Monteys 2008).

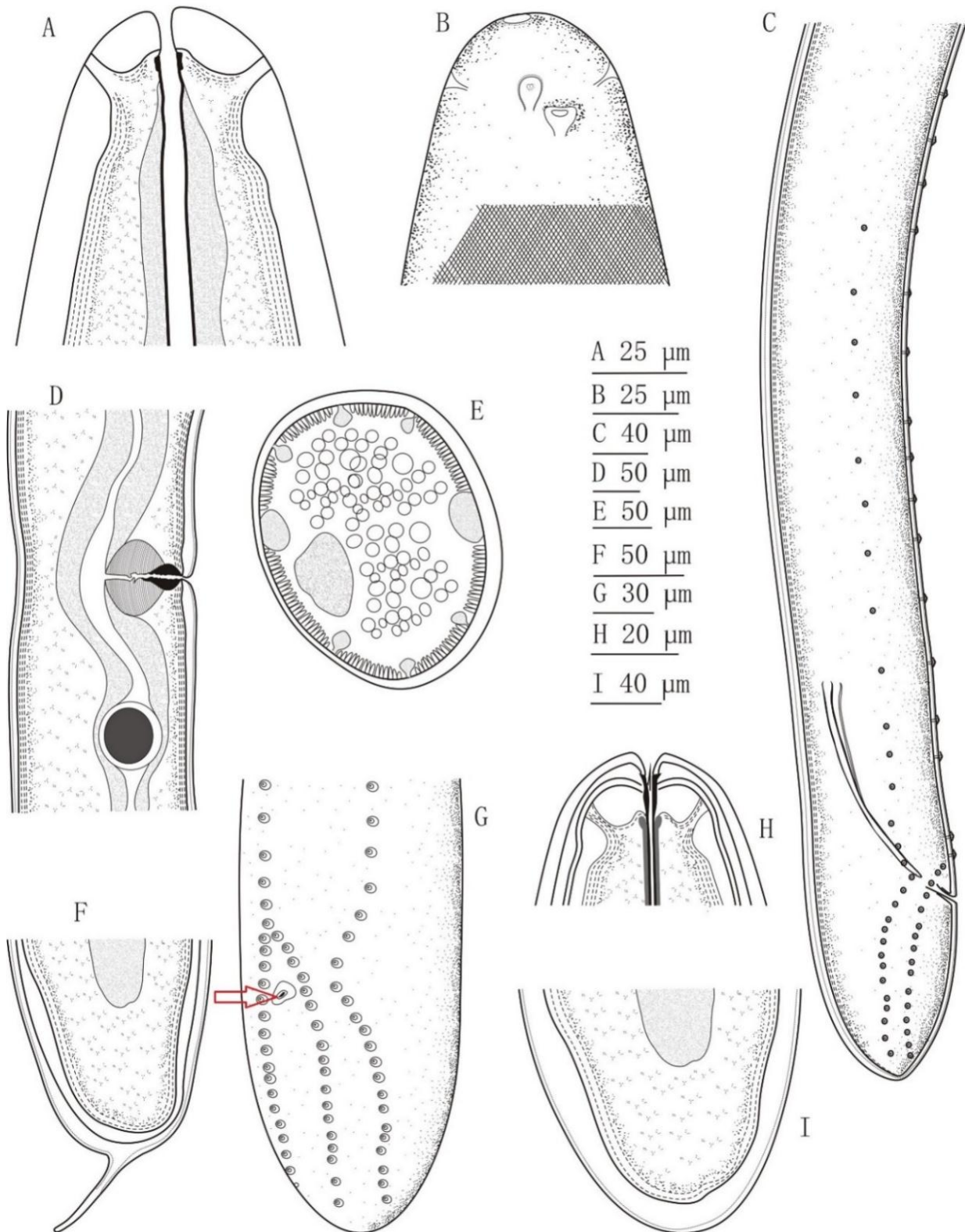


Fig. 1. *Aethemermis orientalis* n. gen., n. sp.: A: Female, anterior region in lateral median view, B: Female, anterior region in lateral surface view, C: Male, caudal region, D: Female, vulval region and vagina, E: Female, cross section, mid-body, F: Post-parasitic juvenile, caudal region, G: Male, caudal region in sublateral surface view (arrow indicates the cloaca), H: Post-parasitic juvenile anterior region in lateral median view, I: Female, caudal region.

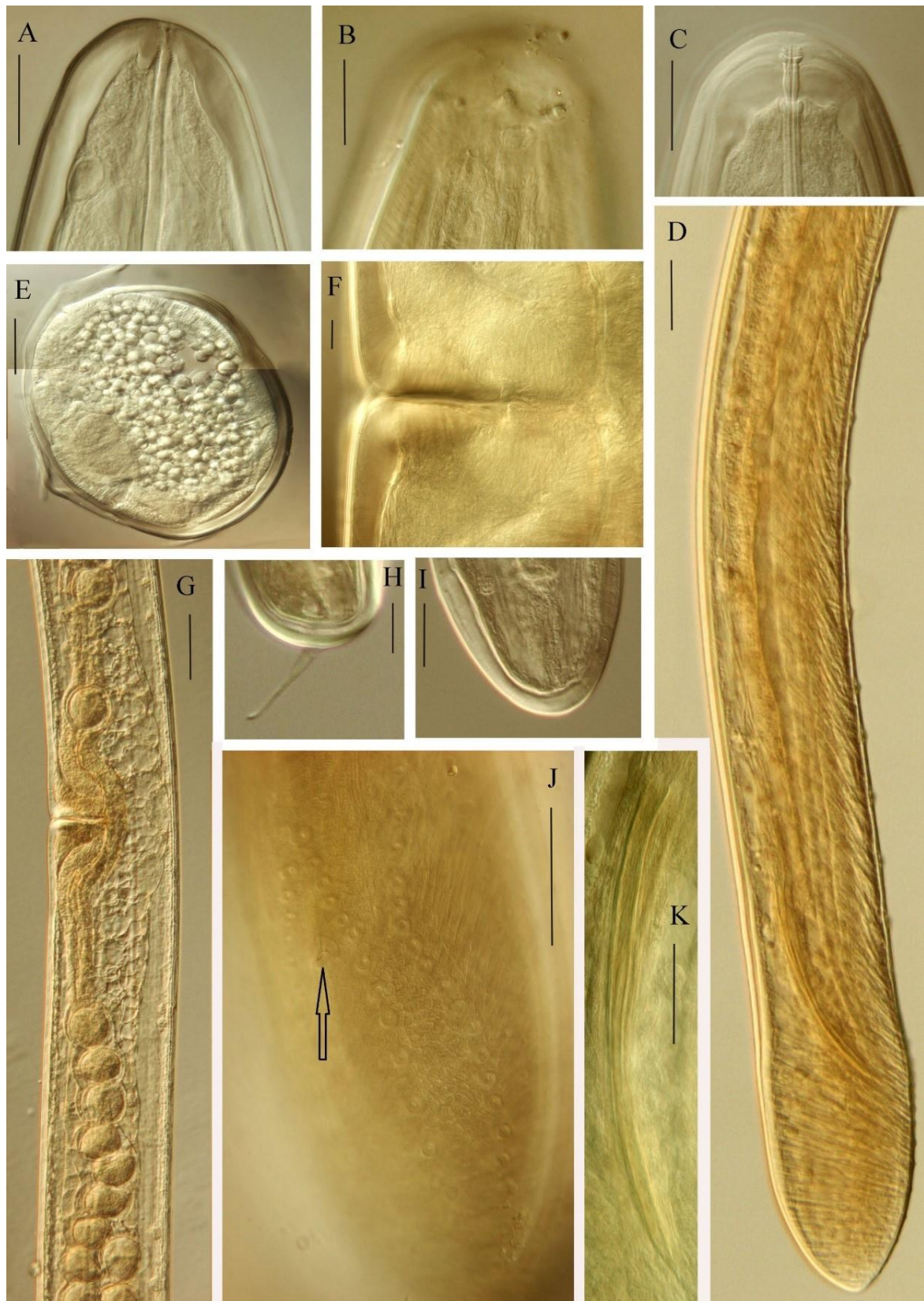


Fig. 2. *Aethemermis orientalis* n. gen., n. sp. (LM): A: Female, anterior region in lateral median view, B: Female, anterior region in lateral surface view, C: Post-parasitic juvenile anterior region in lateral median view, D: Male, caudal region, E: Female, cross section, mid-body, F: Female, vulval region and vagina, G: Female, vulval region, vagina and eggs, H: Post-parasitic juvenile caudal region, I: Female, caudal region, J: Male, caudal region in sublateral surface view (arrow indicates the cloaca), K: Male, spicules. Scale bars: A-C, E and H = 25 μ m, D, F and I-K = 50 μ m, G = 100 μ m.

Etymology

The name of the genus refers to unusual mermithid.

Type locality and habitat

The new genus and species has been collected from Kahaq region, Maragheh, East Azarbaijan province in Iran (GPS coordinates: 60°73'92" N, 41°49'32" E, altitude 1835 m a.s.l.), from the sediments.

Type material

Holotype and all paratypes have been deposited in the Nematode Collection of the Department of Plant Protection, Faculty of Agriculture, University of Tabriz, Tabriz, Iran.
<http://zoobank.org/urn:lsid:zoobank.org:pub:5AEC4255-3B4B-4AFC-BA7F-89117783CAB2>

Type and only species

Aethemermis orientalis n. gen., n. sp.

(Figs 1, 2; Table 1)

Adults

Medium size nematodes. Body cylindrical, gradually tapered towards both ends, ventrally curved, open C shaped upon fixation. Color of trophosome brownish and begins after nerve ring, in the female it is extended to near the end of the body, but in the male continues far beyond the head of the spicules and does not reach the level of the cloaca. Cuticle with prominent cross fibers, 6-10 µm thick at nerve ring, 7-13 µm at mid-body and 13-19 µm at posterior end. Head rounded-conoid and 32-49% of body diameter at nerve ring region. Mouth slightly shifted ventrally. Stoma small and thin. The anterior part of the stoma is sclerotized. Six cephalic papillae arranged in a single plane, no lip papillae. Amphids cup-shaped and small size, with aperture occupying 15-18% of the corresponding lip region diameter and located behind cephalic papillae. Eight hypodermal cords at mid-body. Nerve ring located at 1.1-3.1% of body length. Cardia absent. Tail in both

sexes short and without appendage, with bluntly rounded terminus in females, slightly less rounded in males.

Female

Reproductive system didelphic-amphidelphic. Opening of the vulva is a transverse slit almost at the mid body. Vulval lips lacking and cuticular cone well developed (sclerotized). Vagina short, straight and barrel-shaped, perpendicular to body axis, 40-53% of corresponding body diameter in lateral view and surrounded by robust muscles, distal portion of the vagina sclerotized and 40-48 µm long. Eggs numerous, spherical and 69-72 µm diameters. With vestigial genital papillae.

Male

Spicules paired, separate, slightly curved to straight, 24-29 times as long as wide and 1.3-1.6 times body width at cloaca. Genital papillae arranged in three rows, one row at mid body (14-22 in numbers) and two sub-ventral rows (29-38 in numbers) starting far anterior from the spicules head and continue up to tail end. Two more rows of the papillae (12-18 in numbers) resulted from bifurcation of the mid-body row and started from just anterior to cloaca and ended at the tail tip. Tail 1.1-1.4 times body width at cloaca.

Post-parasitic juveniles (n = 6)

Cuticle with prominent cross fibers; stylet 5.5-9.0 µm tail tip with an appendage measured as 25-50 µm long.

Etymology

The species epithet refers to the eastern geographic distribution of the species.

Discussions

The present study aimed to identify the genera of mermithids occurring in northwest of Iran. This newly discovered species expands our knowledge on the representatives of the family in the country and supports our earlier expectations that this group of nematodes is species-rich in Iran.

Table 1. Morphometrics of *Aethemermis orientalis* n. gen., n. sp. from Iran. All measurements are in µm except L in mm, and in the form: mean ± s.d. (range).

Population	Females		Males	Post-parasitic juveniles
	Holotype	Paratypes	Paratypes	Paratypes
n	-	4	4	6
Body length	15.50	17.97 ± 4.90 (11.00-23.50)	9.24 ± 2.30 (7.71-12.76)	5.36 ± 3.33 (4.68-10.36)
a	0.07	0.09 ± 0.12 (0.04-0.12)	0.07 ± 0.01 (0.06-0.08)	0.06 ± 0.01 (0.03-0.06)
c	-	-	0.06 ± 0.01 (0.05-0.08)	-
c'	-	-	1.26 ± 0.10 (1.16-1.40)	-
V%	55	58.6 ± 9.2 (50-69)	-	-
Lip region diam.	50	49.2 ± 4.0 (46-56)	37.5 ± 2.8 (34-41)	25.2 ± 2.8 (20-37.2)
Body diam. at the level of nerve ring	112	126.6 ± 13.1 (112-143)	84.7 ± 12.4 (75-103)	58.6 ± 3.5 (50.0-89.3)
Body diam. at mid-body	200	196.8 ± 28.8 (153-234)	126.2 ± 14.5 (109-128)	102.0 ± 5.3 (80.5-110.0)
Distance from head to the nerve ring	262	263.4 ± 15.3 (244-287)	216.5 ± 17.7 (203-218)	156 ± 4.3 (140.0-188.6)
Length of vagina	78	94.2 ± 10.2 (87-106)	-	-
Width of vagina	106	71.0 ± 7.0 (62-78)	-	-
Spicules length	-	-	167.5 ± 13.0 (150-178)	-
Body diam. at posterior end of the trophosome/cloaca	137	152.2 ± 9.4 (137-162)	114.7 ± 9.0 (103-116)	95.2 ± 3.5 (80.6-104.0)
Tail length	-	-	145.0 ± 4.0 (140-150)	-

Traditionally, mermithids are divided into terrestrial and aquatic species, and should therefore be studied separately. The new genus shares many characteristics with *Heleidomermis*, but the latter comprises aquatic species that parasitize aquatic insects. The relevant distinguishing characters between these two genera are outlined.

It is important to identify the insect host(s) of the new species in order to better understand its biology and its potential for biological control. For this reason, we conducted intensive sampling throughout the region to locate infected host(s), but we were not successful. Unfortunately, the insect fauna of the study area has not yet been investigated, so is currently not possible to provide a list of potential host(s) for this species within the sampled geographic region of *Aethemermis orientalis* n. gen., n. sp.

References

- Abootalebi F., Niknam G., Vazifeh N., Camino N.B. & Shaaf Gorashi S. 2024. *Skrjabinomermis pirnaimi* sp. n. (Nematoda: Mermithidae) from Iran: A morphological and molecular phylogenetic study. *Nematology* 26(7), 753-762. <https://doi.org/10.1163/15685411-bja10336>
- Braun M. 1883. *Die thierisher Parasiten des Menschen nebst einer Anleitung zur praktischen Beschaeftigung mit der Helminthologie fuer Stadierende und Aertze.* - Anon, Wurzburg. 233 pp.
- De Grisse A.T. 1969. Redescription ou modification de quelques techniques utilisées dans L; etude des Nematode phytoparasitaires. *Meded, Rijksfaculteti der Landbouveten, Gent* 34, 351-369.
- Nikdel M., Kaiser H., Niknam G. 2011. First record of *Hexamermis* cf. *albicans* (Siebold, 1848) (Nematoda: Mermithidae) infecting lepidopteran larvae from Iran. *Nematologia Mediterranea* 39(1), 81-83.
- Niknam G., Vazifeh N., Camino N.B. & Ahmadi B. 2025. Description of *Iranimermis singular* gen. n., sp.

- n. (Nematoda: Mermithidae) from Iran, a new member of the family. *Biologia* (8098), 1991-1995. <https://doi.org/10.1007/s11756-025-01937-0>
- Poinar JR G.O. & Mullens B.A. 1987. *Heleidomermis magnapapula* n. sp. (Mermithidae: Nematoda) parasitizing *Culicoides variipennis* (Ceratopogonidae: Diptera) in California. *Revue de Nematologie* 10(4), 387-391.
- Poinar JR G.O. & Monteys V.S. I 2008. Mermithids (Nematoda: Mermithidae) of biting midges (Diptera: Ceratopogonidae): *Heleidomermis cataloniensis* n. sp. from *Culicoides circumscriptus* Kieffer in Spain and a species of *Cretacimermis* Poinar, 2001 from a ceratopogonid in Burmese amber. *Systematic Parasitology* 69, 13-21.
- Ross J.F. & Smith S.M. 1976. A review of the mermithid parasites (Nematoda: Mermithidae) described from North American mosquitoes (Diptera: Culicidae) with descriptions of three new species. *Canadian Journal of Zoology* 54(7), 1084-1102. <https://doi.org/10.1139/z76-124>
- Rubstov I.A. 1970. [A new species and genus of mermithids from biting midges]. *Novye i Maloizvestnye Vidy Foewzy Sibiri* 3, 94-101 (in Russian).
- Rusconi J.M., Battista C.D., Balcazar D., Rosales M. & Achinelly M.F. 2020. *Amphimermis enzoni* n. sp. (Nematoda: Mermithidae) parasitizing damselflies and dragonflies in Argentina. *Journal of Nematology* 52, e2020-51.
- Siebold Th Von. 1848. Ueber die Fadenwürmer der Insecten. *Stettiner Entomologische Zeitung* 9, 290-300.
- Steiner G. 1923. Limicole Mermithiden aus dem Sarekgebirge und der Torne Lappmark. (Beitrag von Dr I. G. de Man.). *Naturw Untersuch Sarekgeb* 4(8), 805-828.
- Vazifeh N., Niknam G., Camino, N.B. & Abootalebi F. 2024. A new species of the genus *Hexamermis* Steiner, 1924 (Nematoda: Mermithidae) from northern Iran: a nematode with an unusual uterine morphology. *Journal of Helminthology* 98(e29),1-8. <https://doi.org/10.1017/S0022149X24000063>
- Vazifeh N., Niknam G. & Camino, N.B. 2025. First record of occurrence of the genus *Oesophagomermis* Artyukhovsky 1969 (Nematoda: Mermithidae), a terrestrial mermithid from Iran, with an updated identification key for its species. *Journal of Entomological Society of Iran* 45(4), 531-538. <https://doi.org/10.22034/jesi.45.4.5>
- Whitehead A.G. & Heming J.R. 1965. A comparison of some quantitative methods of extracting small vermiform nematodes from soil. *Annals of Applied Biology* 55, 25-38.
- Zaim M., Ladonni H., Ershadi MRY., Manouchehri AV., Sahabi Z., Nazari M. & Shahmohammadi H. 1988. Field application of *Romanomermis culicivorax* (Mermithidae: Nematoda) to control anopheline larvae in southern Iran. *Journal of the American Mosquito Control Association* 4(3), 351-355.