DESCRIPTION OF A NEW AND A KNOWN SPECIES OF THE GENUS *OXYDIRUS* THORNE, 1939 (NEMATODA: DORYLAIMIDA)

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Summary. A new and a known species of the genus *Oxydirus* Thorne, 1939 are described and illustrated. *Oxydirus sturhani* sp. n. is characterized by having 1.2-1.4 mm long body; asymmetrical lip region, offset by depression; odontostyle aperture about one-half of its length; vulva transverse at 29-31%; *pars proximalis vaginae* with rounded walls; long filiform tail. *Oxydirus tenuicaudatus* Thorne, 1964 is re-described and a key to the species of the genus is provided.

Keywords: Japan, Nicaragua, *Oxydirus,* taxonomy.

While studying the German Nematode collection at Munster during 1999-2000, one of us (WA) recorded a population of the comparatively rare genus *Oxydirus* Thorne, 1939 collected by Dr. Dieter Sturhan from Nicaragua in 1977. A second population was recorded from a sample collected from South Japan by Dr. T. Mizukubo. On detailed study of these populations at Aligarh, the Japanese population was identified as *Oxydirus tenuicaudatus* Thorne, 1964, whereas the Nicaragua population represented a new species, and is being named here as *O. sturhani* sp. n. Both these species are described and illustrated in the following, along with a key to species of the genus *Oxydirus*.

MATERIAL AND METHODS

The nematodes, extracted from soil samples by Cobb's sieving and decantation and modified Baermann funnel technique, were killed and fixed in hot 4% formalin, dehydrated to glycerin by a slow evaporation method, and mounted in anhydrous glycerin on glass slides. Measurements were taken using an ocular micrometer and line illustrations were made using a drawing tube attached to a Nikon Optiphot-2 microscope. Photographs were taken using a digital camera attached to an Olympus DIC microscope.

DESCRIPTIONS

OXYDIRUS TENUICAUDATUS Thorne, 1964
(Table I; Figs 1 and 2)

Female. Body cylindrical, almost straight upon fixation, tapering slightly anteriorly and posteriorly ending in a long filiform tail. Cuticle finely striated, 1.5-2.0 µm thick at mid body and 4-5 µm on tail. Lateral chords about one-fourth of the body width at mid body. Lateral, dorsal and ventral body pores indistinct.

Lip region asymmetrical, about twice as wide as high and about one-fifth to one-fourth as wide as body width at neck base. Amphids cup-shaped, their aperture about two-thirds as wide as lip region width. Odontostyle linear, about as long as lip region width, its aperture about one-third of its length. Guide ring single, at 0.6-0.7 times lip region width from anterior end. Odontophore rod-like, 1.6-2.0 times the odontostyle length. Nerve ring at 30-33% of neck length from anterior end. Anterior part of pharynx very slender, posterior part occupying about 50-60% of total neck length and enclosed in a very thin sheath of dextrally spiral muscle bands. Cardia rounded, about half of the corresponding body width long.

Reproductive system mono-opisthodelphic, anterior branch absent. Posterior branch well developed; ovary reflexed, 45-85 µm long with oocytes arranged in a single row except near tip. Oviduct joining ovary sub-terminally, measuring 45-70 µm. Sphincter at oviduct-uterus junction weakly developed. Uterus a simple tube, measuring 50-60 µm. Vulva a transverse wide opening. Vagina thick-walled, extending inwards more than half of corresponding body width; *pars proximalis vaginae* 10-13 µm long with convex walls; *pars refringens vaginae* absent; *pars distalis vaginae* 3.0-3.5 µm with slightly convex walls. Pre-rectum about 5.5-7.5 times anal body width long. Rectum 1.3-1.4 times anal body width long. Tail long, filiform, about 9.0-10.5 times anal body width long. Caudal pores two on each side.

Male. Not found.

Remarks. Thorne (1964) described *O. tenuicaudatus* from Puerto Rico. Ferris *et al.* (1980) studied specimens collected from the type locality (original material probably lost) and also from various localities in Indiana and Oak Ridge. The present specimens collected from Japan agree well with the original description except for having

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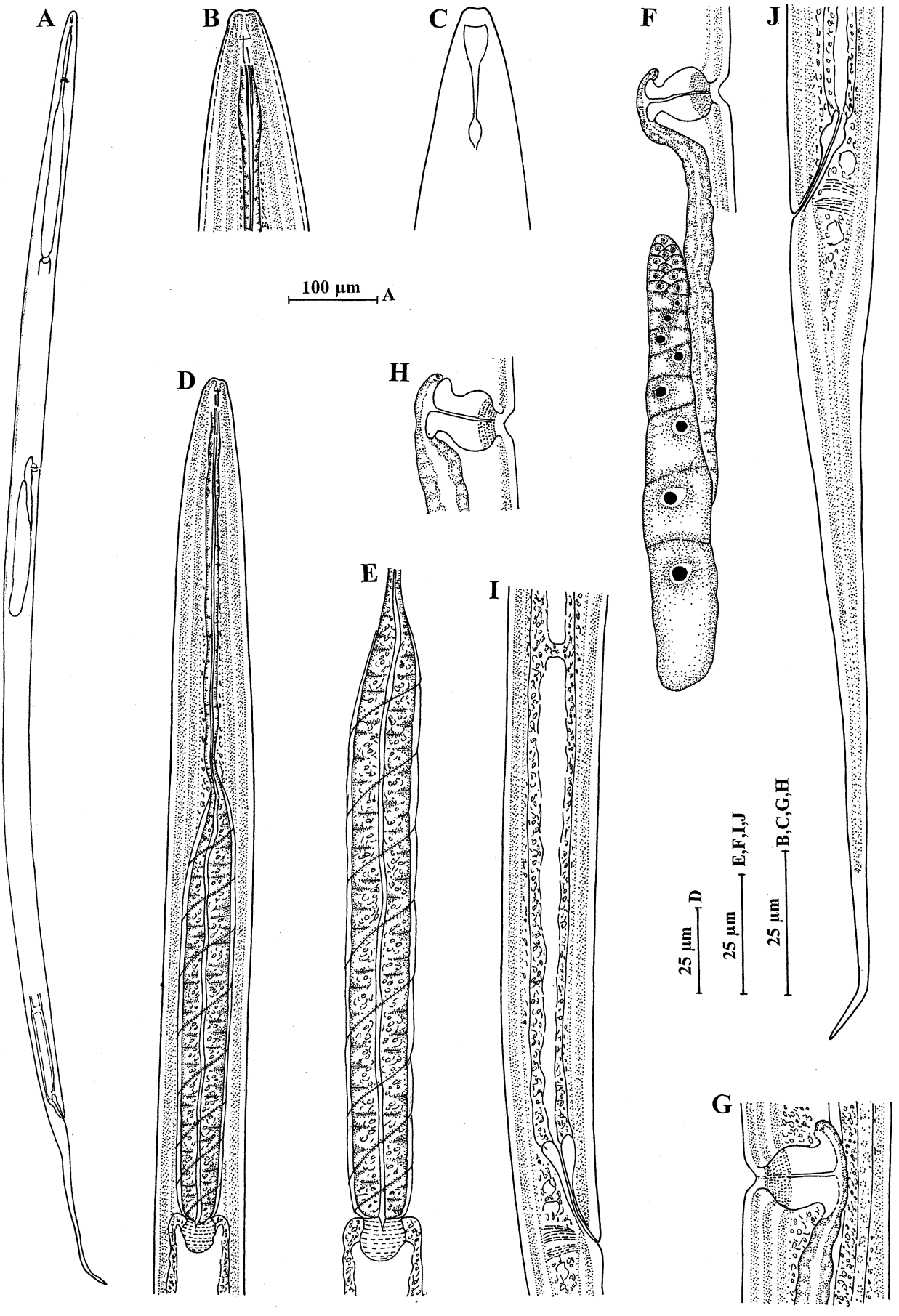

Fig. 1. Drawing of *Oxydirus tenuicaudatua* Thorne, 1964. A, entire female; B, anterior region; C, anterior end showing amphid; D, pharyngeal region; E, expanded part of pharynx; F, female genital system; G and H, vulval region; I, female posterior region showing pre-rectum; J, female posterior end.

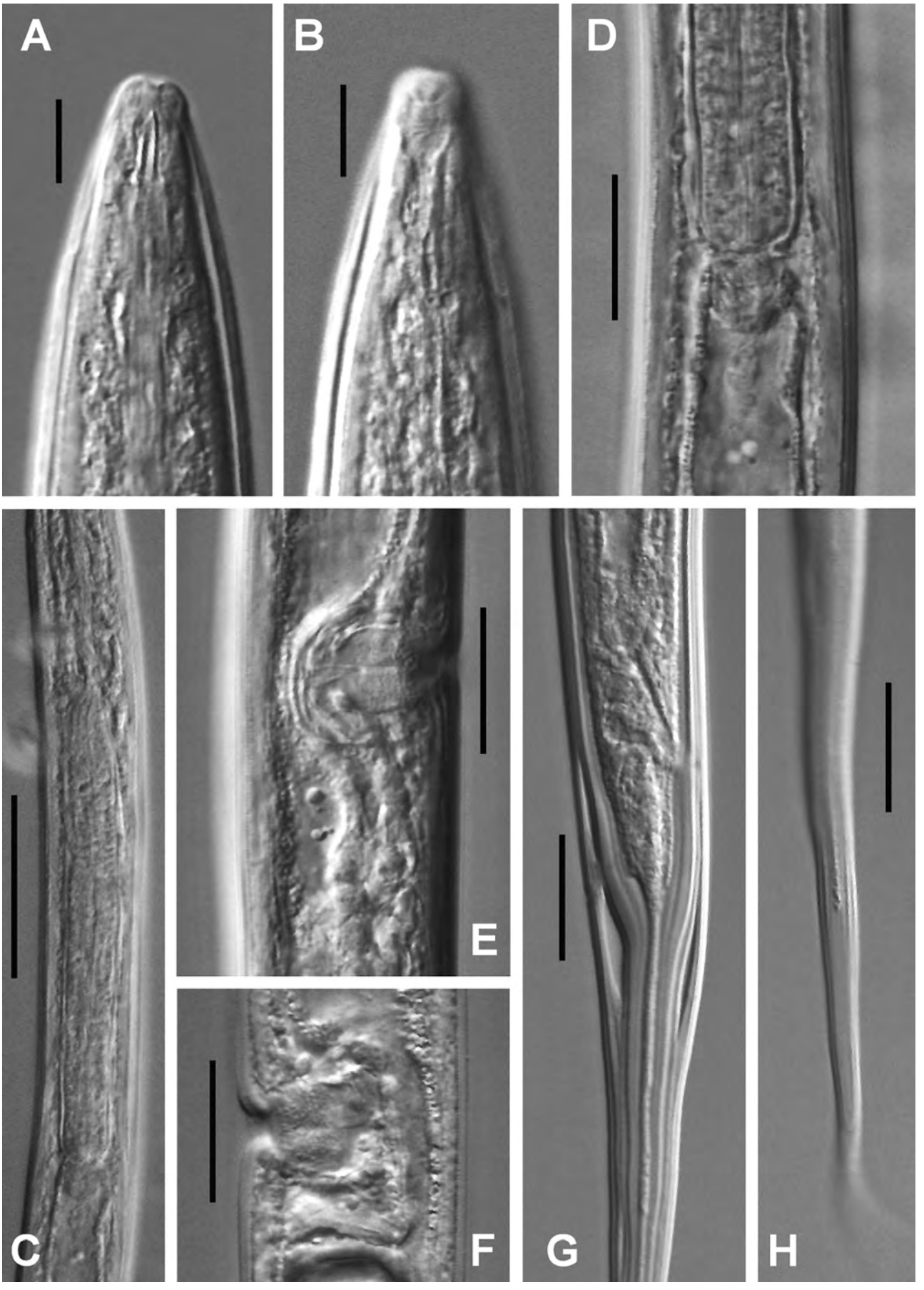

Fig. 2. Micro-photographs of *Oxydirus tenuicaudatus* Thorne, 1964. A, anterior region; B, anterior end showing amphid; C, expanded part of pharynx; D, pharyngo-intestinal junction; E and F, vulval region; G and H, female posterior region.(Scale bars: A, B = 10 µm; C = 50 µm; D-H = 20 µm).

Table I. Morphometrics of *Oxydirus tenuicaudatus* Thorne, 1964. [All measurements in µm except where indicated otherwise, in the form mean ± standard deviation (range)].

Character	Females
n :	6
L (mm)	1.27±0.06 (1.2-1.4)
a	49.5±0.66 (48.6-50.4)
b	4.8±0.20 (4.6-5.2)
c	7.7±0.65 (6.4-8.5)
c`	10.0±0.50 (9.0-10.5)
V	36.5±0.91 (35.7-38.3)
G_1	-
G_2	12.3±2.17 (10.2-17)
Lip region width	6.0
Lip region height	3.0
Amphid aperture	4.0
Odontostyle length	6.0
Odontophore length	10.5±0.76 (10-12)
Guide ring from anterior end	5.0
Nerve ring from anterior end	86.8±2.2 (85-90)
Neck length	268±8.9 (252-280)
Expanded part of Pharynx	157±15.9 (135-175)
Cardia length	10±1.6 (7-12)
Body width at mid body	26.3±1.37 (25-29)
Body width at neck base	26.4±1.01 (25-28)
Body width at anus	16.8±0.7 (16-18)
Anterior genital branch	-
Posterior genital branch	162±29.8 (130-223)
Vaginal depth	18.7±0.9 (18-20)
Vulva from anterior end	476±22.7 (442-512)
Prerectum length	127±18 (100-150)
Rectum length	25.0
Tail length	169±13.7 (145-190)

slightly shorter body (L = 1.2-1.4 *vs* 1.7 mm), slightly longer pharynx (b = 4.1-5.2 *vs* 6.5), slightly posterior vulval position (V = 35.7-40 *vs* 30) and slightly shorter prerectum (5.5-7.5 *vs* 8-10 times anal body width long). The present specimens also confirm well with the populations of Ferrris *et al.* (1980) except for having slightly longer pharynx (b = 4.1-5.2 *vs* 5.7-7.3 in Puerto Rico population), longer expanded part of pharynx (50-60% *vs* 45-50%) and slightly shorter tail (c' = 9-10.5 *vs* 11-13).

Habitat and locality. From grassland, Ishigaki Island, South Japan, Japan.

OXYDIRUS STURHANI **sp. n.**
(Table II; Figs 3 and 4)

Female. Body cylindrical, almost straight upon fixation, tapering slightly anteriorly and posteriorly ending in a long filiform tail. Cuticle finely striated, 1.5-2.0 µm thick at mid body and 4-5 µm on tail. Lateral chords about one-fourth of the body width at mid body. Lateral, dorsal and ventral body pores indistinct.

Lip region asymmetrical, offset by depression, about twice as wide as high and about one-fourth to one-third as wide as body width at neck base. Amphids cup-shaped, their aperture about one-third as wide as lip region width. Odontostyle linear, 0.7-0.8 times lip region width long, its aperture about one-half of its length. Guide ring single, at 0.6-0.7 times lip region width from anterior end. Odontophore rod-like, 1.6 times the odontostyle length. Nerve ring at 35-36% of neck length from anterior end. Anterior part of pharynx very slender; posterior part occupying about 45-53% of total neck length and enclosed in a very thin sheath of dextrally spiral muscle band. Cardia rounded, about one-third of the corresponding body width long.

Reproductive system mono-opisthodelphic, anterior genital branch either completely absent or represented by a very small sac. Posterior branch well developed; ovary reflexed, its tip reaching beyond the oviduct-uterus junction, measuring 85-100 µm with oocytes arranged in a single row except near tip. Oviduct joining ovary sub-terminally, measuring 45-65 µm, consisting of a long slender part with prismatic cells and a slightly wider *pars dilatata* with wide lumen. Sphincter present at oviduct-uterus junction. Uterus a simple tube, measuring 40-55 µm. Vulva transverse; vagina extending inwards about half of corresponding body width; *pars proximalis vaginae* 10-12 µm long with convex walls; *pars refringens vaginae* absent; *pars distalis vaginae* 4-5 µm with rounded walls. Pre-rectum about 6-7.6 times as long as anal body width. Rectum about as long as anal body width. Tail long, filiform, about 15.8-16.4 times anal body width long. Caudal pores two on each side.

Male. Not found.

Type habitat and locality. Blue fields, Nicaragua; rhizosphere of Cocos palm on island in Lagoon; collected by Dr. D. Sturhan in December 1977.

Type material. Holotype female on slide *Oxydirus sturhani* sp. n./1; paratype females on slides *Oxydirus sturhani* sp. n./2-4; deposited with the nematode collection of the Department of Zoology, Aligarh Muslim University, India.

Diagnosis. Oxydirus sturhani sp. n. is characterized by having 1.2-1.4 mm long body; asymmetrical lip region, offset by depression; aperture of odontostyle about one-half of its length; vulva transverse at 29-31%; mono-opisthodelphic female reproductive system; *pars proximalis vaginae* with rounded walls and long filiform tail.

*Relationships***.** *Oxydirus sturhani* sp. n. comes close to *O. tenuicaudatus* Thorne, 1964, *O. thornei* Ferris,

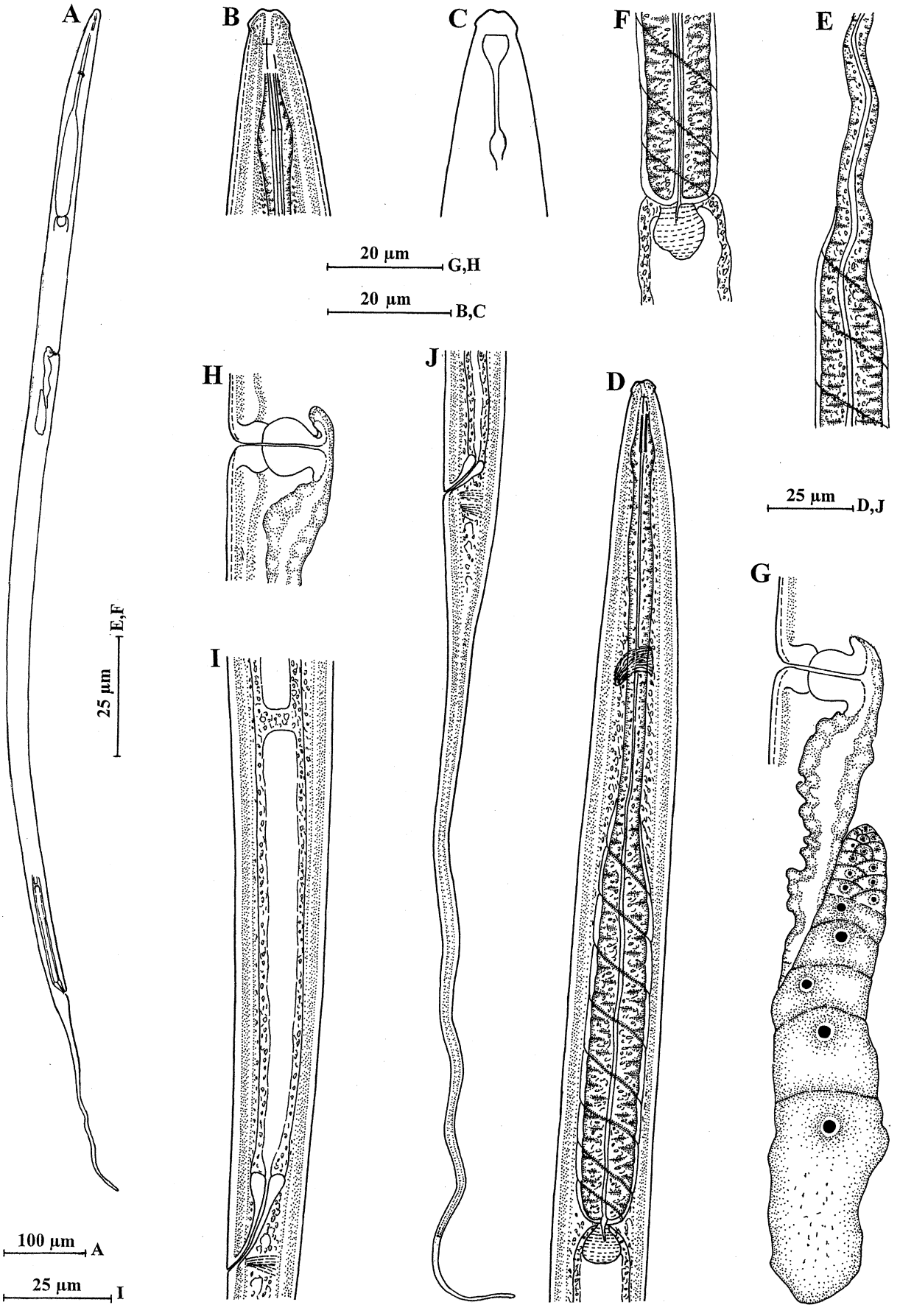

Fig. 3. Drawing of *Oxydirus sturhani* sp. n. A, entire female; B, anterior region; C, anterior end showing amphid; D, pharyngeal region; E, junction between two parts of pharynx; F, pharyngo-intestinal junction; G, female genital system; H, vulval region; I, female posterior region showing pre-rectum; J, female posterior end.

Goseco *et* Ferris, 1980 and O. *visseri* Yeates, 1979 in having mono-opisthodelphic gonad, however, it differs from the former in having slightly offset lip region (*vs* continuous), odontostyle aperture one-half of its length (*vs* one-third), vulva a transverse-slit (transverse wide oval), differently shaped vagina (*pars distalis vaginae* rounded *vs* slightly convex) and longer tail length (c = 5.1-5.3 *vs* 6.4-8.5, c' = 15.8-16.4 *vs* 9-13).

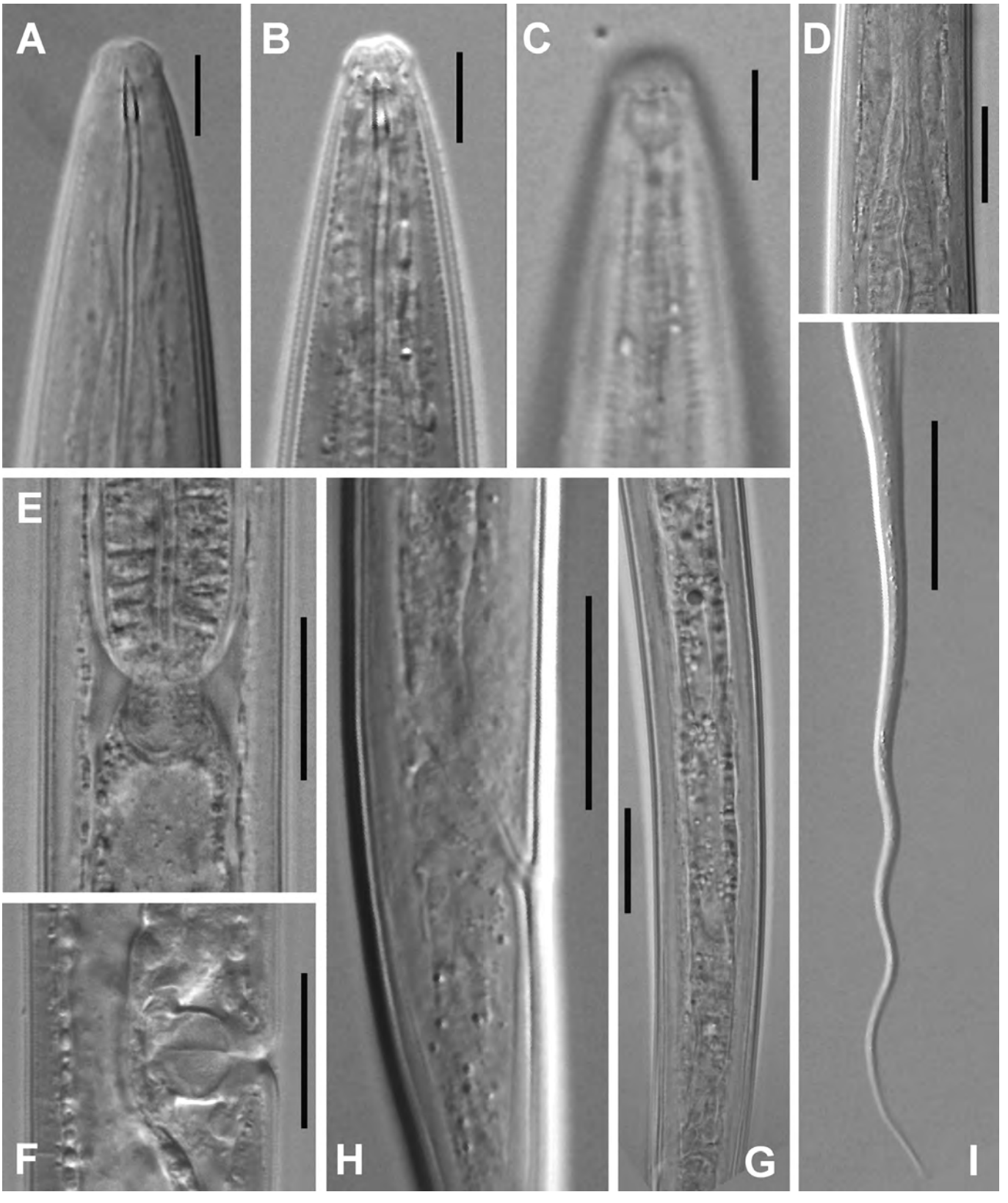

Fig. 4. Micro-photographs of *Oxydirus sturhani* sp. n. A and B, anterior region; C, anterior end showing amphid; D, junction between two parts of pharynx; E, pharyngo-intestinal junction; F, vulval region; G, female posterior region showing pre-rectum; H, female posterior region; I, female posterior end. (Scale bars: A-C = 10 µm; D-I = 20 µm).

Table II. Morphometrics of *Oxydirus sturhani* sp. n. [All measurements in µm except wherever indicated otherwise, in the form mean ± standard deviation (range)].

Character	Holotype female	Paratype females
n :	1	6
L (mm)	1.4	1.31±0.06 (1.2-1.4)
a	49.5	47.8±1.88 (44.2-49.6)
b	5.6	5.5±0.11 (5.37-5.7)
c	5.3	5.17±0.06 (5.1-5.3)
c`	16.2	16±0.23 (15.8-16.4)
V	30.9	30.4±0.63 (29.6-31.4)
G_1	-	-
G_2	9.4	8.5±0.62 (7.9-9.4)
Lip region width	7	7.6±0.48 (7-8)
Lip region height	4	3.7±0.24 (3.5-4)
Amphid aperture	3	3.0
Odontostyle length	6	6.0
Odontophore length	10	10.5±0.5 (10-11)
Guide ring from anterior end	5	5.0
Nerve ring from anterior end	95	95
Neck length	260	250±7.3 (239-260)
Expanded part of Pharynx	130	124±5.1 (117-130)
Cardia length	10	10.5±0.5 (10-11)
Body width at mid body	30	29±0.8 (28-30)
Body width at neck base	28	28± 0.9 (27-29)
Body width at anus/cloaca	17	16.8±0.5 (16-17.6)
Anterior genital branch	-	-
Posterior genital branch	130	120±7.4 (110-130)
Vaginal depth	14	14.7
Vulva from anterior end	440	423±13.6 (403-440)
Prerectum length	120	111±16.2 (85-130)
Rectum length	20	21.5
Tail length	280	267±11 (248-280)

The new species differs from *O. thornei* in having odontostyle aperture one-half of its length (*vs* one-third), anterior vulva position (V = 29-31.4 *vs* 37-40), vulva transverse-slit (*vs* transverse wide) and longer tail (c = 5.1-5.3 *vs* 6.5-10.5, c' = 15.8-16.4 *vs* 9). It differs from *O. visseri* in having shorter and comparatively robust body (L = 1.2-1.4 *vs* 2.3-2.7 mm, a = 44-49.6 *vs* 46.6-61.4), in having very small anterior uterine sac (*vs* anterior uterine sac about two body widths long), and longer tail (c = 5.1-5.3 *vs* 7.4-9.4, c' = 15.8-16.4 *vs* 8).

KEY TO SPECIES OF THE GENUS *OXYDIRUS*

1. Female gonad single..... 2
   Female gonad paired..... 6

2. Anterior uterine branch completely absent or represented by a very small rudimentary uterine sac..... 3
   Anterior uterine branch present..... 4

3. Lip region almost continuous; shorter tail (c = 6.4-8.5, c' = 9-13)……*tenuicaudatus* Thorne, 1964
   Lip region offset by depression; longer tail (c = 5.1-5.3, c' = 15.8-16.4)..... *sturhani* sp. n.

4. Anterior uterine branch less than one body width long.....*thornei* Ferris, Goseco *et* Ferris, 1980
   Anterior uterine branch more than one body width long..... 5

5. Vulva 37.6-42.5%; tail swellings present...*oxycephalus* (De Man, 1885) Thorne, 1939
   Vulva 27-32%; tail swellings absent *visseri* Yeates, 1979

6. Body length greater than 3 mm..... *elongatus* Altherr, 1963
   Body length less than 3 mm..... 7

7. V = 32%..... *husmanni* Altherr, 1972
   V = 35-41.6%..... 8

8. Expanded part of pharynx 40% or less of pharyngeal length..... *amplicephalus* Colomba *et* Vinciguerra, 1979

   Expanded part of pharynx more than 40% of pharyngeal length..... 9

9. Tail swelling present..... *nethus* Ferris, Goseco *et* Ferris, 1980
   Tail swelling absent..... 10

10. Body length less than 2 mm..... *gangeticus* Siddiqi, 1966
    Body length more than 2 mm..... 11

11. Tail abruptly tapering posterior to anal region; spicules strongly arcuate..... *oxycephaloides* (De Man, 1921) Thorne, 1939

Tail not abruptly tapering posterior to anal region; spicules not strongly arcuate….*tropicus* Thorne, 1964

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