

# Description of a new predaceous nematode, *Monobutlerius macrogubernaculum* n. sp. (Nemata : Diplogastridae)

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## SUMMARY

Description is given of a new predaceous nematode, *Monobutlerius macrogubernaculum* n. sp. (Diplogastrida : Diplogastridae) extracted from soil around roots of *Pothos* sp. growing in a nursery in Santa Barbara, California, U.S.A. The new species is distinguished from other species of the genus by the number and position of teeth (one dorsal, two subventral, two ventrolateral sets of three teeth each); size (18-23  $\mu\text{m}$ ) and sickle-shape of the gubernaculum; number of preanal (two) and postanal (four) papillae, short body (592-861  $\mu\text{m}$ ), and the external structure of the cuticle. In addition to transverse striae, the cuticle has longitudinal ridges near the anterior body terminus, and oval swellings over the remaining body. Supplemental information on the genus, and a diagnostic key to species is given.

## RÉSUMÉ

Description d'un nouveau nématode prédateur, *Monobutlerius macrogubernaculum* n. sp. (Nemata : Diplogastridae)

Description est donnée du nouveau nématode prédateur *Monobutlerius macrogubernaculum* n. sp. (Diplogastrida : Diplogastridae) extrait du sol de rhizosphère de *Pothos* sp. cultivé dans une pépinière, à Santa Barbara, Californie, USA. Il diffère des autres espèces du genre par le nombre et la position des dents (une dorsale, deux subventrales et deux séries ventrolatérales de trois dents chacune), par la longueur (18-23  $\mu\text{m}$ ) et la forme en faucille du gubernaculum, par le nombre de papilles préanales (deux) et postanales (quatre), par le corps de faible longueur (592-861  $\mu\text{m}$ ), et par l'aspect de la surface de la cuticule. En plus des stries transversales, la cuticule présente des sillons longitudinaux à proximité de l'extrémité antérieure, et des pustules ovales sur le reste du corps. Des données complémentaires sont fournies, ainsi qu'une clé de détermination des espèces du genre.

Prior to 1984, the genus *Butlerius* Goodey, 1929 contained species having one or two female genital branches. Andrassy (1984) placed the species with one branch in the genus *Monobutlerius*, with *M. monhystera* (Taylor, 1964) Andrassy, 1984 as the type species. Ebsary (1986) proposed the genus *Parabutlerius*, for the same species of *Butlerius* and also with *P. monhystera* as type species. So, *Parabutlerius* is an objective junior synonym of *Monobutlerius* Andrassy, 1984, valid name for the genus.

In April 1989, a new species of *Monobutlerius* was found in soil around the roots of *Pothos* sp. growing in a nursery in Santa Barbara, California. The new species is described below, and the diagnosis of the genus is emended to accommodate the new species. A key to the species of the genus is proposed.

Specimens of *M. macrogubernaculum* n. sp. were originally collected by T. Wurster and K. Cheesman (Santa Barbara County Agricultural Commissioner's

Office, Santa Barbara, California) from soil around roots of *Pothos* sp. growing in San Lorenzo Nursery, Santa Barbara, California. Nematodes were extracted from soil by the sieving and Baermann funnel technique (Thorne, 1961), heat killed, and preserved in 2.5 % formalin. Specimens of *M. macrogubernaculum* n. sp. were hand-picked from the preserved suspension, fixed in FAA, processed to glycerin (Seinhorst, 1959), and permanently mounted in anhydrous glycerin. Observations were made using a light microscope at 800  $\times$  magnification. Measurements and illustrations were made using a camera lucida attachment to obtain 1100  $\times$  and 2250  $\times$  magnifications. Because the long filiform tail of diplogasterid nematodes is often found broken, measurements of body length and vulva position were expressed relative to the distance from anterior end to anus (i.e. L' and V' respectively). For scanning electron microscope (SEM) observations, specimens were prepared as reported by Chitambar and Noffsinger (1989).

Genus *Monobutlerius* Andrassy, 1984  
= *Parabutlerius* Ebsary, 1986

*Monobutlerius macrogubernaculum* n. sp.  
(Figs 1, 2)

DIAGNOSIS (Emended from Andrassy, 1984)

Diplogastrida. Diplogastridae. Body elongate, cylindrical; tail long, filiform. Anterior terminus flattened; continuous with body; with six lips. Cuticle with transverse striae, longitudinal ridges and oval swellings, or fine punctations. Six cephalic sensory papillae in females, four additional papillae located dorsally and ventrally in males; sensilla trichodea (setae-like). Amphid opening distinct, ellipsoidal or oval, posterior to lip region. Stoma large; armed with teeth in posterior third of stoma. One large dorsal tooth, two subventral small teeth, several ventrolateral small teeth in separate sets, or denticulate pad. Cheilorhabdions slightly or greatly protruded, circumoral, sometimes supported with recurved rugae. Three part esophagus : corpus cylindrical, heavily muscled, lumen thickened, with swollen, valvate, muscled median bulb; isthmus short; posterior bulb swollen, glandular, lumen thin walled, without valve. Females amphidelphic, monovarial, ovary reflexed, spermatheca absent. Postuterine sac present, connected to vagina by a cuticularized or noncuticularized duct with or without a diverticulum. Males monorchic, testis reflexed. Two spicules, equal sized, arcuate; distal end angular or curved. Gubernaculum complex; sickle-shaped, triangular or keel-like. Bursa absent. Male preanal and postnatal papillae present, numerous, paired, cone-shaped.

RELATIONSHIP

*Monobutlerius* is most similar to *Butlerius* Goodey, 1929 but differs from this genus by the presence of only one genital branch and an oval postuterine sac in females, and the shape of the gubernaculum in males.

TYPE SPECIES

*Monobutlerius monhystera* (Taylor, 1964) Andrassy, 1984  
= *Parabutlerius monhystera* (Taylor, 1964) Ebsary, 1986

OTHER SPECIES

*M. degrissei* (Grootaert & Jaques, 1979) Andrassy, 1984  
= *P. degrissei* (Grootaert & Jaques, 1979) Ebsary, 1986  
*M. macrogubernaculum* n. sp.  
*M. macrospiculum* (Hunt, 1980) Andrassy, 1984  
= *P. macrospiculum* (Hunt, 1980) Ebsary, 1986.

MEASUREMENTS

*Females* (paratypes : n = 13) : L = 768  $\mu\text{m}$   $\pm$  31.3 (95 % confidence interval; range = 676-861); a = 30.5  $\pm$  1.3 (27.7-34.3); b = 4.8  $\pm$  0.4 (4.0-6.8); c = 3.6  $\pm$  0.3 (3.2-5.0); c' = 11.7  $\pm$  1.0 (8.1-14.2); V = 54 %  $\pm$  1.4 (52-59); (n = 19, includes the above thirteen nondamaged paratypes and six others with broken tails) : L' = 554  $\mu\text{m}$   $\pm$  19.5 (466-619); V' = 76 %  $\pm$  0.7 (74-79); postuterine sac = 48  $\mu\text{m}$   $\pm$  3.1 (35-60); stoma length = 20  $\mu\text{m}$   $\pm$  0.4 (19-22); vulval body width = 26  $\mu\text{m}$   $\pm$  1.0 (22-32); anal body width = 19  $\mu\text{m}$   $\pm$  0.9 (16-24); postcorpus length = 69 %  $\pm$  2.6 (55-77) length of corpus.

*Males* (paratypes : n = 7) : L = 673  $\mu\text{m}$   $\pm$  70.9 (95 % confidence interval; range = 592-788); L' = 483  $\mu\text{m}$   $\pm$  42.8 (418-562); a = 34.1  $\pm$  4.0 (28.3-41.3); b = 4.6  $\pm$  0.3 (4.1-5.0); c = 3.6  $\pm$  0.5 (3.2-4.7); c' = 9.9  $\pm$  2.0 (6.0-12.7); stoma = 17.3  $\mu\text{m}$   $\pm$  0.6 (16.4-18.2); mid body width = 20  $\mu\text{m}$   $\pm$  0.7 (19-21); anal body width = 19  $\mu\text{m}$   $\pm$  1.1 (18-21); postcorpus length = 82 %  $\pm$  2.9 (78-86) length of corpus; spicule = 33  $\mu\text{m}$   $\pm$  0.8 (32-35); gubernaculum = 22  $\mu\text{m}$   $\pm$  1.7 (18-23).

*Holotype* (male) : L = 648  $\mu\text{m}$ ; L' = 463  $\mu\text{m}$ ; a = 32.1; b = 4.8; c = 3.5; c' = 8.8; stoma length = 16.4  $\mu\text{m}$ ; mid body width = 20  $\mu\text{m}$ ; anal body width = 21  $\mu\text{m}$ ; postcorpus length = 74 % length of corpus; spicule = 35  $\mu\text{m}$ ; gubernaculum = 22  $\mu\text{m}$ .

DESCRIPTION

*Male* : Fixed specimens anteriorly straight, posteriorly slightly ventrally arcuate. Body cylindrical, elongate; tail long, filiform. Cuticle near anterior terminus with transverse striae and longitudinal ridges giving a "corn cob" appearance; remaining cuticle with fine transverse striae and large oval swelling in longitudinal rows, sometimes with smaller "pimple-like" swellings in transverse rows. Lateral fields absent. Lips separated; each lip with distinctly protruded, circumoral cheilorhabdion; rugae absent. Amphids distinct, 9  $\pm$  0.9 (8-10)  $\mu\text{m}$  posterior to lips; opening just anterior to dorsal tooth, ellipsoidal, aperture length approximately 4  $\mu\text{m}$ . Stoma large, length 2 1/2 times mid stoma width, barrel shaped. Posterior fourth of stoma armed : one large dorsal tooth; eight small teeth (two subventral, two smaller ventrolateral multi-teeth sets). Subventral teeth opposite dorsal tooth; ventrolateral multi-teeth sets near dorsal tooth, three teeth each set, teeth fused at base. Large dorsal tooth and small teeth solid, moderately sclerotized. Nerve ring 93  $\pm$  8.4 (76-105)  $\mu\text{m}$  from anterior terminus. Excretory pore indistinct, 113  $\pm$  11.8 (107-130)  $\mu\text{m}$  from anterior terminus; duct not cuticularized. Oesophageal-intestinal

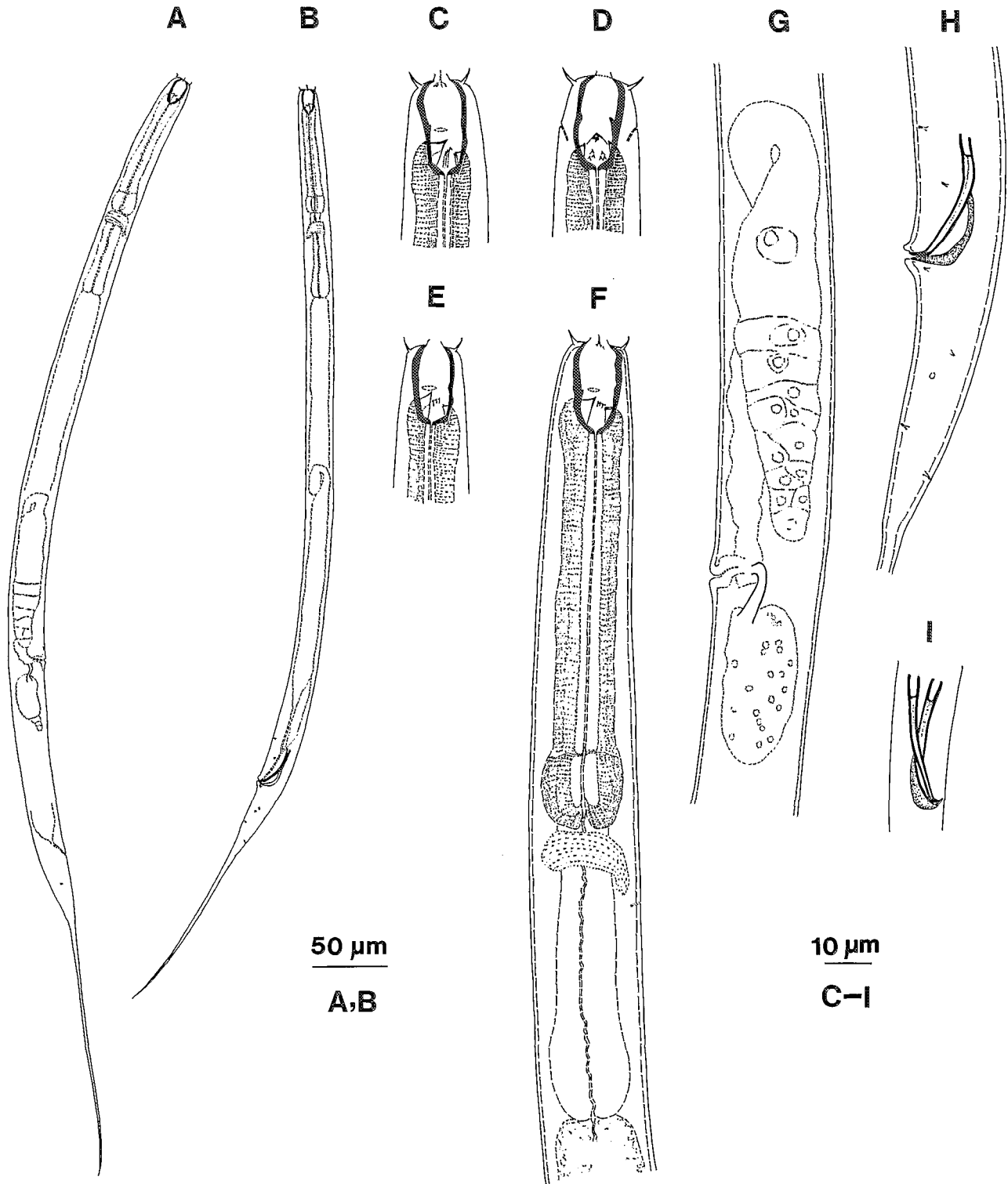


Fig. 1. *Monobutlerius macrogubernaculum* n. sp. A : Female; B : Male; C, D : Female, stoma; C : Lateral view; D : Ventral view; E : Male, stoma; F : Female, anterior body region; G : Female, gonad region; H : Male, cloacal region; I : Spicules, ventrolateral view.

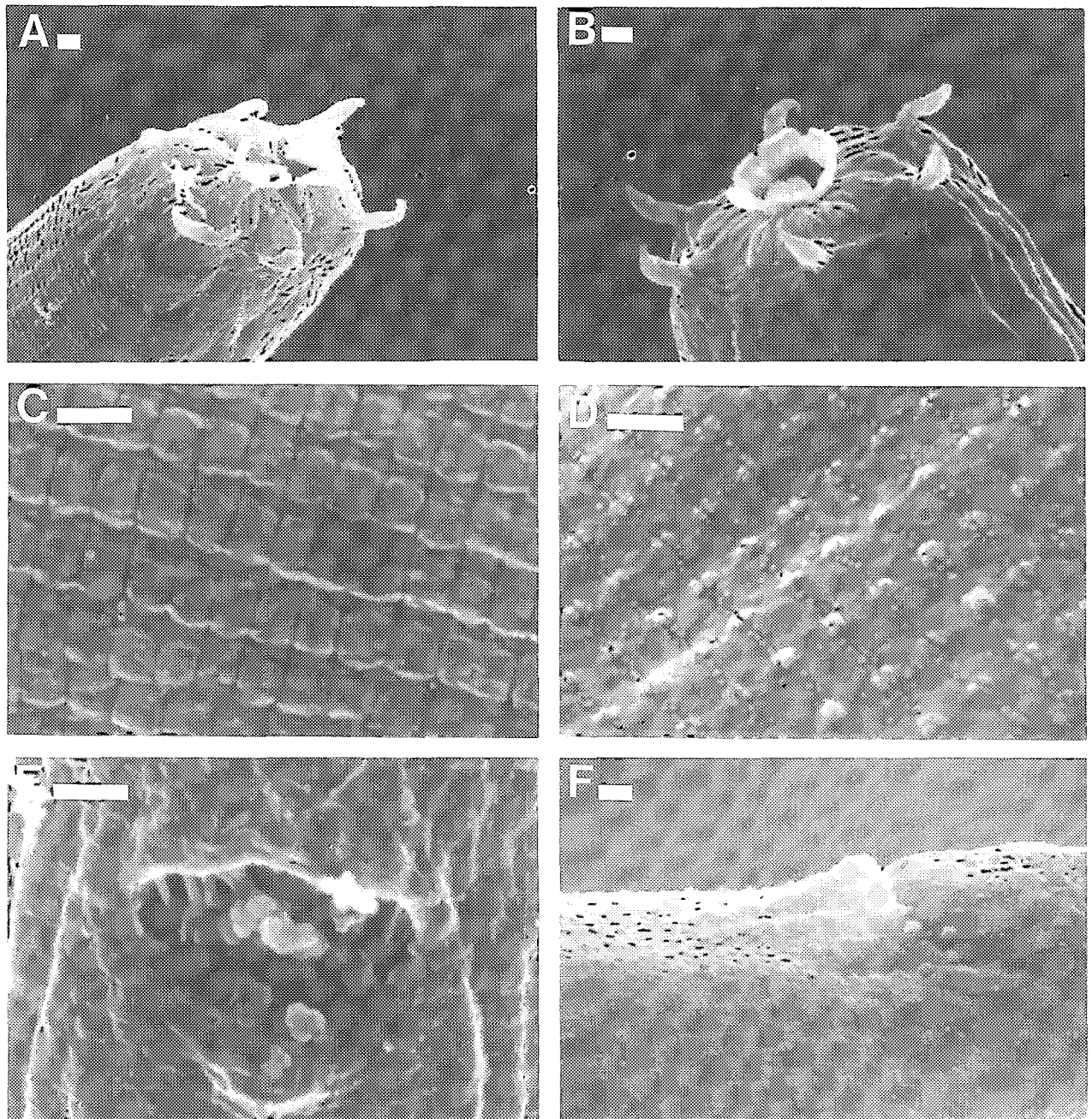


Fig. 2. *Monobutlerius macrogubernaculum* n. sp. A-F : Female. A, B : Anterior end, showing separated lips, and protruded, circumoral cheilorhabdions; C, D : Cuticle, C : Anterior body region, D : Mid body region; E : Amphid; F : Anus, sublateral view. (Bar = 1  $\mu$ m).

valve indistinct. Two spicules, equal sized, fused at tip; arcuate, angular at distal end; proximal end "U" shaped. Gubernaculum well developed, sickle-shaped, large, extending over one-half to one-third spicule length in lateral view. Two pairs preanal papillae, cone-shaped. One lateral pair,  $17 \pm 0.9$  (16-18)  $\mu$ m anterior

to anus; one subventral pair,  $30 \pm 3.3$  (25-36)  $\mu$ m anterior to anus. Four pairs caudal papillae, cone-shaped. One pair subdorsal,  $48 \pm 3.3$  (45-55)  $\mu$ m posterior to anus; one lateral pair  $20 \pm 2.2$  (17-24)  $\mu$ m posterior to anus; two subventral pairs, one pair  $2 \pm 0.6$  (1-3)  $\mu$ m posterior to anus, second pair  $36 \pm 3.9$

(32-45)  $\mu\text{m}$  posterior to anus. Phasmid  $25 \pm 6.1$  (14-33)  $\mu\text{m}$  posterior to anus. Anus crescent-shaped in ventral view. Tail  $189 \pm 35.2$  (126-230)  $\mu\text{m}$  long, ten times anal body width; first conical then filiform, dorsal curvature greater than ventral; terminus minute, obscure.

*Female* : Similar to males, usually larger. Fixed specimens straight, or slightly ventrally arcuate. Nerve ring around isthmus,  $112 \pm 3.9$  (100-124)  $\mu\text{m}$  from anterior terminus. Excretory pore indistinct,  $128 \pm 6.6$  (106-157)  $\mu\text{m}$  from anterior terminus, duct not cuticularized. Reproductive system amphidelphic, antepudendal; monovarial, ovary reflexed, flexure may extend to vulva. Vulva pore-like, generally not prominent. Vagina short, thick walled; straight or folded; sometimes evaginated. Spermatheca absent. Postuterine sac (PUS) distinct, oval, two vulval body width from vulva, filled with sperm; rudimentary ovary sometimes present; heavily sclerotized duct connects PUS to vagina, duct funnel shaped at PUS, diverticulum absent. Phasmid  $20 \pm 1.8$  (14-29)  $\mu\text{m}$  posterior to anus. Tail  $218 \pm 16.5$  (143-249)  $\mu\text{m}$  long.

TYPE HABITAT AND LOCALITY

Soil around roots of *Pothos* sp. at San Lorenzo Nursery, Santa Barbara, California.

TYPE SPECIMENS

*Holotype*, male (slide No. 1) deposited in the University of California, Davis Nematode Collection (UCDNC), Department of Nematology, University of California, Davis, California, USA.

*Paratypes* : Six females and two males (slide nos. la, b) deposited in the same collection; seven females and three males (slide nos. 1d - 1g, j) deposited in the CDFR Permanent Slide Reference Collection (Nematology), California Department of Food and Agriculture, Analysis and Identification Branch, Sacramento, California, USA; six females and two males (slide nos. 1c, h, k, l) deposited in the Wageningen Agricultural Nematode Collection, Department of Nematology, Wageningen Agricultural University, Wageningen, Netherlands.

DIAGNOSIS

*M. macrogubernaculum* n. sp. is distinguished from all other species of the genus by the number and position of teeth, body length and cuticle structure in males and females, and by the large, sickle-shaped gubernaculum and number of preanal and postanal papillae in males.

Key to species of *Monobutlerius* males and females

(Emended from Ebsary, 1985)

- 1 — Male ..... 2
- Female ..... 5
- 2 — Spicule length less than 40  $\mu\text{m}$ , separate or fused at tip ..... 3
- Spicule length more than 70  $\mu\text{m}$ , fused for most of length ..... *macrospiculum*
- 3 — Gubernaculum triangular or keel-like; 3 pairs pre-anal and 6 pairs postanal papillae ..... 4
- Gubernaculum large, sickle-shaped; 2 pairs preanal and 4 pairs postanal papillae ..... *macrogubernaculum*
- 4 — Gubernaculum keel-like; keel distally rounded ..... *degrissei*
- Gubernaculum triangular; triangle distally pointed ..... *monhystera*
- 5 — Postuterine duct cuticularized; stoma without sub-ventral denticulate pad ..... 6
- Postuterine duct not cuticularized; stoma with sub-ventral denticulate pad ..... *monhystera*
- 6 — Body length less than 1.0 mm ( $L' < 700 \mu\text{m}$ ); stoma with 9 teeth (one dorsal, two subventral, and two ventrolateral sets of three teeth each); cuticle surface transversely striated with longitudinal ridges anteriorly, and oval, pimple-like swellings posteriorly ..... *macrogubernaculum*
- Body length 1.0 mm or greater ( $L' > 700 \mu\text{m}$ ); stoma with less than 9 teeth; cuticle surface smooth but with a punctate appearance (basal layer finely punctated) 7
- 7 — Postuterine duct with diverticulum; postuterine sac not cuticularized ..... *degrissei*
- Postuterine duct without diverticulum; postuterine sac cuticularized ..... *macrospiculum*

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