

A redescription of the nematode *Oncholaimus vesicarius* (Wieser, 1959)  
and observations on the pigment spots of this species and  
of *Oncholaimus skawensis* Ditlevsen, 1921

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*Oncholaimus vesicarius* (Wieser, 1959) n. comb., is described and is differentiated from *O. oxyuris* (Wieser, 1953) n. comb., by the marked constriction of the body at the anus and by the medial position of the midventral, caudal setose papillae and gubernaculum in the male. It is differentiated from *O. steinböcki* by the shape and length of the male tail and from *O. skawensis* by the shorter, stouter tail in both sexes, the very prominent midventral caudal papillae, and the relative proportions of the tail and spicules in the male. Local populations of *O. vesicarius* and *O. skawensis* are consistently separated by the color of the anterior pigment spots. The anterior red pigment spots of *O. skawensis* appear in the late embryonic stage of the unhatched egg and before the appearance of the diffuse brown oesophageal pigment in the oesophageal muscle.

Cet article contient d'abord une description complète d'*Oncholaimus vesicarius* (Wieser, 1959) n. comb. Cette espèce se distingue de l'espèce *O. oxyuris* (Wieser, 1953) n. comb. par une atténuation marquée de la queue et par la position médiale des papilles sétées caudales médio-ventrales et du gubernaculum chez les mâles. Elle se distingue de l'espèce *O. steinböcki* par la forme et la longueur de la queue chez les mâles. Elle se distingue de l'espèce *O. skawensis* par la possession d'une queue plus courte et plus forte dans les deux sexes, par la forte proéminence des papilles sétées médio-ventrales et par les proportions relatives de la queue et des spicules chez les mâles. Les populations locales d'*O. vesicarius* et d'*O. skawensis* se distinguent entre elles par la couleur des taches pigmentaires antérieures. Les taches pigmentaires antérieures rouges d'*O. skawensis* sont visibles dans le dernier stade embryonnaire des oeufs non encore éclos avant que n'apparaisse, dans les muscles oesophagiens, le pigment brun diffus de l'oesophage.

### Introduction

Many species of nematode possess pigmented spots frequently referred to as "eyespot" or "ocelli." DeMan (1886) implied that the "eyes" of the marine nematode *Enoplus communis* Bastian had a light sensory function. However, Rauther (1907) and later Schulz (1931) claimed that these aggregations of pigment granules in the oesophagus were the products of excretion. Croll (1966) established that the free-living freshwater nematode *Chromadorina viridis*, which has pigmented ocelli, has a directional response to light as well as spectral sensitivity.

Recently four species of marine nematodes with pigment spots were found in the littoral zone of the greater Vancouver area, namely, *Enoplus* sp., *Chromadorina germanica* (Bütschli, 1874), *Oncholaimus vesicarius* (Wieser, 1959), and *Oncholaimus skawensis* Ditlevsen, 1921.

This paper provides more complete data to differentiate between these last two species and redescribes *O. vesicarius*. Observations on the form and origin of the pigment spots of *O. vesicarius* and *O. skawensis* are discussed.

### Materials and Methods

Specimens were sorted by hand from saline-mud suspension, killed by heat, and fixed in 5% formalin. Measurements were made in saline on fresh specimens which had been immobilized by heat. All measurements are from 10 specimens except those marked with an asterisk, which are from 9.

### Results

*Oncholaimus vesicarius* (Wieser, 1959) N. COMB.<sup>1</sup>  
(Figs. 2, 3, 5, 7)

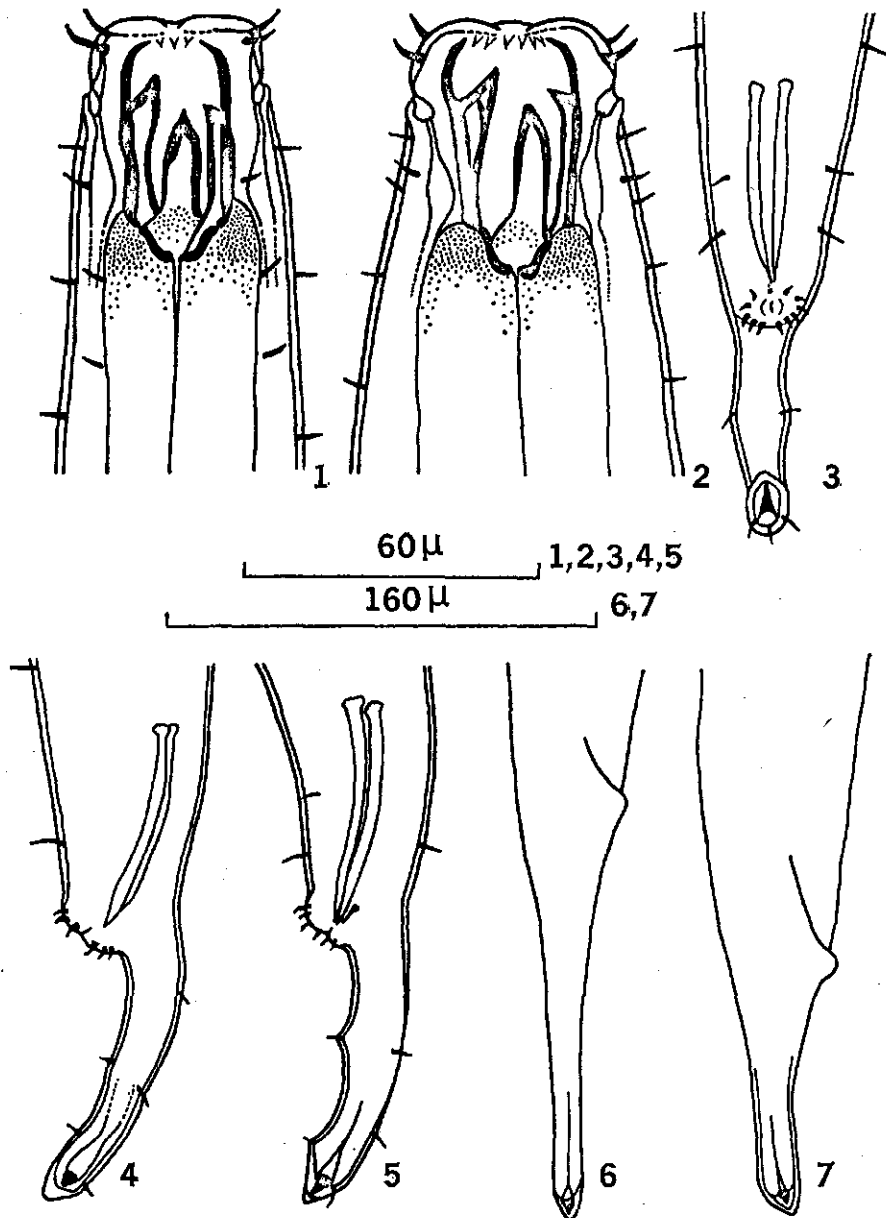
Syn. *Oncholaimium vesicarium* Wieser, 1959

Cuticle smooth, with numerous scattered setae but without cuticular striations or punctations. Maximum width in male 107\*  $\mu$  (95-120  $\mu$ ), in female 140  $\mu$  (111-164  $\mu$ ). Head, slightly offset from body contour by slight expansion, 36.7  $\mu$  (35.1-39.0  $\mu$ ) wide in male,

<sup>1</sup>Rachor (1970) recently synonymized the genus *Oncholaimium* Cobb, 1930 with *Oncholaimus* Dujardin, 1845 and so we propose the following new combinations: *Oncholaimus vesicarius* (Wieser, 1959) n. comb. and *Oncholaimus oxyuris* (Wieser, 1953) n. comb.

42.9  $\mu$  (41.6–44.8  $\mu$ ) in female, with six labial papillae and 10 (6 + 4) stout cephalic setae. Short cervical setae located between anterior extremity and nerve ring. Setae not observed posterior to nerve ring. Amphid aperture just behind head. Buccal cavity armed with three strongly developed teeth. Left subventral tooth,

4–7  $\mu$  longer than others. Concentrated mass of reddish-brown to purplish-black pigment granules embedded in anterior oesophageal musculature at base of buccal cavity. Diffuse brown pigment occurring more posteriorly along entire oesophageal length. Oesophagus in male 554  $\mu$  (408–624  $\mu$ ) long,\* in female 625  $\mu$



FIGS. 1, 4, 6. *Oncholaimus skawensis*: 1, female, anterior region dorsoventral view; 4, male tail; 6, female tail. FIGS. 2, 3, 5, 7. *Oncholaimus vesicarius*: 2, female anterior region dorsoventral view; 3, ventral view of male tail; 5, lateral view of male tail; 7, female tail.

TABLE I  
Comparative description, including the DeMan formula, of *Oncholaimus vesicarius*, *O. skawensis*, and *O. steinböcki*

Sex	DeMan formula				V	Pigment in oesophagus	Circumanal papillae ♂	Midventral caudal papillae ♂	Anal constriction and tail length ♂	Reference
	L	a	b	c						
(1) <i>Oncholaimus vesicarius</i> ♀	4.57	45.7	9.1	64.3	78.7	Present at anterior	6 (setae)	1 large in middle; 1 smaller at tip	Very strong; short tail	Wieser (1959)
♂	3.65	52.1	8.0	72.0	—	—	—	—	—	—
(2) <i>O. vesicarius</i> ♀	(3.70-4.96)	(25.0-37.7)	(6.4-7.4)	(37.1-46.4)	(71-82)	(g) reddish-brown to purplish-black spots at anterior	—	1 large in middle; 1 smaller at tip	Very strong; short tail	10 specimens
(Redescription)	4.40	31.7	7.0	42.0	79	—	—	—	—	—
♂	(3.22-4.67)	(30.4-42.5)	(6.5-8.1)	(64.4-107.4)	—	(h) scattered brown pigment posteriorly	> 6	—	Very strong; short tail	10 specimens
	3.97	36.9	7.2	76.5	—	—	—	—	—	—
(3) <i>Oncholaimus skawensis</i> ♀	3.33-4.12	53-67	7.3-8.3	33-34	74	Brown spots at anterior	—	—	—	Chitwood (1960)
♂	3.12-3.52	51-58	7.6-10.0	41-45	—	—	—	2 pairs subventral	Strong	—
(4) <i>O. skawensis</i> ♀	(3.80-4.64)	(30.9-37.1)	(5.9-7.8)	(24.9-30.4)	(75-79)	Red spots at anterior with diffuse brown pigment posteriorly	13	1 middle 1 tip	—	10 specimens
(Local data)	4.10	33.9	6.8	27.3	77	—	—	—	—	—
♂	(3.54-4.19)	(31.9-40.6)	(6.7-7.3)	(44.2-66.6)	—	—	> 6	—	Strong	9 specimens
	3.85	37.7	7.1	56.9	—	—	—	—	—	—
(5) <i>Oncholaimus steinböcki</i> ♀	4.8	24.2	6.4	17	72.5	Absent	6 or more	2 small ones on anterior of tail	Moderate; long slender tail	Ditlevsen (1928)
♂	4.3	28.5	6.5	23.6	—	—	—	—	—	—

(578–680  $\mu$ ) long, cylindroid. Excretory pore in male 78.5  $\mu$  (71.5–87.1  $\mu$ ), in female 88.3  $\mu$  (73.6–99.2  $\mu$ ) from anterior extremity. Spinneret present, spinneret gland cells located anterior to anus.

Male 3.97 mm (3.22–4.67 mm) long;  $a = 36.9$  (30.4–42.5);  $b = 7.2$  (6.5–8.1);  $c = 76.5$  (64.4–107.4); testes opposed, outstretched. Spicules slightly arcuate, 43.2  $\mu$  (41.6–44.2  $\mu$ ) long, gubernaculum plate-like, about 7  $\mu$  long, with small dorsal apophysis at anterior extremity. The body is markedly constricted at anal position and the tail has characteristic crooked-finger-like appearance (Fig. 5), 52  $\mu$  (42–64  $\mu$ ) long.\* Tail with large midventral papilla half way along tail length and smaller midventral papilla just anterior to tail tip. Both of these caudal papillae bear setae. Six to 12 setose circumanal papillae present, plus a paired subventral series of setae located preanally and some caudal setae as illustrated (Figs. 3, 5).

Female 4.40 mm (3.70–4.96 mm) long;  $a = 31.7$  (25.0–37.7);  $b = 7.0$  (6.4–7.4);  $c = 42.0$  (37.1–46.4);  $V = 79\%$  (71–82%); ovary single, reflexed. Demanian system absent. Tail 105  $\mu$  (93–122  $\mu$ ) long; anal body diameter, 45.1  $\mu$  (41.6–48.0  $\mu$ ). Tail without preanal and caudal setae. The juvenile body shape, like that of the female (Fig. 7), has no anal constriction.

*Habitat and locality*—Top few inches of mud and sand in the littoral zone of Burrard Inlet, Vancouver, British Columbia. Specimens have been deposited in the Canadian National Collection of Nematodes, Ottawa, Canada, under No. 6172.

### Discussion

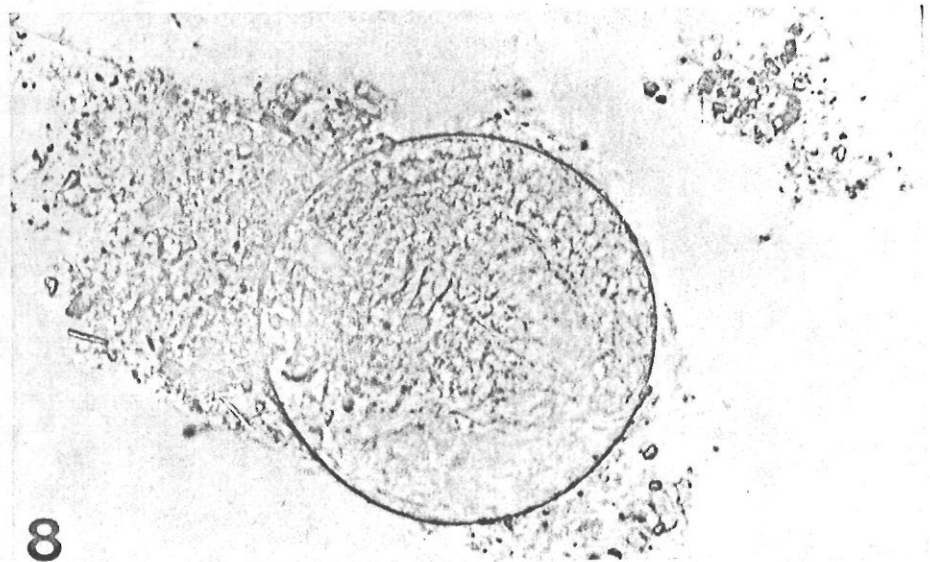
This species was first described by Wieser (1959), who, on limited data, distinguished it from *Oncholaimium oxyuris* Wieser, 1953 by the constriction of the body at the anus, the position and reduced number of the circumanal papillae, and the position of the large caudal papilla in the male. The new description differentiates *O. vesicarius* from *O. oxyuris* by the marked anal constriction and by the fact that the large caudal papilla is in the middle of the tail rather than in the distal third of the tail as

in *O. oxyuris*. However, *O. vesicarius* has more than six circumanal papillae and, in this respect, is similar to *O. oxyuris*, *O. skawensis*, and *O. steinböcki* Ditlevsen, 1928 (Table 1). The latter two species were synonymized by Schuurmans Stekhoven (1935) but the synonymy was questioned by Chitwood (1960), for the male tail of *O. steinböcki*, as described by Ditlevsen (1928), is much more slender than *O. skawensis* (Table 1). The shape and length of the male tail differentiates *O. steinböcki* also from *O. vesicarius*. We have seen up to 12 circumanal papillae in *O. vesicarius* but this number appears to be variable in both *O. skawensis* and *O. vesicarius*. Specimens of *O. vesicarius* are differentiated from the specimens of *O. skawensis* found in the same area by the shorter, stouter tail in both sexes, the gubernaculum and the very prominent midventral midcaudal papillae in the male and the color of the pigment granules (Table 1 and Figs. 1–7). Also the male tail and spicules of *O. vesicarius* are more similar in length than in *O. skawensis* where the male tail (69  $\mu$ ; 58–85  $\mu$ ) is substantially longer than the spicules (42.9  $\mu$ ). The local populations of *O. vesicarius* and *O. skawensis* can be consistently separated on the basis of color of the pigment spots. However, the description of the local population of *O. skawensis* seems to fit the population of that species described by both Ditlevsen (1921) and Chitwood (1960) except for the color of the pigment spots. Ditlevsen (1921) omits reference to them but Chitwood describes them as brown. The color of the anterior pigment spots of *O. skawensis* in the local population was red, but there was also scattered brownish pigment along the length of the oesophagus. The pigment granules lose their color when preserved.

To explain the different colors of the pigment spots of *O. skawensis* preliminary observations were made on the origin of the pigment color.

Gravid females of *O. skawensis* were kept in seawater at 7°C for several weeks and the development of the pigment spots in the newly laid eggs and in the larvae was observed. Light microscope examination showed that reddish, granular pigment appeared in the anterior

Fig. 8. *Oncholaimus skawensis* embryonated egg showing cuticular lining of buccal cavity and anterior pigmented eyespots. About 1000  $\times$ . Fig. 9. *Oncholaimus skawensis* larva emerging from the egg and showing the pigmented eyespots in the anterior oesophagus. About 1000  $\times$ .



oesophagus in the late embryonic stage of the unhatched egg at the time of development of the cuticular lining of the buccal cavity (Fig. 8) and before the appearance of the scattered brownish oesophageal pigment in the oesophageal muscle. The red pigment was clearly visible also in newly hatched larva (Fig. 9) but the brownish pigment appeared later in development.

The presence of the red pigment spots in unhatched embryonic specimens may suggest that they are not of excretory origin. Also the dense accumulation of the granules at the anterior into discrete spots is reminiscent of pigment spots known to be associated with photoreception in other transparent invertebrates. However, this type of red-pigmented "eyespot" is distinct in origin and possibly also in function from the more peripherally situated pigmented ocelli described (Murphy 1963) in *Acanthonchus rostratus*. The ultrastructure of the pigment granules and their relationship to surrounding tissues is being examined in an attempt to define their function.

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