A first list of plant-parasitic nematodes from the Wilderness National Park, with a description of *Ogma sekgwaum* spec. nov.

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Van den Berg, Esther. 1993. A first list of plant-parasitic nematodes from the Wilderness National Park, with a description of *Ogma sekgwaum* spec. nov. *Koedoe* 36(2): 61-76. Pretoria. ISSN 0075-6458.

Ogma sekgwaum spec. nov. is described and figured from the Wilderness National Park. Females of this species are characterized by having one lip annulus with smooth, wavy margin, no submedian lobes, 53-59 body annuli, not strongly retrorse anteriorly, but becoming more so posteriorly with 12-14 longitudinal rows of projections at midbody, gradually lengthening and attenuating towards posterior end of body, longer on post-vulval ventral side of body, not branched or bifurcate with small protuberances on extreme tips which become hair-like on post-vulval projections and a 64-81 µm long stylet. *Ogma coronatum* Schuurmans Stekhoven & Teunissen, 1938 is described and figured with notes on the juvenile. Additional measurements and SEM photographs are given for *Criconema duplicivestitum* (Andrássy, 1963) Raski & Luc, 1985 and measurements for *Ogma naomiae* Van den Berg, 1992. A list is given of the other known plant-parasitic nematodes also found. *Neolobocriconema palaniense* Muthukrishnan, 1987 is transferred to *Ogma palaniense* (Muthukrishnan, 1987) comb. nov.

Key Words: *Criconema*, *Ogma*, taxonomy, Wilderness National Park.

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Introduction

During a first visit to the Wilderness National Park in April 1991, 12 soil samples were collected at a few spots in a small area of the park and in the Ebb and Flow Rest Camp. Many known plant-parasitic species were found (Tables 1, 2 & 3). Single specimens of the genera *Criconema* and *Ogma*, belonging to unknown species, were found but could not be described because of inadequate material, while a few specimens of an undescribed *Ogma* species were found and are here-in described as new. *Ogma coronatum* Schuurmans Stekhoven & Teunissen, 1938 was found for the first time since the species was described from the Albert National Park, Zaïre in 1938. Several fourth-stage juveniles were found, mostly with females inside. These juveniles differ completely from those described by De Coninck (1945) in his redescription of the original material. A description and figures of the present females and juveniles are given. Many specimens of *Criconema duplicivestitum* (Andrássy, 1963) Raski & Luc, 1985 were found allowing SEM

photographs to be taken. Measurements are also given. *Ogma naomiae* Van den Berg, 1992 recently described from Natal, has now again been found and its measurements are also given. *Neolobocriconema palaniense* Muthukrishnan, 1987 is transferred to *Ogma palaniense* (Muthukrishnan, 1987) comb. nov.

Materials and Methods

All measurements and drawings were made from specimens killed in water by gradual application of heat, preserved in TAF and mounted in anhydrous glycerine according to the slow method of Goodey (1951). SEM photographs were taken from specimens preserved in TAF, dehydrated in increasing concentrations of amyl acetate in pure alcohol and finally in pure amyl acetate. Critical point drying and gold/palladium coating (25 nm) were carried out in the conventional way and the specimens viewed with a JEOL-35 stereoscan microscope at 15 kV. Soil classification was done according to the simplified particle size analysis procedure of Van der Watt (1966).

One female of *O. sekgwaum* spec. nov. is deposited in the collection of the Laboratoire de Biologie Parasitaire, Protistologie, Helminthologie, Muséum

Table 1
Plant-parasitic nematodes of the Order Tylenchida, Superfamily Tylenchoidea (sensu Maggenti et al. (1988)
found in the Wilderness National Park

Nematode	Collection sites											
	1	2	3	4	5	6	7	8	9	10	11	12
Belonolaimidae (stunt nematodes)												
<i>Tylenchorhynchus</i> sp.	-	-	-	+	-	-	-	-	-	-	-	+
Hoplolaimidae (spiral nematodes)												
<i>Hoplolaimus pararobustus</i> (Schuurmans Stekhoven & Teunissen, 1938) Sher, 1963	-	-	-	-	-	-	+	-	-	-	-	-
<i>Rotylechus brevicaudatus</i> Colbran, 1962	-	-	-	-	-	-	+	+	-	-	-	-
<i>R. incultus</i> Sher, 1965	-	-	-	-	+	-	-	-	-	-	-	-
<i>Helicotylechus</i> sp.	-	-	-	-	-	-	-	-	-	+	-	-
<i>H. brevis</i> (Whitehead, 1958) Fortuner, 1984	+	-	-	-	+	-	-	-	-	-	-	-
<i>H. californicus</i> Sher, 1966	-	-	-	-	-	+	-	+	-	-	-	-
<i>H. digonicus</i> Perry in Perry, Darling & Thorne 1959	+	-	-	-	+	-	-	-	-	-	-	-
<i>H. dihystra</i> (Cobb, 1893) Sher, 1961	-	-	-	+	-	-	-	-	-	-	-	-
<i>H. exallus</i> Sher, 1966	-	-	-	-	-	-	-	-	-	+	-	-
<i>Scutellonema bizanae</i> Van den Berg & Heyns, 1973	-	-	-	-	+	-	-	-	-	-	-	-
<i>S. brachyurus</i> (Steiner, 1938) Andrassy, 1958	+	-	+	-	-	+	-	-	-	+	-	-
<i>S. nigermontanum</i> Van den Berg, 1990	+	-	-	-	-	-	-	-	-	+	-	-
Reniform nematodes												
<i>Rotylechulus</i> sp.	-	-	-	-	-	-	-	-	-	+	-	-
<i>Rotylechulus reniformis</i> Linford & Oliveira, 1940	-	-	-	-	-	-	-	-	+	-	-	-
Heteroderidae (root-knot nematodes)												
<i>Meloidogyne</i> sp.	-	+	-	-	-	-	-	-	-	+	-	-
<i>M. ethiopica</i> Whitehead, 1968	-	-	+	-	-	-	-	-	-	-	-	-
<i>M. hapla</i> Chitwood, 1949	-	-	-	-	-	-	+	-	-	-	-	-
<i>M. javanica</i> (Treub, 1885) Chitwood, 1949	-	+	+	-	-	-	-	-	-	-	-	-

National d'Histoire Naturelle, Paris, France. Five other specimens are deposited in the National Collection of Nematodes, Biosystematics Division, Plant Protection Research Institute, Private Bag X134, Pretoria 0001, South Africa.

Taxonomy

Ogma sekgwaum spec. nov. (Fig. 1)

Measurements

Holotype female: L = 361 µm; a = 6; b = 3; V = 92; OV1 = 54; stylet = 81 µm; R = 53;

RSt = 12; ROes = 18; Rex = 20; RV = 7; VL/VB = 0,5; St%L = 22.

Paratype females (n = 5): L = 349 µm ± 37,8(297–389); a = 6 ± 0,6(5–7); b = 3; o = 8 ± 1,1(6–8); V = 93 ± 0,9(92–95); OV1 = 55 ± 2,4(52–57); stylet = 75 µm ± 6,2(64–81); R = 53–59; RSt = 11–13; ROes = 15–18; Rex = 17–20; RV = 5–8; VL/VB = 0,6 ± 0,1(0,4–0,7); St%L = 22 ± 1(20–23).

Female: Body slightly curved ventrad. Lip region with one annulus, diameter 22 µm ± 1,9(20–25); margin smooth, wavy, mostly projecting outward; labial area raised above

Table 2

Plant-parasitic nematodes of the Order Tylenchida, Superfamily Criconematoidea (sensu Maggenti et al. (1988) found in the Wilderness National Park

Nematode	Collection sites											
	1	2	3	4	5	6	7	8	9	10	11	12
Criconematidae												
Ring nematodes												
<i>Criconema</i> sp.	-	-	-	-	+	-	-	-	-	-	-	-
<i>C. crassianulatum</i> (De Guiran, 1963) Raski & Luc, 1985	-	-	-	-	+	-	-	-	-	-	-	-
<i>C. duplicivestitum</i> (Andrássy, 1963) Raski & Luc, 1985	-	-	-	+	+	-	-	-	-	-	-	-
<i>C. sanctifrancisci</i> (Van den Berg & Heyns 1977) Raski & Luc, 1985	+	-	+	-	-	-	+	-	+	-	-	-
<i>Criconemaoides parvus</i> Raski, 1952	-	-	-	-	+	-	-	-	-	-	-	-
<i>Mesocriconema sphaerocephalum</i> (Taylor, 1936) De Grisse & Loof, 1989	-	-	-	-	-	+	-	-	-	-	-	-
<i>Ogma civellae</i> (Steiner, 1949) Raski & Luc, 1987	-	-	-	-	+	-	-	-	-	-	-	-
<i>O. coronatum</i> Schuurmans Stekhoven & Teunissen, 1938	+	-	-	-	+	-	-	-	-	-	-	-
<i>O. decalineatum</i> (Chitwood, 1957) Andr�ssy, 1979	-	-	-	-	+	-	+	-	-	-	-	-
<i>O. naomiae</i> Van den Berg, 1992	-	-	-	-	+	-	-	-	-	-	-	-
<i>O. sekgwaum</i> spec. nov.	-	-	-	-	+	-	-	-	-	-	-	-
Sheath nematodes												
<i>Hemicyclophora halophila</i> Yeates, 1967	-	-	-	-	-	-	-	+	-	-	-	-
<i>H. ripa</i> Van den Berg, 1981	-	-	-	-	+	-	-	-	-	-	-	-
<i>Trophotylenchulus</i> sp.	-	-	-	-	+	-	-	-	-	-	-	-
Pin nematodes												
<i>Gracilpaurus crenatus</i> (Corbett, 1966) Ganguly & Khan, 1990	-	-	-	-	-	-	-	-	-	+	-	-
<i>Paratylenchus projectus</i> Jenkins, 1956	-	-	+	-	-	-	-	-	-	+	+	-

lip annulus with six pseudolips, no sub-median lobes and a prominent labial disc. First body annulus diameter $18 \mu\text{m} \pm 1,6$ (17–20), projecting outward or slightly anteriorly with slightly crenate margins. Two succeeding body annuli diameters $25 \mu\text{m} \pm 4,6$ (18–31) and $34 \mu\text{m} \pm 6,1$ (26–40) respectively. First few body annuli mostly projecting outward, succeeding annuli gradually becoming more retrorse towards posterior end. All body annuli with longitudinal rows of projections, starting with about eight on second annulus, to 12–14 at midbody; projections become

longer and attenuated towards posterior end of body, remaining rounded at tip, never branched or bifid, some appearing swollen just anterior to tip; projections on post-vulval, ventral side of body longer than those on dorsal side; all projections with minute protuberances, becoming longer towards posterior end of body, almost appearing as short hairs on the posterior projections. Anus and vulva obscured by projections, although in lateral view vulva can sometimes be seen as two protruding lips. Width of annuli at mid-body $6 \mu\text{m} \pm 0,2$ (6–7). Excretory pore situ-

Table 3
Plant-parasitic nematodes of the Order Dorylaimida found in the Wilderness National Park

Nematode	Collection sites											
	1	2	3	4	5	6	7	8	9	10	11	12
Longidoroidea (<i>sensu</i> Jairajpuri, 1992)												
Xiphinematidae (dagger nematodes)												
<i>Xiphinema diffusum</i> Lamberti & Bleve Zacheo, 1979	-	-	-	-	+	-	-	-	-	-	-	-
<i>X. elongatum</i> Shuurmans Stekhoven & Teunissen, 1938	-	-	-	-	+	-	-	-	-	-	-	-
<i>X. erriae</i> Hutsebaut, Heyns & Coomans, 1988	+	+	+	-	+	-	-	-	-	-	-	-
<i>X. imitator</i> Heyns, 1965	-	-	-	-	-	-	+	-	-	-	-	-
<i>X. ripogranum</i> Hutsebaut, Heyns & Coomans, 1988	-	-	-	-	-	-	-	-	+	-	-	-
Longidoridae (needle nematodes)												
<i>Paralongidorus</i> sp.	+	-	-	-	-	-	-	-	-	-	-	-
<i>P. spasskii</i> Heyns, 1972	-	-	-	-	+	-	-	-	-	-	-	-
Trichodoroidea (<i>sensu</i> Decraemer, 1991)												
Trichodoridae (stubby root nematodes)												
<i>Paratrichodorus</i> sp.	+	-	-	-	+	-	-	-	-	-	-	-
<i>Trichodorus vandenbergae</i> De Waele & Kilian, 1992	+	-	+	-	+	-	-	-	-	+	-	-

ated from opposite to four annuli posterior to base of oesophagus, $130\ \mu\text{m} \pm 12(115-149)$ from anterior end of body. Width at midbody $57\ \mu\text{m} \pm 7,3(48-84)$ and at excretory pore $59\ \mu\text{m} \pm 7,2(49-68)$. Hemizonid not seen. Stylet well developed with cupped basal knobs, the latter $11\ \mu\text{m} \pm 0,6(10-11)$ wide and $4\ \mu\text{m} \pm 0,6(3-5)$ high. Metenchium $60\ \mu\text{m} \pm 4,3(53-64)$ long and telenchium $15\ \mu\text{m} \pm 2,1(12-17)$ long. Spermatheca not seen. Posterior end of body rounded.

Male: Not found.

Juvenile: Not found.

Material examined

Type locality: CAPE PROVINCE: Wilderness, 9 April 1991, holotype female (slide 27376), four paratype females (slides 27376 & 27377), leg. E. van den Berg, K.P.N. Kleyn-

hans, M. Marais and S.M. Kilian, collected next to the Brown-hooded Kingfisher Trail on the west bank of the Duiwe River about 150 m from the gravel road entrance gate ($33^{\circ}59'S$, $22^{\circ}39'E$) from amongst grass and indigenous forest in a sandy loam soil (5% clay 23% silt, 72% sand), soil pH 5,9 and temperature $19,6^{\circ}\text{C}$. Annual rainfall 1 100 mm and about 50 m above sea-level.

Diagnosis and relationship: *Ogma sekgwaum* spec. nov. females are characterized by having one lip annulus with smooth, wavy margin, no submedian lobes, 53–59 body annuli, not strongly retrorse anteriorly but becoming more so posteriorly with 12–14 longitudinal rows of projections at midbody, gradually lengthening and attenuating towards posterior end of body, longer on post-vulval ventral side of body, not branched or bifurcate with small protuberances on extreme tips be-

Fig. 1. *Ogmia sekgwaum* spec. nov.

A. Anterior part of holotype female body. B. Lip region of holotype female body, external view. C. Projections on body annuli no. 19–22. D. Body annuli no. 34–37, ventral view. E. Posterior part of holotype female body, ventral view. F. Posterior part of holotype female, dorsal view. G. Posterior part of another female, lateral view.

coming more hair-like on post-vulval projections and a 64–81 µm long stylet.

From the group of species in the genus having:

- a rounded tail,

- longitudinal rows of projections,
- a stylet length of 45–96 µm, and
- body annuli number of 42–103

corresponding to the new species

Fig. 2. *Ogma coronatum* Schuurmans Stekhoven & Teunissen, 1938.

A. Anterior part of female body. B. Posterior part of female body, lateral view. C. Posterior part of female body, dorsal view. D. Wave-like curvature of annulus with ball-like structure. E. Posterior part of body, ventral view.

- viz. *O. chrisbarnardi* (Heyns, 1970) Andrassy, 1979, *O. coronatum* Schuurmans Stekhoven & Teunissen, 1938, *O. dracomontanum* (Van den Berg, 1983) Siddiqi, 1986, *O. palmatum* (Siddiqi & Southey, 1962) Siddiqi, 1986, *O. taylatum* (Khan, Chawla & Saha, 1976) Siddiqi, 1986, and *O. taylori* (Jairajpuri, 1964) Siddiqi, 1986,

this new species is immediately separated by a combination of other characters as well as non-branched vs. branched projections.

Neolobocriconeuma palaniense Muthukrishnan, 1987 was not transferred to *Ogma* by Raski & Luc (1987) while synonymizing the genus *Neolobocriconeuma* with *Ogma*. It is therefore transferred here to *Ogma palaniense* (Muthukrishnan, 1987) comb. nov. *Ogma sekgwaum* spec. nov. differs from *O. palaniense* (Muthukrishnan, 1987) comb. nov. in having 12–14 longitudinal rows of slender projections vs. 8–12 rows of short, broad lobes with serrated margins, slightly more body annuli (53–59 vs. 48–50) and one lip annulus vs. two. *Ogma sekgwaum* spec. nov. differs from *O. latens* (Mehta & Raski, 1971) Raski & Luc, 1987, with similar projections in the following: one lip annulus vs. two with a smooth margin vs. crenate, shorter body (297–389 µm vs. 440–480 µm), fewer longitudinal rows of projections (12–14 vs. 18–27) with protuberances on tips vs. fine irregularities and a shorter stylet (64–81 µm vs. 81–82 µm).

Etymology: The species name is derived from the Tswana word — *sekgwa* — for wilderness.

Ogma coronatum Schuurmans Stekhoven & Teunissen, 1938 (Figs. 2-5)

This species was described from the Albert National Park in Zaïre by Schuurmans Stekhoven & Teunissen (1938) and the same material was redescribed by De Coninck (1945). Specimens of this species have now been collected at two localities in the Wilderness National Park (Table 2).

Measurements

For measurements see Table 4 where they are presented and compared with those of De Coninck (1945).

Female: Body straight to slightly curved ventrad. Lip region with two annuli, a large disc-shaped first annulus and a smaller second annulus which lies opposite, halfway or totally beyond the basal margin of the lip framework but is considered as belonging to the lip region; labial area not markedly raised above lip annulus with six pseudolips, no submedian lobes and a prominently raised, squarish labial disc with four faint lobes on four corners; margin of lip annuli irregular; first lip annulus projecting outward or backward, second forward or outward. First one or two body annuli projecting forward or outward and all succeeding body annuli well retrorse; all body annuli with 12–18 longitudinal rows of projections at midbody; just posterior to lip region the projections are broad, rounded, gradually becoming longer and slender towards posterior end of body; bifurcation gradually increases posteriorly especially in vulval area (Figs. 2B, C & E, while those dorsally are much shorter and less bifurcate (Fig. 2C). From about third body annulus all projections bear minute protuberances, more distinct on posterior part of body; each wave-like curvature of every annulus which corresponds with the projections has a small ball-like structure on anterior and posterior curve, those on posterior curve situated underneath each projection, most clearly seen on the side of the body when viewed under the light microscope (Figs. 5E & F). Anus obscured by projections, possibly seen in two specimens. Vulva visible between projections. Excretory pore frequently obscured by debris. Hemizonid not seen. Stylet long and slender with slightly cupped basal knobs. Spermatheca small and empty or not seen. Posterior end of body narrowly rounded.

Male: Not found.

Table 4
Comparison of the morphometrics of the South African *Ogma coronatum* Schuurmans Stekhoven & Teunissen, 1938 with those from Albert Park, Zaïre

Characters	Wilderness National Park		Albert Park acc. to De Conink (1945)
	<i>n</i> = 21 ♀♀	<i>n</i> = 1j	<i>n</i> = 16 ♀♀
L (µm)	369 ± 59,3(247–488)	293	444–643
a	6 ± 0,8(5–8)	5	6,7–9,1
b	3 ± 0,4(3–4)	–	4,5–5,5
c	17,24 (<i>n</i> = 2)	–	–
o	8 ± 1(6–9)	–	–
dogo ¹	6 ± 0,8(5–7)	–	–
V	93 ± 1,3(90–95)	–	85–92
OV1	60 ± 7,2(54–76)	–	–
Stylet length (µm)	87 ± 6,9(77–99)	–	90,9(82–96,5)
Metenchium length (µm)	70 ± 6,6(62–83)	–	–
Telenchium length (µm)	17 ± 1,3(15–20)	–	–
Stylet knob height (µm)	4 ± 0,5(3–6)	–	3,3(2,6–3,8)
Stylet knob width (µm)	11 ± 1,2(9–14)	–	10,1(8,8–11,0)
Excretory pore from anterior end (µm)	132 ± 20,3(94–176)	115	–
Width at midbody (µm)	63 ± 7(51–76)	58	–
Width at excretory pore (µm)	61 ± 6,9(50–72)	–	–
Annuli width (µm)	8 ± 1,2(6–10)	5	–
Tail length (µm)	22,16 (<i>n</i> = 2)	–	–
Length of oesophagus from front end to centre of valve of median bulb (µm)	98 ± 6,1(90–108)	–	–
Length of oesophagus from centre of valve to base of oesophagus (µm)	30 ± 5,2(19–38)	–	–
First lip annulus diameter (µm)	24 ± 2,5(20–29)	17	23,8(22,5–26,5)
Second lip annulus diameter (µm)	19 ± 1,9(15–22)	16	21,2(17,7–24)
First body annulus diameter (µm)	25 ± 3(18–29)	20	28,5(24–33)
Second body annulus diameter (µm)	34 ± 4,2(26–41)	24	–
R	49–56	60	44–49
RSt	11–20	–	–
ROes	14–18	–	–
Rex	15–20	23	–
RV	6–8	–	5–7
RVan	1	–	1–3
Ran	5–6	–	3–5
VL/VB	0,6 ± 0,1(0,4–0,8)	–	–
St % L	24 ± 4,9(19–36)	–	14,3–18,5

¹ Dorsal oesophageal gland opening from base of stylet knobs

Juvenile (J4): Several females were still fully or partly enclosed in deteriorated juvenile cuticles, morphologically still good but only one could be measured.

Number of lip annuli not distinct, but diameters of first four annuli follow the same pattern as that of female. Cuticle projections differ completely with ten longitudinal rows of short, broad and rounded scales, each bear-

ing three to seven long, sharp-pointed cuticular filaments at midbody. All annuli strongly retrorse.

Material examined: CAPE PROVINCE: Wilderness, 9 April 1991, *leg.* E. van den Berg, K.P.N. Kleynhans, M. Marais and S.M. Kilian, collected at four spots along the Brown-hooded Kingfisher Trail in the park

Fig. 3. *Oigma coronatum* Schuurmans Stekhoven & Teunissen, 1938

A. Lip region, South African female. B. Lip region, Zairian paratype female. C. Annuli opposite stylet knobs, South African female. D. Annuli opposite stylet knobs, Zairian paratype female. E. Body annuli no. 25 - 27, South African female. F. Body annuli no. 25 - 27, Zairian paratype female. G. Fifth to seventh annulus anterior to vulva, South African female. H. Fifth to seventh annulus anterior to vulva, Zairian paratype female.

Fig. 4. *Ogma coronatum* Schuurmans Stekhoven & Teunissen, 1938.

A. Female lip region, *en face* view. B. Lateral view of female lip region. C. Body annuli with protuberances. D. Annuli at midbody. E. Projections just anterior to vulva. F. Posterior projections enlarged. (Bar = 5 μ m in A, B, C, F; 10 μ m in D and E).

on the west bank of the Duiwe River from grass and indigenous forest (Site no. 5).

Discussion: The South African females were compared with 15 paratype females from Zaïre and the following slight differences were found:

- post-vulval area narrowly rounded vs. conical;
- projections opposite oesophageal area broader and more rounded (Fig. 3C vs. 3D);
- midbody projections broader, shorter and not quite so bifurcate (Fig. 3E vs. 3F);
- pre-vulval projections broader and more bifurcate (Fig. 3G vs. 3H);
- ventral, post-vulval projections longer, more slender and bifurcate; dorsally the projections are also more branched;
- the minute protuberances are more prominent on all projections from the third body annulus posteriorly; illustrations of Schuurmans Stekhoven & Teunissen (1938) and De Coninck (1945) also show them on the tips of only the posterior projections;
- most Zaïrian specimens were "stretched" out resulting in larger a and L values; and
- although the above authors did not mention the presence of small lobe-like structures Fig. 2B & F of Schuurmans Stekhoven & Teunissen does show rounded structures which could indicate their presence. These structures were also seen faintly on the paratypes.

The above differences are regarded as the result of geographic variation. Apart from these slight differences the measurements fit those given by De Coninck who pointed out that those of Schuurmans Stekhoven &

Teunissen were incorrect, especially the L value of 850 μm .

The Wilderness juveniles differ completely from Fig. 29 (juvenile/pre-adult) of De Coninck (1945) which shows the projections to be similar to those of the female. It is not certain whether these juveniles actually belonged to *O. coronatum*. Schuurmans Stekhoven & Teunissen studied three juveniles from Kamatembé, five females and one juvenile from Magumbu and 27 juveniles from Shamuhera while De Coninck reported his material as 16 females from Shamuhera and three juveniles from a different locality. These juveniles had more body annuli ($R = 54-57$ vs. $44-49$) than the females, but he regarded them as belonging to *coronatum* because they were smaller than the females ($L = 382-450 \mu\text{m}$ vs. $444-643 \mu\text{m}$) and he could not see a vulva. At that stage De Coninck was certainly not aware of the difference in cuticular structure between juveniles and females within the same species.

The four slides loaned from the Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussels contained fifteen females but no juveniles. No other type material could be found because according to Wilfrida Decraemer (*pers. comm.*) much of Schuurmans Stekhovens' material was not retained.

There is no doubt that the present juveniles belong to *O. coronatum*.

Ogma naomiae Van den Berg, 1992

This species was recently described from Natal. Some specimens have now again been found at Site no. 3. Their measurements are given.

Measurements

Females ($n = 10$): $L = 408 \mu\text{m} \pm 52.5$ (336–515); $a = 6 \pm 0.9$ (5–7); $b = 3 \pm 0.4$ (3–4); $o = 7 \pm 2.2$ (4–11); $V = 94 \pm 1$ (92–95); $OV1 = 52 \pm 7.6$ (43–67); $\text{stylet} = 86 \mu\text{m} \pm 6.6$ (74–93); $R = 62-69$; $RSt = 13-23$; $ROes = 18-29$; $Rex =$

Fig. 5. *Oigma coronatum* Schuurmans Stekhoven & Teunissen, 1938.

A. Annuli with ball-like structures dorsally. B. Annuli with ball-like structures below projections. C. Dorsal and ventral ball-like structures near middle of body. D. Ball-like structures on posterior part of body. E. Lateral view, ventral ball-like structures. F. Lateral view, dorsal ball-like structures. (Bar = 5 μ m in E, F; 10 μ m in A, B, C, D).

Fig. 6. *Criconema duplivesitum* (Andrássy, 1963) Raski & Luc, 1985.

A. Dorso-lateral view of lip region with protruding stylet. B. Lip region, *en face* view. C. Lip region, lateral view. D. Annuli at midbody. E-F. Posterior region of two females. (Bar = 5 μ m in A, B, C; 10 μ m in D, E, F).

Table 5
Morphometric characters of *Criconeema duplicitestitum* (Andrássy, 1963) Raski & Luc, 1985

Characters	Females <i>n</i> = 25	Male <i>n</i> = 1	Juvenile cuticle with female inside <i>n</i> = 1	Juvenile cuticle with male inside <i>n</i> = 1
L (μm)	402 ± 43.7(321–502)	303	282	310
a	9 ± 1.1(7–11)	—	—	—
b	4 ± 0.4(3–5)	—	—	—
c	43 ± 13.8(25–81)	10	—	—
o	7 ± 1.3(6–10)	—	—	—
dogo ¹	5 ± 0.8(4–7)	—	—	—
V	89 ± 1.2(85–90)	—	—	—
OV ¹	45 ± 6.8(31–62)	—	—	—
Stylet length (μm)	70 ± 4.5(62–78)	—	—	—
Metenchium length (μm)	59 ± 3.9(53–68)	—	—	—
Telenchium length (μm)	12 ± 2(9–15)	—	—	—
Stylet knob height (μm)	4 ± 0.4(3–4)	—	—	—
Stylet knob width (μm)	9 ± 0.8(9–11)	—	—	—
Excretory pore from anterior end (μm)	129 ± 11.1(115–148)	—	—	—
Width at midbody (μm)	46 ± 5.4(36–55)	—	42	29
Width at excretory pore (μm)	45 ± 4.7(35–53)	—	—	—
Annuli width (μm)	7 ± 1.1(5–10)	3	3	4
Tail length (μm)	10 ± 3.1(5–17)	31	—	—
Length of oesophagus from front end to centre of valve of median bulb (μm)	81 ± 5.5(70–93)	—	—	—
Length of oesophagus from centre of valve to base of oesophagus (μm)	28 ± 4.4(19–36)	—	—	—
Lip annulus diameter (μm)	19 ± 1.2(16–21)	—	12	11
First body annulus diameter (μm)	16 ± 1.3(14–19)	—	15	12
Second body annulus diameter (μm)	24 ± 2.1(20–27)	—	21	15
Third body annulus diameter (μm)	28 ± 2.4(23–32)	—	25	18
R	50–71	—	61	66
RSt	9–17	—	—	—
ROes	13–22	—	—	—
Rex	17–22	—	—	—
RV	7–11	—	—	—
RVan	3–6	—	—	—
Ran	2–4	—	—	—
VL/VB	1.3 ± 0.2(0.9–1.6)	—	—	—
St % L	18 ± 1.7(15–23)	—	—	—
Lateral field width (μm)	—	4	—	—
Spicule length (μm)	—	36	—	—
Gubernaculum length (μm)	—	4	—	—

¹ Dorsal oesophageal gland opening from base of stylet knobs

19–23; RV = 5–7; VL/VB = 0.6 ± 0.07(0.5–0.7); St%L = 21 ± 3.4(17–28); opening of dorsal oesophageal gland 6 μm ± 1.4(4–8) from base of stylet knobs; metenchium = 70 μm ± 6.8(65–80); telenchium = 16 μm ± 1.4(13–19); stylet knob height = 4 μm ± 0.6(3–5); stylet knob width = 11 μm

± 0.5(10–12); excretory pore from anterior end = 114 μm ± 19(93–139); width at midbody = 71 μm ± 8.4(58–83); width at excretory pore = 73 μm ± 7.4(63–83); annulus width = 7 μm ± 1.1(6–9); length of oesophagus from anterior end to centre of valve of median bulb = 99 μm ± 5.6(92–110); length

of oesophagus from this point to base of oesophagus = $30\text{ }\mu\text{m} \pm 5,5(20-39)$; lip annulus = $20\text{ }\mu\text{m} \pm 1,4(17-22)$; first body annulus = $18\text{ }\mu\text{m} \pm 0,9(17-20)$; second body annulus = $25\text{ }\mu\text{m} \pm 2,3(22-28)$.

Criconema duplicivestitum
(Andrássy, 1963) Raski &
Luc, 1985 (Fig. 6)

Specimens of this species were collected at two localities in the park (Table 2). For measurements see Table 5. SEM photographs are given.

These specimens fit the original description of the species well. The female lip and first body annuli wavy or slightly lobed. From one to three anastomoses present and in some specimens the lateral field is demarcated slightly by irregularities on a few annuli. Juvenile with eight longitudinal rows of projections becoming slightly longer towards posterior end of body, mostly with finely scalloped margins. Andrássy (1963) noted that all males found were enveloped in the J - 4 cuticle and he thought it probable that they retained the cuticle during adult life. The fact that a male without a J - 4 cuticle was found proves that this is not the case

Data on sampling sites

All samples collected within the boundary of the Wilderness National Park and at the Ebb & Flow Rest Camp, alongside the roads or trails within the range of $33^{\circ}59'S$ to $34^{\circ}00'S$ and $22^{\circ}37'E$ to $22^{\circ}43'E$ by E. van den Berg, K.P.N. Kleynhans, M. Marais and S.M. Kilian, altitude about 50 m above sea-level, annual rainfall 1 100 mm. Samples one and two were collected on 8 April, nos. three to nine on 9 April and nos. 10 to 12 on 10 April, 1991.

Site 1: Ebb & Flow Rest Camp. Collected alongside the trail to the cave in the mountain from amongst roots of *Sideroxylon inerme* L., from a loamy sand soil (5% clay, 10% silt, 85% sand) and soil pH 6,3.

Site 2: Ebb & Flow Rest Camp. Collected behind bungalows one to five against mountainside among mixed natural vegetation from loamy sand soil (8% clay, 5% silt, 87% sand) and soil pH 7,3.

Site 3: Collected next to gravel road which leads from Ebb & Flow Rest Camp to Onder-Langvlei at the Kleinkrans turn-off north of railway line from natural vegetation from sandy soil (0% clay, 10% silt, 90% sand), soil pH 5,4 and temperature $17,9^{\circ}\text{C}$.

Site 4: Collected in the "Wilderness Lake area" about 3 km further east of Site 3 on the shore of the Onder-Langvlei lake from amongst roots of *Cyperus* sp. in a sandy soil (8% clay, 12% silt, 80% sand) and soil pH 5,6.

Site 5: Collected at four spots along the Brown-hooded Kingfisher Trail (the furthest about 270 m from entrance gate) on the west bank of the Duiwe River from mixed natural vegetation from a sandy loam soil (5% clay, 23% silt, 72% sand), soil pH 5,9 and temperature $15,7^{\circ}\text{C}$ to $19,6^{\circ}\text{C}$.

Site 6: Collected next to the boardwalk to the "Malachite outlook" on the shore of the Bo-Langvlei lake from the roots of *Leersia hexandra* Swartz from a sandy loam soil (10% clay, 15% silt, 75% sand), soil pH 7,6 and temperature $19,4^{\circ}\text{C}$.

Site 7: Collected about 600 m south of Rondevlei station between the Langvlei and Rondevlei lakes from *Pelargonium cucullatum* Ait. from a sandy soil (0% clay, 5% silt, 95% sand), soil pH 5,8 and temperature $22,9^{\circ}\text{C}$.

Site 8: Similar to Site 7 but collected from *Carpobrotus edulis* N. E. Br. from a sandy soil (3% clay, 5% silt, 92% sand), soil pH 5,4 and temperature 21°C .

Site 9: Collected south of Rondevlei lake on the south side of the gravel road from natural vegetation from a loamy sand soil (5% clay,

10% silt, 85% sand), soil pH 7,8 and temperature 22,5°C.

Site 10: Collected at four spots along a 150 m stretch of the Touw River trail from mixed natural vegetation from a sandy loam soil (5% clay, 13% silt, 82% sand), soil pH 7,7 and temperature 18,2°C.

Site 11: Collected at the entrance to the Touw River trail at Ebb & Flow Rest Camp against the mountainside from a sandy loam soil (13% clay, 15% silt, 72% sand), soil pH 7,9 and temperature 18,1°C.

Site 12: Collected near Site 11 but in the bank of the Touw River, just above the water-line from grass roots from a sandy soil (3% clay, 1% silt, 96% sand), soil pH 5,3 and temperature 18,2°C.

Acknowledgements

The author thanks the National Parks Board and staff of the Wilderness National Park for the opportunity to collect the samples. The following persons from the Plant Protection Research Institute are also thanked: Mrs N. H. Buckley for technical assistance, Dr K.P.N. Kleynhans for reading the manuscript and Mr H. van Tonder for the SEM photographs. Special thanks to Dr E. Geraert for his valuable advice and the time he took to compare the South African and Zaïrian *O. coronatum* specimens. Dr Wilfrida Decraemer is also thanked for her help in obtaining of and the loan of the paratypes of *O. coronatum* from the Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussels.

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