

**THE GENUS *QUADRICOMA* FILIPJEV, 1922  
WITH A REDESCRIPTION OF *Q. COBBI* (STEINER, 1916),  
*Q. CRASSICOMOIDES* TIMM, 1970 AND *Q. LORICATA*  
FILIPJEV, 1922 (NEMATODA-DESMOSCOLECIDA)**

Contribution n° X on nematodes from the Great Barrier Reef,  
collected during the Belgian expedition in 1967

by

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**Résumé**

Le genre *Quadricoma* Filipjev, 1922, avec une redescription de *Q. cobbi* (Steiner, 1916), *Q. crassicomoides* Timm, 1970 et *Q. loricata* Filipjev, 1922 (Nematoda-Desmoscolecida).

Une étude morphologique et taxonomique a été faite du genre *Quadricoma* Filipjev, 1922. Les organes internes sont étudiés en détail autant que possible, ce qui n'était pas le cas dans les études antérieures ; une comparaison avec le genre *Tricoma* Cobb, 1894 est faite. *Q. cobbi* (Steiner, 1916) Filipjev, 1922, *Q. crassicomoides* Timm, 1970 et *Q. loricata* Filipjev, 1922 sont redécrites.

**Introduction**

The genus *Quadricoma* Filipjev, 1922 is reexamined on the basis of type material, original descriptions and specimens from the Great Barrier Reef (Australia).

A redescription is given of *Q. cobbi* (Steiner, 1916) Filipjev, 1922, based on the original description and on Australian specimens since the type specimen as well as the specimen described by Timm (1970) are no longer available.

*Q. crassicomoides* Timm, 1970 and *Q. loricata* Filipjev, 1922 are also redescribed, the first species on the basis of a detailed morphological study from Australian specimens and type material and the latter species after a profound study of the original description and material from Timm.

### Material and Methods

The Australian specimens of *Quadricoma*-species studied were found at the localities listed in Table 1. The description of these localities was given in earlier reports (Decraemer, 1976).

All samples were collected by Professor Dr A. Coomans and all type material is deposited in the collection of the Instituut voor Dierkunde, Rijksuniversiteit, Gent, Belgium.

All samples were fixed in 5 percent formalin, except for the sample from Nymph Island and sample 1 from Lizard Island both fixed in hot FA4:1 (= 10 ml 40 percent formaldehyde, 1 ml glacial acetic acid, 89 ml aq. dest.), the sample from between Cairns and Hyman Island fixed in TAF (= 7 ml 40 percent formaldehyde, 2 ml triethanolamine, 91 ml aq. dest.) and sample 3 from Lizard Island fixed in neutralized 10 percent formalin.

For the transfer from fixation solution into pure glycerine, the methods of Seinhorst (1959) and De Grisse (1965) were followed.

To make transverse sections a.o. of the head, the glycerine slide containing the animal was opened. The animal to cut was brought into a glycerine drop on the plastic cover. The manual cutting was done with an eye scalpel n° 1 under a stereoscopic microscope. The sections were then separately brought into a glycerine-gelatine drop. By repeatedly warming and cooling, the section was brought into the most suitable position.

The drawings were made with the aid of a camera lucida of Reichert, Zettopan.

The following nominal species of *Quadricoma* from other nematode collections were studied:

\*\* *Q. angulocephala*: Nematodensammlung des Instituts für Meeresforschung, Bremerhaven (NSIMB) : holotype ♂ + 1 ratype ♀ slide n° 364b.

*Q. bahamaensis*: United States Department of Agriculture, Maryland (USDA):

holotype ♂ : slide n° T-135t,

allotype ♀ : slide n° T-136t,

paratype ♂ : slide n° T-687p.

*Q. cobbi*: Istituto e Museo di Zoologia ed Anatomia comparata dell'Universita di Bari, Italy: 1 juvenile.

\* *Q. crassicauda*: University of California Nematode Collection, Davis (UCNC) : holotype ♂ : slide n° 1172.

*Q. crassicoma*: UCNC (Davis): 1 ♂ + 1 ♀ : slides nos 7b, 7.

*Q. crassicomoides*: UCNC (Davis):

allotype ♀ slide n° 1179,

paratypes ♀♀ + ♂♂ slides nos 1180, 1181 (2b, 2c).

TABLE 1.  
Localities of species described

Locality	Date	Depth (m)	Type of bottom	Species found
Lizard Island				
— sample 1, 800 m west of	14-9-67	20	sand between <i>Halimeda</i>	<i>Quadricoma papillata</i> : 1 ♂ <i>Q. cobbi</i> : 1 ♀
— sample 2, 800 m west of	12-9-67	21.5	sand, silt, Foraminifera	<i>Q. papillata</i> : 2 ♀ ♀ <i>Q. lizardiensis</i> : 1 ♂, 1 ♀ <i>Q. freudenhammeri</i> : 1 ♀, 1 juv. <i>Q. noffsingeriae</i> : 2 ♂ ♂, 2 ♀ ♀, 4 juv.
— sample 3, 800 m west of	13-9-67	20	sand, among sponges, <i>Gelliodes</i>	<i>Q. crassicomoides</i> : 1 ♀
— sample L <sub>36</sub>	14-9-67	15.5	fine sand, algae, Foraminifera	<i>Q. noffsingeriae</i> : 1 ♂
Nymph Island	25-9-67	shallow	between algae, Foraminifera	<i>Q. crassicomoides</i> : 2 ♀ ♀
Three Isles	11-10-67	23	sand	<i>Q. papillata</i> : 1 ♂ <i>Q. noffsingeriae</i> : 1 ♂
Between Cairns and Hyman Island	20-10-67	40	sand	<i>Q. papillata</i> : 2 ♀ ♀ <i>Q. noffsingeriae</i> : 1 ♀ <i>Q. cobbi</i> : 2 ♂ ♂
Between One Three Island and Wis- tari Reef — station 1	8-11-67	53	sand	<i>Q. noffsingeriae</i> : 1 ♂

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- \* *Q. desmoscoleoides*: NSIMB (Bremerhaven):  
allotype ♀ n° **240c**,  
paratype ♀ n° 236b,  
♀ n° **238a**.
- \* *Q. frontalis*: UCNC (Davis): 1 ♂.
- \*\* *Q. hupferi*: USDA (Maryland):  
lectotype ♀ : slide n° T-688p,  
paralectotype ♂ : slide n° T-689p.  
*Q. iberica*: NSIMB (Bremerhaven): holotype ♂ : slide n° 367a.  
*Q. loricata*: USDA (Maryland):  
♀ : slide n° G-3380,  
UCNC (Davis) :  
1 ♂ : slide n° 4c,  
1 ♀ : slide n° 4d,  
1 juv. : slide n° 4b,  
1 ♂ + 1 ♀ : slide n° **4f**.  
*Q. loricatoides*: NSIMB (Bremerhaven): slide n° 355d.
- \* *Q. longicauda*: NSIMB (Bremerhaven): holotype ♂ : slide n° 215b.
- \*\* *Q. magna*: USDA (Maryland): paratypes ♀ ♀ : slide n° T-690p.  
*Q. media*: (Bari, Italy): 1 ♂.
- \* *Q. parva*: UCNC (Davis): holotype ♀ : slide n° **1183**.  
*Q. pontica*: UCNC (Davis): 1 ♂ : slide n° 5.  
*Q. trigintatres*: Station marine d'Endoume, Marseilles, France :  
holotype ♂, paratype ♂
- \* genera classified in *Desmolorenzenia* by Freudenhammer (1975),
- \*\* genera classified in *Quadricomoides* by Decraemer (1976).  
Nominal species of *Tricoma* from other nematode collections studied:
- T. maxima*: NSIMB (Bremerhaven): 1 ♂ + 1 ♀ slide n° 243b.
- T. nematoides*: NSIMB (Bremerhaven):  
1 ♀ : slide n° 243b,  
1 ♂ + 1 ♀ : slide n° 304.
- T. nematoides* : Marseilles, France: 1 ♂.

#### Explanation of abbreviations used

cs = length of cephalic setae; gub = length of gubernaculum;  
hd = maximum head dimensions (width x length); **L** = length of  
body; mbd = maximum body diameter; (mbd) = maximum body  
diameter (foreign material not included); nr = position nerve ring  
from anterior body end; oes = length of oesophagus; sd<sub>1</sub> = length  
of subdorsal setae on the first main ring; spic = length of spicules,  
measured along the median line; sv<sub>2</sub> = length of subventral setae  
on the second main ring; t = tail length; tmr = length of the  
terminal main ring + naked end-part with spinneret.

**All** measurements are in micrometer (µm).

## DESCRIPTION OF GENUS AND SPECIES

### GENUS *QUADRICOMA* FILIPJEV, 1922

syn. *Neoquadricoma* Kreis, 1963 (Type species: *N. arctica* Kreis, 1963) in Timm, 1970.

The original diagnosis of Filipjev (1922) is no longer useful, but on the basis of characters of the type species *Quadricoma loricata* Filipjev, 1922, the genus *Quadricoma* can clearly be distinguished from the other genera.

In contradiction with Lorenzen (1969) who synonymized without comment the genus *Quadricoma* with *Tricoma* while introducing a new subfamily Tricominae, we consider however, in accordance with Timm (1970) and Freudenhammer (1975), *Quadricoma* as a distinct genus. The diagnosis given by Timm (1970) and emended in Decraemer (1976) can be completed by adding that male reproductive system bears 2 testes.

The genus *Quadricoma* belongs to the subfamily Tricominae Lorenzen, 1969 in possessing a tricomoid setal pattern without differentiation in shape between the subdorsal and subventral somatic setae and in the male reproductive system, by having 2 testes.

### Discussion

The difference between both genera *Tricoma* and *Quadricoma* is relatively small and mainly based on the shape of the main rings but can, apart from the following exception mentioned, still be used. In *Q. noffsingeriae*, one male and one female were found which, in contradiction with the other specimens of this species, possess only quadricomoid rings in the anterior part of the body and in the tail region; the rings situated in between are more tricomoid (cf. Decraemer, 1977).

### Structure of the body rings (Fig. 1)

Body cuticle with uniform cuticular rings, separated from each other by narrower and low interzones. The desmen (cf. Freudenhammer, 1975) of the main rings in the anterior part of the body slope posteriorly extending into the following interzone; in the posterior body region the situation is reversed: the desmen decrease anteriorly extending into the preceeding interzone.

In non-shifted and thus non-overlapping rings, the largest concentration of foreign particles lies in the middle of the cuticular ring of the main ring, sometimes forming a narrow marked off band when only few covering material is present as e.g. in *Q. crassicoma* (Fig. 1, D-F).

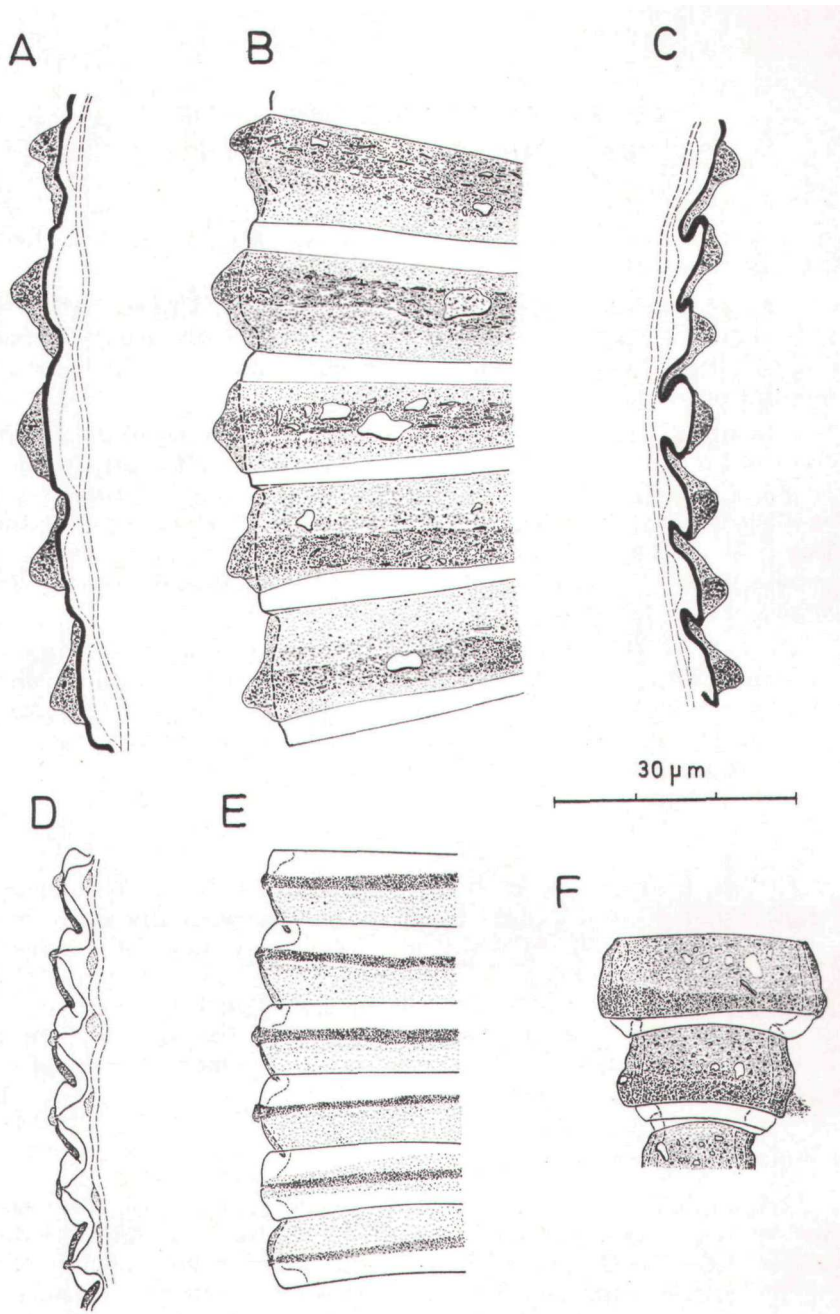


FIG. 1

Annulation and structure of the cuticle in *Quadricoma*.

*Q. crassicomoides*: detail of body wall at the level of the inversion.  
A, B: dorsal side (main rings 29-33); C: ventral side (main rings 28-34).

*Q. crassicoma*: detail of body wall.  
D, E: dorsal side at the level of the inversion (main rings 27-32); F: surface view of body wall in tail region (main rings 42-43).

The inversion in orientation of the main rings occurs suddenly at the level of a single ring on which the foreign material is restricted to the median part of the cuticular ring, leaving the anterior and posterior parts free. The position of the transition ring is about constant in each species and a remarkable stability was found: in most species, the inversion occurs at 5-6 rings anterior to the anus. The explanation lies perhaps in the way of locomotion, but unfortunately no living material was available to examine this.

By curving or contraction of the body, the main rings overlap each other like roof tiles, thereby the difference in orientation of the rings is more pronounced. By overlapping of the rings we observe in the naked part of the ring a thicker cuticle than in the covered zone and the cavity between both main layers of the cuticle (cf. Chitwood and Chitwood, 1950) is shifted towards the covered part. In longitudinal optical section of a male paratype of *Q. crassicoma* (Fig. 1, D) possessing only few foreign material on the main rings, a distinct pore was observed in the middle of each ring. At the level of this opening, the cuticular ring in this specimen is covered by a slightly raised, narrow band of foreign material, more or less marked off from the thin fine granular rest of the desmos. Such a pore is possibly present in all Quadricoma-species (cf. largest concentration of foreign material in the middle of the ring) but the presence of secretion and foreign material prevents the observation of such a detailed structure in the other species.

In the juvenile stages, the body cuticle consists of homonome cuticular rings without desmen; sometimes they can be covered with a very thin layer of a fine substance. Only in one specimen of the fourth juvenile stage, we observed in the tail region a vague beginning of a quadricomoid shape.

## Head

The head is with the exception of juveniles, always clearly offset from the rest of the body and separated from the first main ring by a narrow interzone. From the peduncles of the cephalic setae on, the head is more or less tapered anteriorly towards a narrow to very broad truncated end or a narrow dome-shaped anterior end, but without the formation of a conspicuous triangular head-shape as in Tricoma-species. The cuticle is apart from the labial region mainly thickened and sclerotized, forming a kind of helmet (except in *Q. freudenhammeri*). In the specimens studied, six lips were observed in *Q. cobbi*, *Q. crassicomoides* and *Q. noffsingeriae*. There was always only one crown of six minute papillae visible (in *Q. noffsingeriae* the papillae are larger and tubelike).

## Digestive system

The stoma is unarmed except in *Q. noffsingeriae* where it bears three pairs of teeth; the stomatal wall can be distinctly reinforced (cf. cheilorhabdia in *Q. freudenhammeri*). The stoma enlarges posteriorly and embraces the protruding end of the oesophagus.

The oesophagus is mostly cylindrical with more or less protruding glands in its terminal part. In some species, the oesophagus can be strongly elongated e.g. in *Q. freudenhammeri*, *Q. noffsingeriae*.

#### Excretory system and pseudocoelomocytes

A ventral excretory gland was not observed.

One to three finely granular pseudocoelomocytes flank on both sides the anterior part of the intestine in several *Quadricoma*-species.

#### Ocelli

The ocelli are pale to dark-yellowish or red-brownish, with irregular shape and, in most species, situated at the level of the anterior part of the intestine. Exceptions were found in *Q. freudenhammeri* and *Q. noffsingeriae* where the ocelli lie along the posterior part of the oesophagus.

#### Male reproductive system

The male reproductive system possesses two testes. Both testes continue without distinct transition into a wider common structure with finely granular wall, the vesícula seminalis(?). This common structure is followed by a narrower vas deferens of which the granulation can be differentiated from that of the "vesícula seminalis". One or two ejaculatory glands flank the posterior region of the vas deferens on both sides of the body; laterally from both apophyses of the gubernaculum, a glandular cell can be present.

In *Q. papillata*, the males possess two adjacent ventral genital papillae situated about halfway the body length. In the male specimens of *Q. scanica* Lorenzen (1969), I observed a pair of subventral papillae on main ring 14. These papillae are relatively high, provided with a rounded knoblike tip and surrounded at the base by foreign material. The latter papillae are from a totally different type than the genital papillae in *Q. papillata*, cf. the different shape, the far anterior position and the fact that they occur on the same ring.

#### Juveniles

In only two of the species studied: *Q. freudenhammeri* and *Q. noffsingeriae*, juvenile specimens were found. In *Q. freudenhammeri*, the juvenile specimen studied possesses a homonome cuticular annulation with a larger number of rings than in the adult: 49 rings instead of 41 in the adult and with only one pair of subdorsal setae and one pair of subventral setae. Presumably, this specimen belongs to a very early stage (cf. a.o. the very small number of sometic setae).

In *Q. noffsingeriae*, two juvenile stages were distinguished:

1) the third juvenile stage with a homonome cuticular annulation with two rings more than in the adult (39 rings instead of



37 rings) and with the same number of subdorsal setae (9), but a much smaller number of subventral setae (three pairs instead of 13 pairs as in the adult). The reproductive system is still poorly developed;

2) the second juvenile stage with a homonome cuticular annulation with a larger number of rings than in the adult and than in the third stage (41-42 instead of 38 in the adult) and with a much smaller number of somatic setae subdorsally as well as subventrally compared with the adults (four pairs of subdorsal setae and two pairs of subventral setae instead of nine pairs of subdorsal setae and 13 pairs of subventral setae as in the adult).

With the exception of the reproductive system, the other internal organs are identically structured as in the adult forms.

A new key for *Quadricoma*-species is proposed since the key given by Timm (1970) included also the species of *Desmolorenzenia* Freudenhammer, 1975 and consequently can no longer be used. From the key given by Freudenhammer (1975), the new key differs because a separate key is given for males and females; in males, the key is mainly based on the copulatory system and on the presence or absence of genital papillae; in females, it is based on the number of main rings, the head shape, the oesophagus length in relation to the body length. In contradiction with Freudenhammer (1975), the shape of the somatic setae is not considered a diagnostic feature of primary importance.

#### Key to the species of *Quadricoma*

##### A. Males

1. ventral papilla(e) present ..... 2  
    ventral papilla(e) absent ..... 5
2. one postanal papilla, medio-ventrally situated on the third last main ring; papilla completely covered with foreign material ..... 3  
    ventral papillae paired or single and pre-anally or pre-anally and post-anally situated: pre-anal papillae naked ... 4
3. head with widened, distally bent terminal head border; spicula: 46  $\mu$ m long, capitulum slightly marked; 44 desmen ..... *Q. lizardiensis* Decraemer (in press)  
    anterior head border not clearly widened and not bent; spicula: 58  $\mu$ m long, capitulum strongly developed; 43-44 desmen ..... *Q. bahamaensis* Timm, 1970
4. 2 successive, each of them single, pre-anal papillae, separated by 3-5 desmen; 43-44 desmen .....  
    ..... *Q. papillota* Decraemer (in press)  
    1 pair of pre-anal papillae on main ring 14 and 1 post-anal papilla; 39 desmen .. *Q. scanica* (Allgen, 1935) Timm, 1970



B. *Females*

1. less than 40 desmen ..... 2  
 more than 40 desmen ..... 6
2. head in anterior half gradually tapered towards a relatively narrow truncated end; oesophagus length less than 15 per cent of the total body length ..... 3  
 head in anterior half hardly tapered, anterior border very broad, truncated; oesophagus length more than 15 per cent of the total body length ..... 5
3. head conspicuously anteriorly tapered; labial region protruding beyond the helmet; cephalic setae almost as long as or longer than the head ..... 4  
 head less anteriorly tapered; labial region not clearly marked; cephalic setae only half as long as the head; 38 desmen. .... *Q. brevichaeta* Freudenhammer, 1975
4. labial region with 6 distinct lips; oesophagus narrow, cylindrical; tail with 5 main rings ; 37 desmen .....  
 ..... *Q. cobbi* (Steiner, 1916) Filipjev, 1922  
 labial region without lips; oesophagus anteriorly swollen and provided with a small tooth-like structure in the lumen; 33-34 desmen ..... *Q. loricata* Filipjev, 1922
5. oesophagus length 23-29 per cent of the total body length; anterior head border widened, non-sclerotized and offset; 37 desmen ..... *Q. noffsingeriae* Decraemer (in press)  
 oesophagus length about 17 per cent of the total body length; anterior head border not widened and offset; 39 desmen. .... *Q. scanica* (Allgèn, 1935) Timm, 1970
6. less than 60 desmen ..... 7  
 more than 60 desmen; body with 66 desmen; head anteriorly tapered towards a truncated end .....  
 ..... *Q. intermedia* (Steiner, 1916) Filipjev, 1922
7. oesophagus length more than 20 per cent of the total body length; head cuticle only in the anterior half of the head sclerotized; amphids restricted to the anterior half of the head; 41 desmen .... *Q. freudenhammeri* Decraemer (in press)  
 oesophagus length less than 16 per cent of the total body length; head cuticle nearly completely sclerotized; amphids not restricted to the anterior half of the head; number of desmen larger than 41 ..... 8
8. head conspicuously broad: 2-2.5 times the head length; anterior head border broad, truncated; cephalic setae broad and short, i.e. shorter than half the head width; 44 desmen. .... *Q. crassicoma* (Steiner, 1916) Filipjev, 1922  
 head less wide; cephalic setae finer and longer i.e. about as long as or longer than the maximum head width ..... 9
9. head with helmet largely covered with foreign material; labial region with 6 lips protruding from the helmet; cephalic setae with hooked tip; 44 desmen .....  
 ..... *Q. crassicomoides* Timm, 1970  
 head free of foreign material; labial region without lips; cephalic setae without hooked tip ..... 10

10. 43-44 desmen; anterior truncated head border not widened and distally bent ..... 11  
 45-46 desmen; anterior truncated head border widened, posteriorly bent and offset .....  
 ..... *Q. lizardiensis* Decraemer (in press)
11. amphids with short extension on main ring 1; setal pattern with 7 pairs of subdorsal and 10 pairs of subventral setae ..... *Q. papillata* Decraemer (in press)  
 amphids rounded; setal pattern with 9 pairs of subdorsal and 12 pairs of subventral setae .....  
 ..... *Q. bahamaensis* Timm, 1970

*QUADRICOMA COBBI* (STEINER, 1916) FILIPJEV, 1922 (Fig. 2)

Redescription based on Australian specimens.

**Measurements:**

Male 1 : L = 595, hd = 19x16, cs = 18, sd<sub>4</sub> = 14, sd<sub>8</sub> = 16, sd<sub>15</sub> = 16, sd<sub>19</sub> = 17, sd<sub>24</sub> = 16, sd<sub>31</sub> = 17, sd<sub>36</sub> = 19, sv<sub>3</sub> = 13, sv<sub>6</sub> = 14, sv<sub>8</sub> = 17, sv<sub>11</sub> = 19, sv<sub>14</sub> = 20, sv<sub>15</sub> = 21, sv<sub>19</sub> = 18, sv<sub>22</sub> = 19, sv<sub>25</sub> = 18, sv<sub>29</sub> = 17, sv<sub>36</sub> = 21, spic = 54, gub = 35, t = 100, tmr = 34, spinneret = 7.5, mbd = 77, (mbd) = 57, oes = 67, nr = 54.

Male 2 : L = 590, hd = 19x17, cs = 17, sd<sub>6</sub> = 13, sd<sub>9</sub> = 14, sd<sub>13</sub> = 14, sd<sub>20</sub> = 13, sd<sub>25</sub> = 15, sd<sub>31</sub> = 16, sd<sub>36</sub> = 21, sv<sub>3</sub> = 12, sv<sub>14</sub> = 16, sv<sub>16</sub> = 18, sv<sub>19</sub> = 17, sv<sub>22</sub> = 17, sv<sub>25</sub> = 17, sv<sub>29</sub> = 15, sv<sub>34</sub> = 16, sv<sub>36</sub> = 18, spic = 53, gub = 32, t = 102, tmr = 36, mbd = 80, (mbd) = 61, oes = 72, nr = 55.

Female : L = 745, hd = 20x17, cs = 19, sd<sub>4</sub> = 14, sd<sub>5</sub> = 15, sd<sub>9</sub> = 16, sd<sub>14</sub> = 16, sd<sub>26</sub> = 17, sd<sub>31</sub> = 17, sd<sub>36</sub> = 19, sv<sub>3</sub> = 16, sv<sub>6</sub> = 15, sv<sub>9</sub> = 18, sv<sub>12</sub> = 19, sv<sub>18</sub> = 20, sv<sub>25</sub> = 19, sv<sub>29</sub> = 17, sv<sub>34</sub> = 21, sv<sub>36</sub> = 21, t = 115, tmr = 38, mbd = 96, (mbd) = 77, oes = 79, nr = 59.

**Males:**

The body is clearly tapered towards both extremities. Its cuticle is provided with 37 typical quadricoroid rings with desmen composed of secretion and coarse foreign material. Ringinversion in main ring 27.

The somatic setae are arranged as follows:

subdorsal:  $\frac{4,8,15,19,24,31,36}{4,8,15,19,26,31,36} = 7$

subventral:  $\frac{3,6,8,11,14,16,19,22,25,29,36}{3,6,8,11,14,16,19,22,25,29,34,36} = 11$   
 $\frac{3,6,8,11,14,16,19,22,25,29,34,36}{3,6,8,11,14,16,19,22,25,29,34,36} = 12$

both individuals studied with 7 pairs of subdorsal setae and 11-12 pairs of subventral setae. The somatic setae with oval shape in transverse section are mostly observed as broad, distally tapered setae with a fine central canal that opens at the top; the setae are, over their whole length, flanked by a membrane. They insert on relatively high peduncles which slightly protrude out of the desmen. The subdorsal and subventral setae are comparable in length; the first pair of setae is slightly shorter than the following ones and the terminal pair of setae is longer than the former setae.

The head somewhat broader than long, gradually tapers in the anterior half towards a rounded end. Its cuticle is with the exception of the labial region, thickened and sclerotized, forming a kind of helmet. The labial region is composed of six lips, slightly protruding out of the helmet; each lip bears a minute papilla.

The cephalic setae with broader base, are distally tapered towards a fine open tip and flanked over their whole length by a membrane, difficult to observe in lateral view. The cephalic setae are nearly as long as the maximum head width and insert on low peduncles, hardly protruding out halfway the head length.

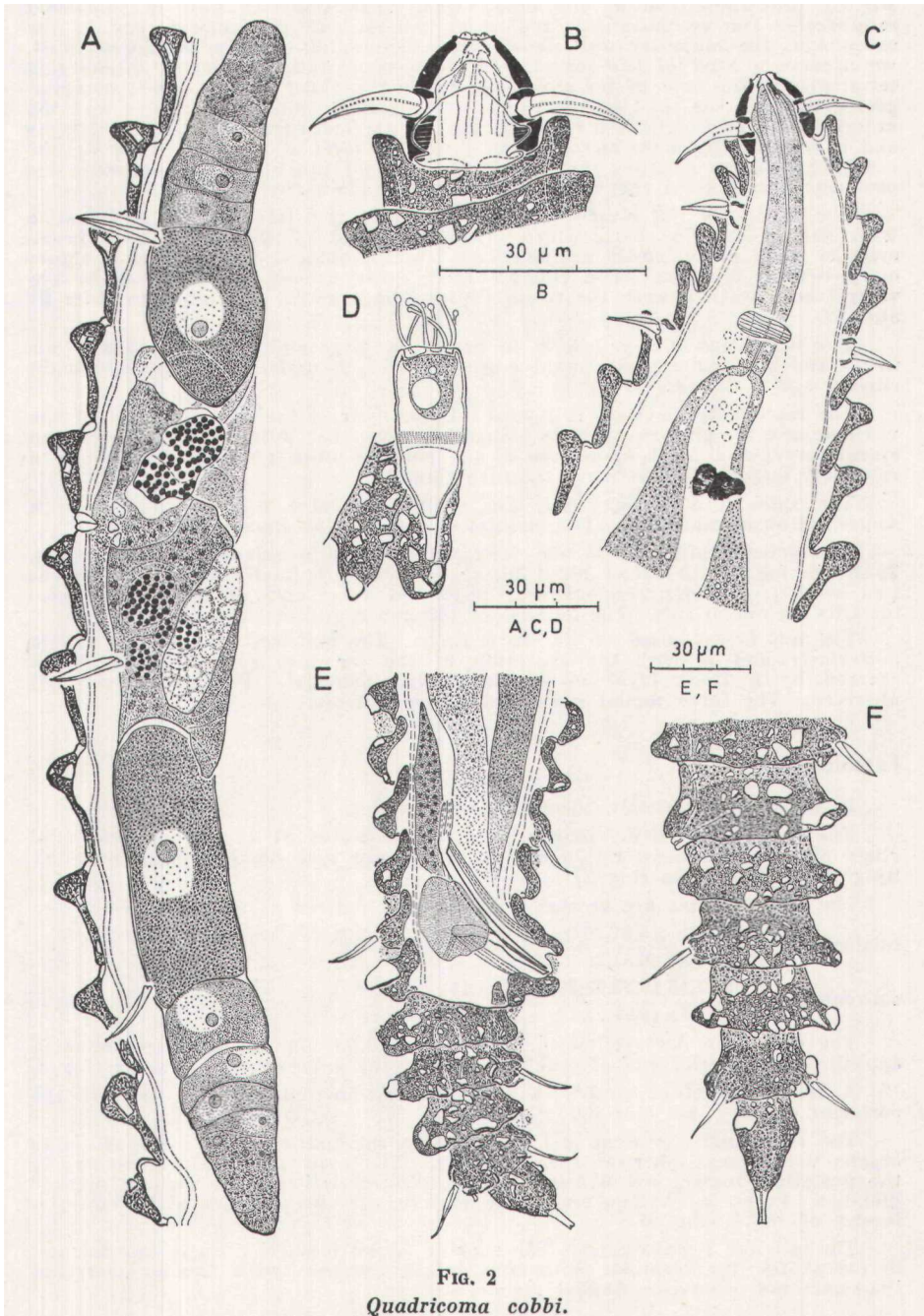


FIG. 2  
*Quadricoma cobbi*.

A: female reproductive system (S. Lizard Island); B: surface view of head (Lizard Island); C: anterior body region (? Lizard Island); D: part of body wall with *Suctorea*; E: posterior body region (from between Cairns and Hyman Island); F: surface view of tail region (Lizard Island).

The amphids are rounded, covering a large part of the head. Anteriorly, they nearly reach the border of the helmet; in the posterior half of the head, the amphids are swollen and extend to the first main ring. The amphidial canal ends in a small groove in the posterior head end.

The stoma is small, 2  $\mu\text{m}$  deep, widened posteriorly and embracing the slightly protruding end of the oesophagus. The stomatal wall is somewhat reinforced. The oesophagus is typical cylindrical. In the anterior end of the oesophagus the muscular wall shows little differentiations; in the dorsal wall, we observe a kind of fine canal with reinforced wall, apparently discharging terminally in the base of the stoma: probably the outlet of the dorsal oesophageal gland. At the level of the posterior end of the fourth main ring and the anterior part of the fifth main ring, the nerve ring surrounds the oesophagus and is followed by many nerve cells. From the level of the nerve ring on, the oesophagus tapers slightly; the oesophago-intestinal junction occurs opposite the posterior end of main ring 5 or anterior end of main ring 6.

The cardia is not clearly marked off from the intestine. The intestine with narrow anterior part, widens from the level of the ocelli to a broad cylinder with many small granula and larger globules. The intestine shows no postrectal blindsac. The cloacal tube is very short and situated in the ventral body wall between the strongly protruding ventral wall of main rings 31 and 32.

The ocelli are dark-yellowish to brownish, large and elongated:  $18 \times 7.5 \mu\text{m}$  in and situated opposite main rings 6 and 7 in male 1 and opposite main rings 7 and 8 in male 2.

The reproductive system is typical. Dorsally from the posterior part of the vas deferens, we observe a single elongated organ that possibly functions as an ejaculatory gland. The apophyses of the gubernaculum are both flanked by a relatively large and very finely granular glandcell.

The spicules 53-54  $\mu\text{m}$  long, are slightly arcuated and provided with a somewhat offset capitulum. The muscles of the spicular apparatus are typical.

The gubernaculum 32-35  $\mu\text{m}$  long, consists of a sclerotized distal part, 20-25  $\mu\text{m}$  long, with broad blunt distal end and proximally widening towards two weakly sclerotized apophyses, 10-12  $\mu\text{m}$  long and obliquely orientated towards the dorsal side. The muscles of the gubernaculum are typical.

The tail is composed of six main rings. The endring, 36  $\mu\text{m}$  long, tapers posteriorly and is with the exception of the terminal spinneret, completely covered by a thick layer of coarse foreign material. Phasmata were not observed. The three caudal glands were very obscure.

### Female:

In most characteristics, identical to the males.

The body is relatively long; its cuticle possesses 37 typical quadricomoid rings with desmen of secretion and rather opaque and coarse foreign material. Ringinversion in main ring 27.

The somatic setae are arranged to a similar pattern as in the males:

**subdorsal:**  $\frac{4,9,16,21,25,31,36}{2,5,9,14,20,26,31,36} = 7$   
 $\frac{3,6,9,12,15,19,22,25,29,34,36}{3,6,9,12,15,18,22,25,29,34,36} = 11$   
**subventral:**  $\frac{3,6,9,12,15,19,22,25,29,34,36}{3,6,9,12,15,18,22,25,29,34,36} = 11$

The ocelli are dark-yellowish, rounded,  $9 \times 10 \mu\text{m}$  in diameter and situated opposite the posterior end of main ring 7 and the anterior end of main ring 8.

A short anal tube protrudes from the medio-ventral body wall at the posterior end of main ring 32.

The reproductive system is typical. Both spermathecae are large sac-like organs with many spherical spermatozooids. The uteri are finely granular; in the posterior branch, the uterus shows a differentiation with vaguely marked globules. Vulva and vagina are rather obscure, they are situated at the anterior border of main ring 21.

The tail has 5 main rings. The endring 38  $\mu\text{m}$  long, is distally tapered and in except for the terminal spinneret, totally covered with foreign material. Phasmata not observed. Caudal glands obscure.

### Localities and habitats:

Between Cairns and Hyman Island; Lizard Island (sample 4).



Material :

2 : Between Cairns and Hyman Island; 1 ♂ Lizard Island.

Discussion:

From a study of the original description of *Tricoma cobbi* Steiner, 1916 and the description of *Quadricoma cobbi* (Steiner, 1916) Filipjev, 1922 in Timm (1970), it appears that the Australian individuals show a great resemblance to them and may be considered as *Q. cobbi*. They have a similar habitus with comparable head- and tail-shape, the same number of main rings, a comparable setal pattern and the same structure of the copulatory apparatus.

The Australian specimens, especially the female are however clearly longer than both males of *Q. cobbi* described until now; above all the difference in body length with the holotype is remarkable: 590-595  $\mu\text{m}$  instead of 191  $\mu\text{m}$  in the holotype. Timm (1970) supposed however that Steiner's measurements are presumably too small.

The spicula in the Australian males are longer than in the male specimen in Timm (1970) i.e. 53-54  $\mu\text{m}$  instead of 35  $\mu\text{m}$ .

From the comparative study also appears a small difference in the position of the ocelli: opposite main rings 6-8 in the Australian specimens compared with opposite rings 9-10 in the male in Timm (1970).

The type specimen of Steiner (1916) as well as the male specimen described by Timm (1970) are no longer available.

In spite of the differences in body length and in the length of the spicules the Australian individuals are still considered as *Q. cobbi*.

The Australian specimens wore epizoic *Suctorea*.

*QUADRICOMA CRASSICOMOIDES* TIMM, 1970 (Fig. 3-6)

#### Measurements: Lizard Island

Female : L = 520, hd = 22x15, cs = 16, sd<sub>4</sub> = 17, sd<sub>8</sub> = 19, sd<sub>11</sub> = 21, sd<sub>15</sub> = 22, sd<sub>27</sub> = 22, sd<sub>34</sub> = 21, sd<sub>40</sub> = 20, sv<sub>3</sub> = 18, sv<sub>6</sub> = 19, sv<sub>9</sub> = 20, sv<sub>12</sub> = 22, sv<sub>24</sub> = 19, sv<sub>27</sub> = 21, sv<sub>31</sub> = 20, sv<sub>35</sub> = 21, sv<sub>41</sub> = 19, t = 95, tmr = 33, spinneret = 11, oes = 49, mbd = 49, bd vulva = 57.

#### Nymph Island

Female 1 : L = 490, hd = 22x13, cs = 16, sd<sub>4</sub> = 18, sd<sub>8</sub> = 18, sd<sub>11</sub> = 18, sd<sub>15</sub> = 18, sd<sub>28</sub> = 16, sd<sub>30</sub> = 16, sd<sub>34</sub> = 17, sd<sub>44</sub> = 19, sv<sub>4</sub> = 15, sv<sub>6</sub> = 16, sv<sub>9</sub> = 18, sv<sub>12</sub> = 18, sv<sub>23</sub> = 16, sv<sub>26</sub> = 16, sv<sub>35</sub> = 16, sv<sub>41</sub> = 17, t = 108, tmr = 32, oes = 49, nr = 35 = mbd = 66, (mbd) = 56.

Female 2 : L = 595, hd = 21x15, cs = 17, sd<sub>4</sub> = 17, sd<sub>8</sub> = 19, sd<sub>11</sub> = 19, sd<sub>15</sub> = 21, sd<sub>27</sub> = 19, sd<sub>34</sub> = 20, sd<sub>40</sub> = 20, sv<sub>3</sub> = 17, sv<sub>6</sub> = 18, sv<sub>9</sub> = 20, sv<sub>12</sub> = 23, sv<sub>14</sub> = 21, sv<sub>20</sub> = 20, sv<sub>30</sub> = 21, sv<sub>35</sub> = 18, sv<sub>41</sub> = 18, t = 110, tmr = 34, spinneret = 13, oes = 52, mbd = 72, bd vulva = 66.

## Females:

The body is stout, tapered towards the extremities. Its cuticle possesses 44 typical quadricomoid rings with desmen composed of secretion and fine and coarse foreign material. Ringinversion on main ring 31.

The somatic setae are arranged as follows: e.g. a female from Nymph Island:

$$\begin{array}{l} \text{subdorsal: } \frac{4,8,11,15,18,23,27,34,40}{4,8,11,15,18,22,28,34,40} = 9 \\ \text{subventral: } \frac{4,6,9,12,14,17,20,24,26,30,35,41}{3,6,9,12,14,17,20,23,26,30,35,41} = 12 \end{array}$$

always with 12 pairs of subventral setae and 8 or 9 pairs of subdorsal setae in the specimens studied. The somatic setae, oval-shaped in transverse section, are in lateral view, mostly broad, distally tapered and provided with a fine internal canal that opens in a posteriorly hooked tip, very conspicuous in the type specimens. The somatic setae differ little in length, anteriorly and posteriorly on the body they can be somewhat shorter.

The head about one and a half times wider than long, tapers from the peduncles of the cephalic setae on anteriorly towards a broad, truncated end. Its cuticle is thickened and sclerotized, especially in the posterior half of the head, forming a kind of helmet. Laterally, the sclerotization of the head cuticle extends less far posteriorly than on the dorsal and ventral side of the head. Posteriorly, the cuticle is except for the zone with the amphids, covered by a thin layer of a fine granular substance that extends more anteriorly on the dorsal and ventral sides of the head. At the level of the anterior extremity, the helmet is lightly widened and surrounds the sometimes (cf type specimens) protruding labial region.

In "en face view" (Fig 3a) we observe six rather vaguely marked lips surrounding a small hexagonal oral opening; the whole surrounded by a rounded hexagonal terminal border of the sclerotized helmet. Each lip with a minute papilla. The papillary nerves can be traced posteriorly along the stoma to about the anterior end of the oesophagus where they disappear in six granular glandcells(?). In successive transverse optical sections, the bead is more or less square-shaped (Fig 3d-e); terminally it is more rounded.

The cephalic setae are broad, distally tapered towards an open posteriorly hooked tip and over their whole length flanked by a membrane, only clearly to observe in a frontal view of the head. The cephalic setae are somewhat longer than the head and insert on very low peduncles, hardly protruding out halfway the head length.

The amphids are thick-walled, rounded to nearly circular in lateral view, covering a large part of the head and extending anteriorly and posteriorly almost to the extreme head border. The amphidial canal ends in a small pore situated subterminally on the head, just behind the sclerotized posterior wall which shows laterally on this level a small anteriorly orientated incurve.

The stoma is 7.5-9  $\mu\text{m}$  deep, narrow and thick-walled. Posteriorly, the stomatal lumen widens slightly, embracing the protruding end of the oesophagus with apparently three small teeth (rather conspicuous in a paratype: slide UCNC n° 1181).

In frontal view, we observe an almost circular thick-walled stoma with enclosed lumen (Fig 3b). In the basal part the stomatal lumen widens; it becomes triradial-shaped with a similar orientation as the oesophageal lumen and it contains the protruding end of the oesophagus, visible as three small tooth-like structures (Fig. 3c).

The oesophagus is more or less cylindrical to the level of the nerve ring; anteriorly, its muscular wall shows slight differentiations. The nerve ring surrounds the oesophagus opposite the posterior end of main ring 4 and the anterior end of main ring 5; it is followed by several nuclei of nerve cells. From the level of the nerve ring on, the oesophagus gradually tapers posteriorly. The oesophago-intestinal junction occurs opposite main ring 6. In a paratype female (slide UCNC n° 1181), the intestine was shifted far anteriorly, presumably due to the very strong development of the gonads. Consequently, the oesophagus was pressed and the transition into the intestine was situated between main rings 3 and 4; the nerve ring lays here at the level of the posterior end of the first main ring.

In the terminal part of the oesophagus, we observe vaguely a separation between glandular and muscular part. A more detailed study of this region with the oesophago-intestinal junction was hindered by the rather opaque desmen.



The cardia region is obscure. The intestine, anteriorly somewhat narrower and finely granular, widens posteriorly over a short distance to a broad cylinder with small and large globules. In a specimen from Lizard Island, the anterior part of the intestine was flanked on both sides by two finely granular pseudocoelomocytes. The intestine shows a conspicuous intestinal postrectal overlapping or blindsac extending far into the tail. A rather large anal tube protrudes from the medio-ventral body wall in the posterior end of main ring 37.

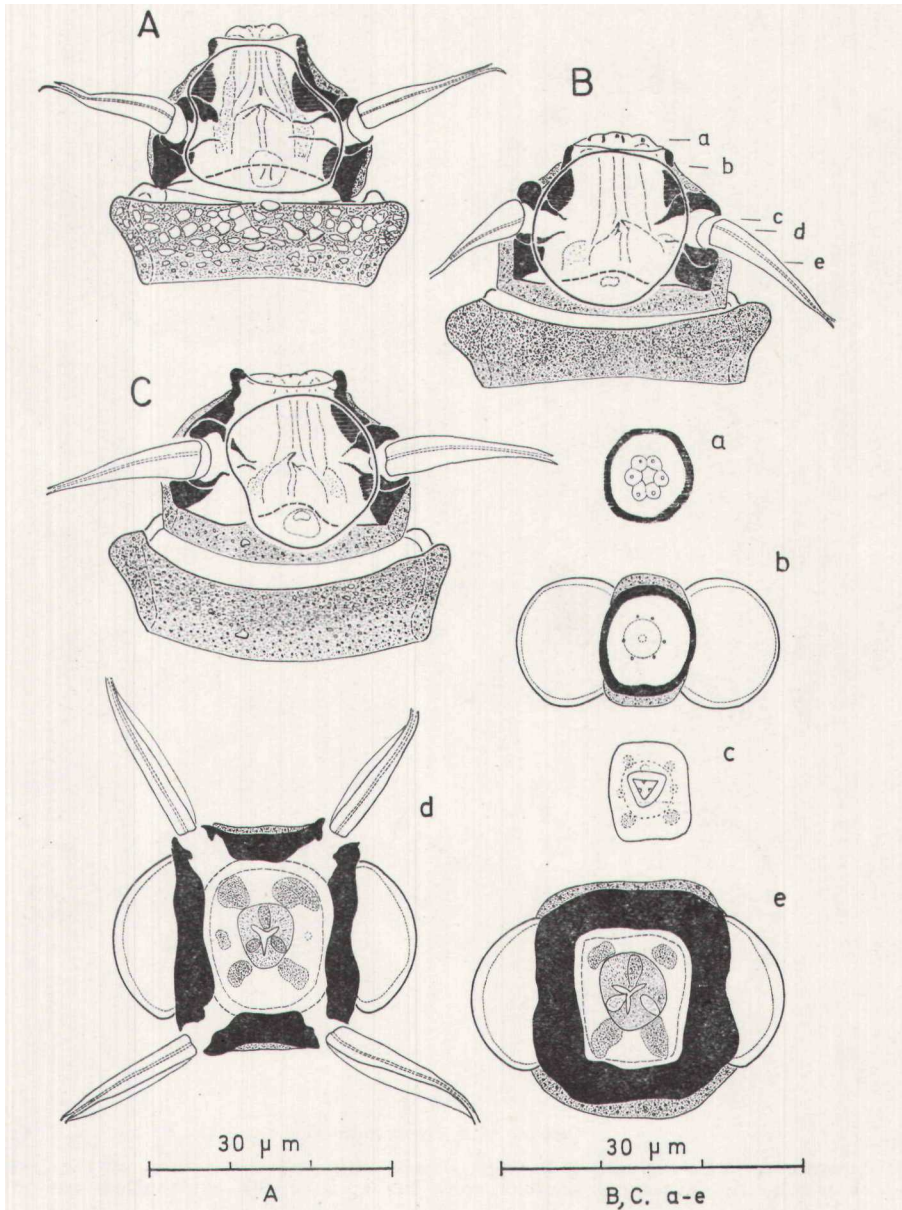


FIG. 3

*Quadricoma crassicomoides*.

A: surface view of head (♀ paratype); surface view of head (♀₂ Nymph Island) with indications (a-e) of the levels at which the transverse optical sections were made; a: en face view; b-e: for explanation see text; C: surface view of head (♀₁ Nymph Island).

In transverse optical sections, we observe from the beginning in each sector of the oesophagus the oesophageal glands (Fig. 3d-e). The latter enlarge gradually and apparently debouch at the level of the peduncles of the cephalic setae where they reach the lumenwall; pores were however not observed. At the level of the posterior end of the amphidial pores, we observe in the transverse optical sections of both sublateral glands small cuticular (?) differentiations (Fig. 4b). During the progress of the oesophagus at the first

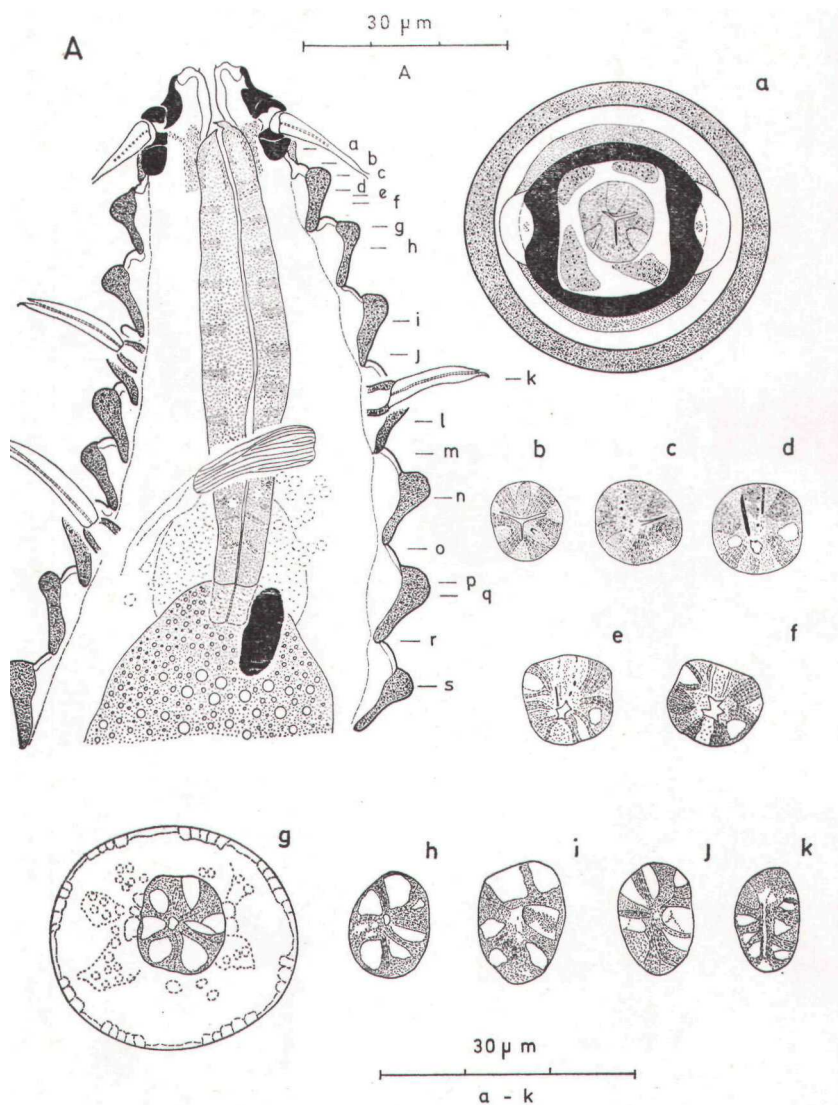


FIG. 4

*Quadricoma crassicomoides*.

A: anterior body region (? Nymph Island) with indications (a-s) of the levels at which the transverse sections were made; a-k: for explanation see text.

main ring, the triradial symmetry of the oesophageal lumen obviously disappears. The radii become obscure and in the dorsal sector appears at the same time two rows of dots: the right subdorsal row with some four thick cuticular (?) dots and the more medio-dorsal row with a number of finer, less distinct points (Fig. 4c). This differentiation disappears after a short distance and is followed by two cuticularized (?) rodlike structures which extend beyond the center

of the oesophagus and thus pressing the lumen ventrally. These rodlike structures run obliquely posteriorly from the outer wall towards the lumen over a distance of 3  $\mu\text{m}$  (Fig. 4d, e); they end opposite the anterior end of main ring 2. The oesophageal lumen has now become star-shaped (Fig. 4f).

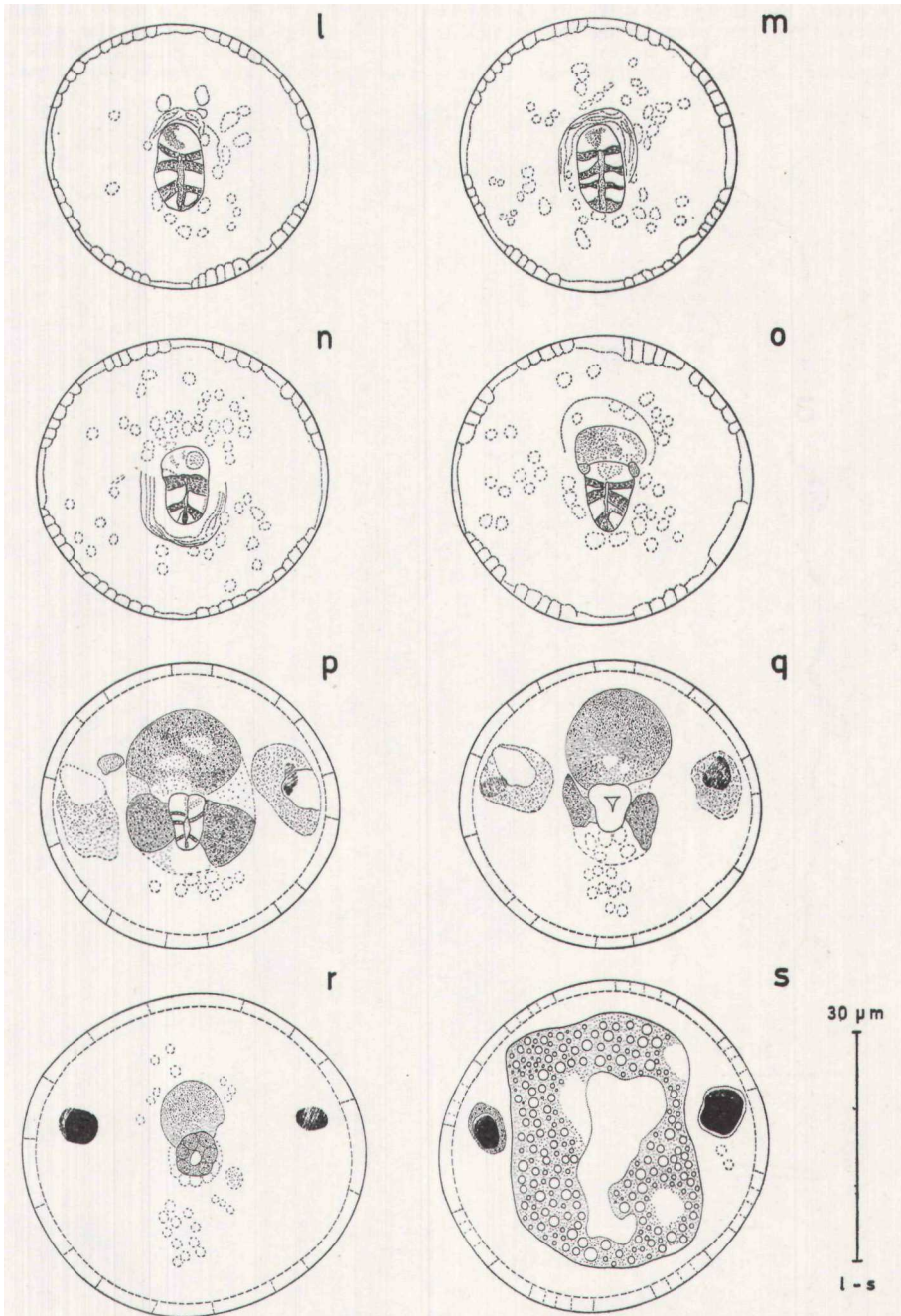


FIG. 5

*Quadricoma crassicomoides*.

l-s: transverse sections through the posterior region of the oesophagus, the cardia region and the anterior part of the intestine: for explanation see text.



At the level of the third main ring the oesophagus is rounded, almost circular in transverse optical section and its wall consists of narrow muscular zones alternating with large amorph zones (Fig. 4g). The muscular layer of the bodywall is composed of eight longitudinal muscle bundles. More posteriorly, the oesophagus becomes gradually laterally flattened to ovaly-shaped; the lumen is difficult to observe (Fig. 4h-k). From the level of the nerve ring, the oesophagus tapers posteriorly. At the beginning of the nerve ring (Fig. 5l) the oesophageal wall shows some narrow muscle bundles separated by large amorph zones; the dorsal third of the oesophagus appa-

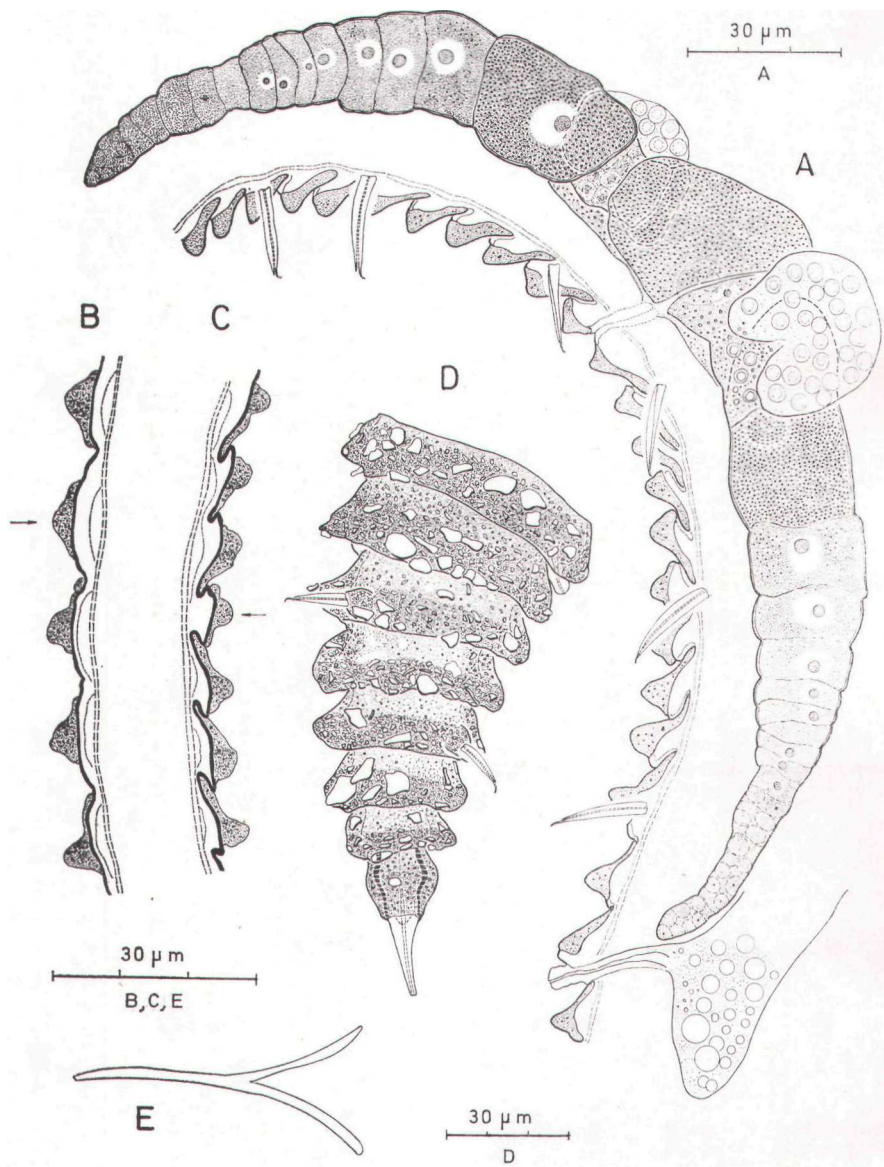


FIG. 6

*Quadricoma crassicomoides*.

A: female reproductive system (♀ Lizard Island); B: detail of dorsal body wall at the level of the inversion (♀, Nymph Island); arrow indicates inversion ring; C: detail of ventral body wall at the level of the inversion (♀, Nymph Island); arrow indicates inversion ring; D: surface view of tail region (♀ paratype); E: gubernaculum (♂ paratype).

rently contains no muscle fibers. Both latero-ventral muscular walls are separated from each other in the median plane by an elongated dorso-ventrally orientated lumen (Fig. 5m,n). Behind the nerve ring, the dorsal sector of the oesophagus widens, giving thus the oesophagus a more or less rounded triangular shape with ventrally orientated tip and an elongated median lumen (Fig. 5 o, p). Terminally at the level of the oesophago-intestinal junction, the oesophagus is small, three-lobed and provided with a triradial lumen (Fig. 5g). Immediately behind, in the cardia region, the lumen is small, circular. The cardia, about 10  $\mu\text{m}$  long, is circular in transverse section; its wall presumably consists of about six cells (Fig. 5r). At the level of the intestine, the lumen opens widely and becomes irregular (Fig. 5s).

The ocelli are light-yellowish, small and rounded to large and oval (e.g. 15x6  $\mu\text{m}$  in a female from Nymph Island); they are situated opposite the posterior end of main ring 6 and main ring 7 in both specimens from Nymph Island and opposite ring 9 in the female from Lizard Island.

The reproductive system is typical didelphic-amphidelphic. Both ovaries are very long, with the posterior branch extending to the rectum; in one specimen, the posterior gonad was partly reflected (presumably due to a lack of space). The vulva and vagina are rather obscure and situated between main rings 25 and 26. Two spermathecae present with spherical spermatozooids.

The tail has 7 main rings. The endring 32-34  $\mu\text{m}$  long in the Australian individuals consists of a broad anteriorly covered conical part and a naked slightly offset spinneret 11-13  $\mu\text{m}$  long in the Australian specimens. In the covered anterior part the cuticle of the endring can show a slight constriction halfway its length (Fig. 6D). The phasmata are small, oval and situated at the level of the covered anterior part of the endring. The caudal glands are obscure, presumably due to the far posterior extension of the postrectal intestinal blindsac.

#### Males:

See original description of Timm (1970); they were not found in the samples from the Great Barrier Reef, Australia.

In one paratype male (slide UCNC n° 1180) the gubernaculum, not mentioned in the original description, could clearly be observed since it was together with a part of the inner substance lying outside the body, caused by a rupture of the bodywall. Gubernaculum 42  $\mu\text{m}$  long, consisting of a fine median distal part 25  $\mu\text{m}$  long and 2 fine dorsally orientated apophyses (Fig. 6E).

#### Locality and habitat of the Australian specimens:

Lizard Island (sample 3), Nymph Island.

#### Material:

1 ♀ : Lizard Island; 2 ♀♀ : Nymph Island.

#### Discussion

From a study of the type material of *Q. crassicomoides* (with the exception of the holotype), appears that the Australian specimens strongly resemble them, but in the Australian specimens the anterior end of the head is somewhat wider than in the type specimens and the labial region does not protrude or protrude less beyond the helmet than in the type material.

A remarkable resemblance was found between our Australian females and a *Quadricoma* male described as a paratype of *Q. bahamaensis* by Timm (1970) (slide USDA n° T-687p) (see Decraemer, in press). They have a similar habitus: with the same number of main rings (44), a comparable broad head-shape and a similar setal pattern. They differ however from this species in the shape of the

somatic setae: with posteriorly hooked tip absent in the male of *Quadricoma* spec.

By lack of male specimens in the Australian samples, it is difficult to determine with certainty to which of the two discussed species the Australian females belong. Both species: *Q. crassicomoides* and *Quadricoma* spec. with one male (USDA slide n° T-687p) are clearly characterized in males by the shape and length of the spicula and gubernaculum. Mainly based on the shape of the somatic setae of the Australian specimens (analogous with *Q. crassicomoides* but different from *Quadricoma* spec.) we consider the Australian specimens tentatively as *Q. crassicomoides* until males are available.

We agree completely with Timm (1970) in comparing *Q. crassicomoides* with *Q. crassicoma* (Steiner, 1916) Filipjev, 1922. Both species are closely related in having e.g. a similar habit, the same number of main rings, a similar setal pattern and a comparable shape of the spicula and gubernaculum. They differ however in the conspicuously short and thick cephalic setae and the shorter, wide head-shape in *Q. crassicoma* in contradiction with *Q. crassicomoides*.

### **QUADRICOMA LORICATA FILIPJEV, 1922 (Fig. 7)**

Redescription based on material from Timm and on the original description of Filipjev (1922).

#### **Males:**

The body is relatively slender, tapering towards both extremities. Its cuticle forms 33-34 typical quadricomoid rings; inversion in main ring 23.

The somatic setae are arranged as follows:

subdorsal:  $\frac{3,6,10,13,17,20,25,30}{3,6,10,13,16,20,24,29} = 8$   
 subventral:  $\frac{3,5,7,9,11,14,16,21,24,27,30}{3,5,7,9,11,13,15,18,21,24,28,30} = 11$  ; always with 8 pairs of subdorsal setae and 11-12 pairs of subventral setae in the specimens studied.

The somatic setae are broad, distally tapered towards an open posteriorly hooked tip. The setae are oval-shaped in transverse section, so that in a certain orientation they are observed as slender structure. Presumably, they are over their whole length flanked by a membrane.

The head is from the insertion of the cephalic setae on, strongly anteriorly tapered towards a rather pointed and narrow, truncated end. Except for the labial region, the cuticle is thickened and sclerotized, forming a kind of helmet. In the posterior half of the head, the cuticle is dorsally and ventrally between the peduncles of the cephalic setae and also posteriorly covered by a thin layer of foreign material. Labial region protruding out of the helmet; no separate lips observed. Six minute papillae can vaguely be distinguished.

The cephalic setae are broad, distally tapered towards an open tip with slightly longer posterior wall. They insert on low peduncles, scarcely protruding out halfway the head length.

The amphids are large, rounded, covering largely the head. Anteriorly, they extend to the end of the helmet and posteriorly, to the head border. The amphidial canal ends in a groove situated at the level of or posteriorly to the peduncles of the cephalic setae.

The stoma is narrow, cylindrical with reinforced wall in the anterior part; about halfway its length the stoma shows fine cuticularizations and widens posteriorly, embracing basely the slightly protruding end of the oesophagus, apparently with small teeth.

After a broadly swollen anterior part in the head region and the first main ring, the oesophagus becomes cylindrical, provided with a slight con-

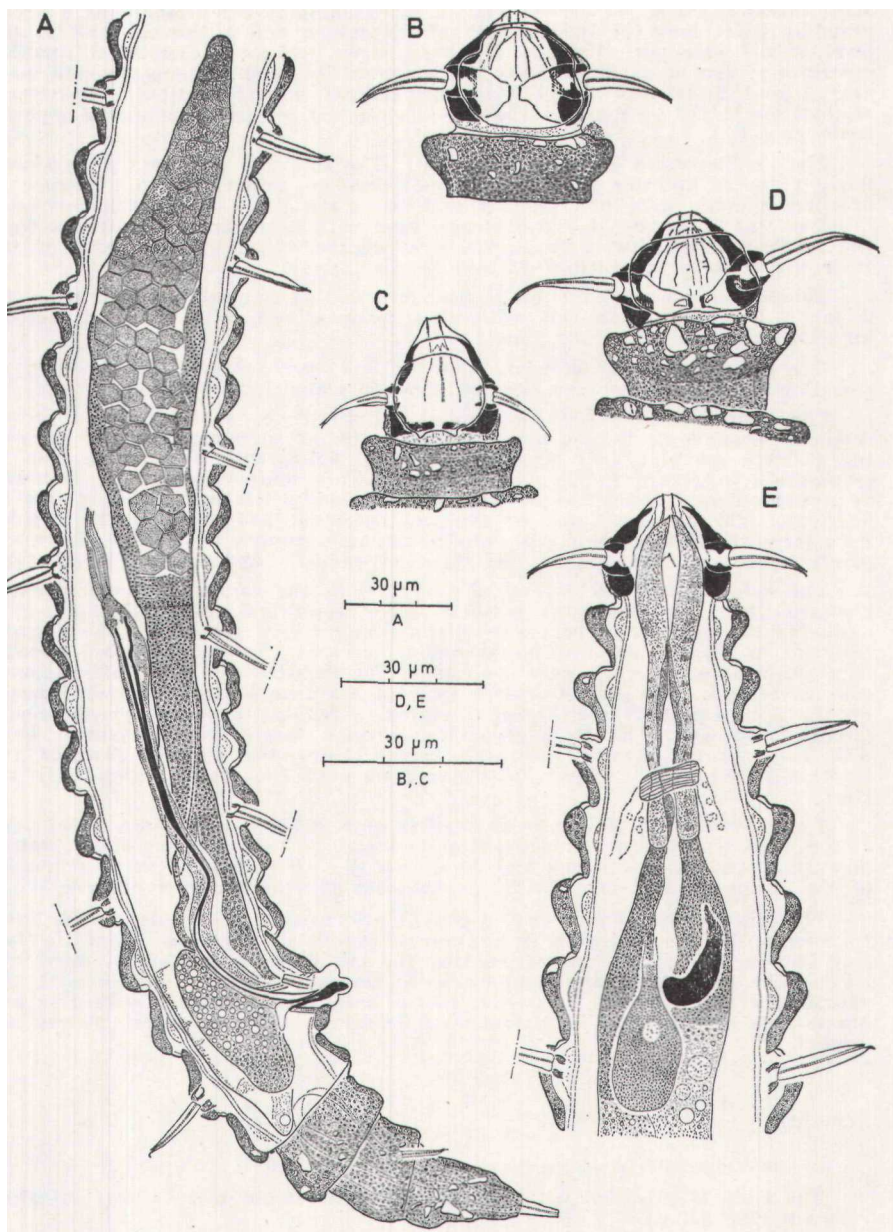


FIG. 7  
*Quadricoma loricata*.

A: male reproductive system and tail region (♂ UCNC slide n° 603 c<sub>4</sub>); B: surface view of head (♂ UCNC slide n° 603 c<sub>4</sub>); C: surface view of head (9 Indian Ocean); D: surface view of head of *Q. loricatoides* (♂ NSIMB slide n° 355d); E: anterior body region (♂ UCNC slide n° 603 c<sub>4</sub>).



striction at the level of the nerve ring. The nerve ring surrounds the oesophagus opposite main ring 3. At the level of the peduncles of the cephalic setae, we observe sublaterally in the oesophageal lumen apparently one small toothlike structure possibly 2 (outlets of the sublateral oesophageal glands?).

At the level of the tapered part of the oesophagus, opposite the posterior end of the first main ring, the lumen becomes very narrow in lateral view to the middle of the second main ring, then the lumen opens widely to subterminally, where it narrows again. Remarkable is the presence of a broad granular wall along the narrow part of the lumen and a thinner wall at the level of the wide open lumen. The oesophagus probably possesses a complex structure as can be supposed from the irregularities in the lumen opposite main ring 1 and 2 as was observed in longitudinal optical section. (Transverse sections could not be made). The oesophago-intestinal junction occurs opposite main ring 4.

The cardia region is vaguely marked. The intestine possesses a narrower, finely granular anterior part and gradually widens posteriorly to a somewhat broader cylinder with fine granula and large globules. A distinct postrectal blindsac was observed. A broad cloacal tube with lobed border protrudes from the medio-ventral body wall at the level of the naked elevated part of the interzone between main rings 28 and 29.

Behind the level of the ocelli, the intestine is flanked on both sides by a large, finely granular cell with pale nucleus and with a short narrow anterior extension (excretory gland?).

The ocelli are dark-yellowish, more or less ovaly-shaped (16  $\mu$ m long) or sometimes arcuated; they are situated opposite main rings 5 and 6.

The reproductive system is typical. Both testes continue in a broad common structure containing many spermatocytes or spermatozooids and possessing a finely granular wall (clear on the right side), with a differentiation in granulation in regard to the vas deferens. This common region is followed by a narrow cylindrical vas deferens (subterminally widened, possibly due to fixation). The terminal part of the vas deferens is flanked on both sides by a large ejaculatory gland with small and large granula. These glands extend partly between the spicula but mainly dorso-caudally beyond the cloacal tube.

The spicules are 104-135  $\mu$ m long, very fine; the corpus shows a strongly arcuated distal part and proximally an offset capitulum. The spicular pocket enclosing the spicules is here very distinct and finely granular. The spicula, very fine in lateral view, are, however, flattened structures as could be observed in a specimen where they were projected. The muscles of the spicular apparatus are typical. The *M. retractores spiculae* are two distinct muscles inserted on the apical part of each spicular pocket, extending towards the dorso-sublateral body wall. The *M. protractores spiculae* insert on the ventral body wall close to the cloacal tube and extend along the spicules towards the capitulum; they are difficult to observe; only in the distal region they are clear.

The gubernaculum 26  $\mu$ m long, consists of a strongly sclerotized distal part, 18  $\mu$ m long with broad rounded apical end and two weakly sclerotized, rather obscure apophyses, 8  $\mu$ m long and dorso-caudally orientated. From the muscle of the gubernaculum, only the *M. protractores gubernaculi* were observed.

The tail consists of four or five main rings in some specimens; in the latter specimens, the terminal ring is however uncompletely separated from the last ring but one, giving the impression that the tail dorsally consists of only four rings. The endring 47  $\mu$ m long, conically tapers posteriorly and is with the exception of the terminal spinneret, 11  $\mu$ m long, totally covered with fine and coarse foreign material. Phasmata not observed. Three caudal glands are present.

### Female:

In most characteristics identical with the males.

The body is provided with 33 typical quadricomoid main rings; inversion in main ring 23.

The somatic setae are arranged according to a similar pattern as in the male specimens e.g. ? (slide UCNC n° f4):

subdorsal:	4,7,11,14,18,22,27,31 = 8
	4,8,12,14,18,22,26,30 = 8
subventral:	3,6,8,10,12,14,16,19,22,26,29,32 = 12
	3,6,8,10,12,14,16,19,22,26,29,32 = 12



The ocelli are yellowish to brownish, with irregular, elongated shape and situated opposite main rings 4 and 5.

A short anal tube protrudes from the ventral body wall in the posterior end of main ring 29. The intestine is provided with postrectal blindsac.

The reproductive system is typical. Two spermathecae are present. The vulva is located between main rings 17 and 18 in the type specimens; the vulva was not observed in the specimens from the Pacific Groove and the Indian Ocean (cf. Timm, 1970).

The tail has four main rings. No phasmata were observed in the conically shaped endring.

### Discussion:

The specimens studied by Timm (1970), sampled from the Pacific Groove and the Indian Ocean, were studied more in detail; they agree completely with the original description of *Q. loricata* in Filipjev (1922).

In the material of Timm, we observed some differences between the specimens from Pacific Groove and those from the Indian Ocean. The individuals from the Indian Ocean are somewhat smaller and have a narrower and more elongated head (pronounced in one female) allied with narrower and also more rounded amphids than in the specimens from the Pacific Groove. In Timm's few specimens, the females from both localities were larger than the males.

From a comparison between the type specimens of *Q. loricatoides* Freudenhammer, 1975 and *Q. loricata* appears that the individuals of *Q. loricatoides* are so closely related with *Q. loricata* in habit, head-shape, digestive system and copulatory apparatus that, in my opinion, they cannot be considered as a separate species. The differences with *Q. loricata* mentioned in the diagnosis of *Q. loricatoides* in Freudenhammer (1975) can be refuted:

— the amphids possess a similar shape; the difference in shape mentioned in Freudenhammer (1975) was by this author presumably deduced from the figures in Timm (1970) where the amphids are represented narrower and rounder than in reality;

— in contradiction with Freudenhammer, the cephalic setae in *Q. loricatoides* do possess a slightly hooked tip as in *Q. loricata* but it is less pronounced than in the somatic setae;

— the specimens of *Q. loricatoides* are longer than those from *Q. loricata*. The smallest difference in length between both species e.g. between the largest female of *Q. loricata*: 725  $\mu\text{m}$  long and the smallest female of *Q. loricatoides*: 820  $\mu\text{m}$  long is 95  $\mu\text{m}$ . This difference is, in regard to the relatively large body length negligible as diagnostic feature and probably only due to their different localities (cf. difference in length between the specimens from Pacific Groove and the Indian Ocean).

Consequently, *Q. loricatoides* Freudenhammer, 1975 is synonymized with *Q. loricata* Filipjev, 1922.

### Acknowledgements

I wish to thank Dr. A.M. Golden, Dr. S. Grimaldi, Dr. I. Freudenhammer, Dr. E.M. Noffsinger, Dr. F. Riemann and Dr. Vitiello for sending slides with type material.

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### Summary

A morphological and taxonomic study was made of the genus *Quadricoma* Filipjev, 1922. The internal organs were, in contradiction with former authors studied in detail as far as possible; they are comparable with those of *Tricoma*-species. A redescription is given of *Q. cobbi* (Steiner, 1916) Filipjev, 1922, *Q. crassicomoides* Timm, 1970 and *Q. loricata* Filipjev, 1922.

### Samenvatting

Het genus *Quadricoma* Filipjev, 1922 met een herbeschrijving van *Q. cobbi* (Steiner, 1916), *Q. crassicomoides* Timm, 1970 en *Q. loricata* Filipjev, 1922 (Nematoda-Desmoscolecida).

Het genus *Quadricoma* Filipjev, 1922 werd morfologisch en taxonomisch bestudeerd. De inwendige organen werden, in tegenstelling tot vroegere auteurs, in detail bestudeerd voor zover mogelijk; ze werden vergeleken met de inwendige structuren in *Tricoma*-species.

*Q. cobbi* (Steiner, 1916) Filipjev 1922, *Q. crassicomoides* Timm, 1970 en *Q. loricata* Filipjev, 1922 werden herbeschreven.

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