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MORPHOLOGICAL STUDY OF PELODERA TERES SCHNEIDER, 1866 BY SCANNING ELECTRON MICROSCOPY

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DEDICATED TO ACADEMICIAN B. ROSICKÝ ON THE OCCASION OF HIS 60TH BIRTHDAY

Abstract. The morphology of the saprophytic nematode *Pelodera teres* was studied by scanning electron microscopy. The worms were isolated from fresh horse faeces and cultured. The metrical and morphological structures of males and females of the nematode were then studied. As this nematode species can survive in the digestive tract of horses, its differential diagnosis is important at coprological examination.

Nematodes of the species *Pelodera teres* often occur in fresh, non-contaminated horse faeces and can distort the results of coprological examination of horses. Their rhabditoid larvae are very similar to the larvae of the genus *Strongyloides* and can be easily mistaken for them. We have therefore studied in detail the morphology of *P. teres*. In Czechoslovakia, this species has not yet been recorded in horses.

MATERIAL AND METHODS

The larvae of *Pelodera teres* were obtained from fresh, non-contaminated horse faeces collected in the vicinity of Lomnice n. Lužnicí (South Bohemia). The larvae were recovered by Berman's method and transferred to a sterilized substrate of horse faeces. Besides this species also larvae of *Strongyloides* spp. were found.

The worm culture was kept at laboratory temperature for several months (Whittaker 1969). Fresh specimens (33 females and 28 males) carefully killed by heating to cca 50 °C were used for the measurements. The mean values and indexes were counted after Mana (Goodey 1963).

For scanning electron microscopy, the specimens were fixed in 6 % glutaraldehyde in cacodylate buffer and, after washing, dehydrated through a graded alcohol series. Then they were transferred to amylacetate, subjected to critical point drying, coated with An/Pd and examined in a Tesla B 300 scanning electron microscope.

RESULTS

The measurements of 33 females and 28 males are given in Table 1.

The body of adult female is stout, transparent in the light microscope and with a distinct inner structure. The cuticle is transversely striated, the striation being more marked on the anterior third of body. The mouth opening is surrounded by six conspicuous lips (Plate I, Fig. 1). It is permanently opened, the lips do not fit to one another.

The lips bear three marked papillae, but only the apical ones are observable in the light microscope. The ventro-lateral and dorso-lateral papillae (Plate I, Fig. 4) are visible only exceptionally (Plate I, Fig. 2). The amphid is situated on the lateral side of the head portion and three small papillae lying close to it were visible in the scanning electron microscope (Plate I, Fig. 3).

The vulva lies in mid-body of the ventral side. It is bordered by two lips (Plate II,

Fig. 1) which are very distinct in older females. The female tail is dome-like, with the pit set upon it (Plate II, Fig. 2). The stoma is tubular, conspicuous. The teeth on the metastoma mentioned by Osche (1952) as a good differentiating character are very indistinct in a common preparation and require a special processing (Osche 1952, Thorne 1961). The oesophagus reaches almost the middle of oral cavity. It possesses a well developed procorpus, isthmus and metacorpus with a distinct valvular apparatus. The nerve ring is visible on the isthmus and the excretory pore opens at the level of bulb. The intestine is filled with dark granules and presses the genital apparatus in sexually inactive females.

The female gonads are paired, of amphidelphic type, the reflexed part of ovaries almost reaches the vulva. The uterus contains 2—12 eggs at various stages of development. The ovoviviparia was observed in older females. Usually two eggs contained mobile larvae and others were less developed. The mean size of eggs was 0.035× ×0.023 mm.

The male is smaller and more slender than the female, but its body surface is similar (Jones 1966). The tail (Plate II, Fig. 3) terminates in an opened bursa of peroderal type. The papillae of bursa are well discernible in ventral view. They are divided in two groups: 3 preanal and 7 postanal papillae. The testes are reflexed, the coil forming about 1/4 of gonad length.

The spicules (Plate II, Fig. 4) are distinct, united distally and of a light brown colour. They protrude from the cloaca on a conspicuous process, which is also provided with papillae (Plate II, Fig. 3). They are very indistinct in the light microscope. The gubernaculum is small. In sexually inactive males, the bursa is often poorly developed and, e.g., the number of papillae in groups is difficult to determine.

DISCUSSION

The results show that the body measurements of both males and females are very variable (Table 1), as it was observed also by Thorne (1961) in all members of the order Rhabditata. He cited several authors who described and explained this phenomenon. Even 25—50 % differences in the measurements were observed in individual collec-

Table 1. Body measurements of *Pelodera teres* (own observations)

Measurement	Females n = 33		Males n = 28	
	Mean value	Minimum-maximum value	Mean value	Minimum-maximum value
1. Length of stoma	0.035	0.019—0.047	0.034	0.019—0.051
2. Distance of nerve ring	0.165	0.117—0.262	0.14	0.101—0.224
3. Distance of excretory pore	0.177	0.114—0.203	0.179	0.164—0.199
4. Length of oesophagus	0.34	0.199—0.476	0.310	0.215—0.448
5. Distance of vulva from anterior extremity	0.824	0.412—1.344	—	—
6. Distance of anus from anterior extremity	1.416	0.683—2.524	1.198	0.564—1.903
7. Length of tail portion	0.078	0.027—0.140	0.073	0.039—0.121
8. Length of spicule	—	—	0.054	0.027—0.084
9. Length of gubernaculum	—	—	0.028	0.009—0.047
10. Maximum width of body	0.101	0.043—0.159	0.084	0.043—0.173
11. Length of body	1.497	0.790—2.603	1.269	0.563—2.015

Table 2. Comparison of Mana's indexes for own observations and literary data

		Own observations	Meyl 1960	Goodey 1963
Females	Body length	0.791—2.603	1.0—1.6	1.04—1.54
	a	12.34—30.58	15—20	15—16
	b	3.53—6.80	5—7	5
	c	12.73—41.50	19—30	27—30
	V	37.27—60.34	53—60	57—59
	+V	24.37—32.71	not given	
	V+	20.49—27.54	not given	
Males	Body length	0.561—2.015	1.0—1.3	1.02—1.1
	a	8.37—25.34	15—25	15—18
	b	2.40—5.02	5—7	5
	c	12.16—24.64	20	18—20

EXPLANATIONS: a = body length: maximum body width
b = body length: oesophagus length
c = body length: tail length
V = distance of vulva expressed in % of body length
+V = length of anterior portion of gonads expressed in % of body length
V+ = length of posterior portion of gonads expressed in % of body length

tions. The effect of the nutritive value of the used substrate is considered to be one of the main reasons.

Our results indicate that also the consistence of the used media plays a role. The worms cultured in a liquid or semi-liquid medium were more slender and longer, whereas those from a dense and solid medium were stout and shorter.

The great variability in measurements was also due to the fact that a natural, non-synchronized population and randomly chosen specimens were measured. It may be supposed that a selection of typical specimens of the same age would lead to a reduction of the variability. A similar state is shown in Table 2 where Mana's indexes are compared with literary data (Meyl 1960, Goodey 1963).

Pelodera teres exhibits an affinity to horse faeces and suggests a possibility of the transfer to the parasitic way of living or at least a survival of the worm in the digestive tract of the horse. Consequently, while performing the larvoscopy of horse faeces it is necessary to consider the possible occurrence of this species and its diagnosis. Dermatitis caused by species of the genus *Pelodera* are cited by Bergeland et al. (1976), Farrington et al. (1976) and others.

МОРФОЛОГИЧЕСКОЕ ИЗУЧЕНИЕ НЕМАТОДЫ *PELODERA TERES* SCHNEIDER, 1866 ПРИ ПОМОЩИ СКАНИРУЮЩЕЙ ЭЛЕКТРОННОЙ МИКРОСКОПИИ

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Резюме. При помощи сканирующей электронной микроскопии изучали морфологию сапрофитической нематоды *Pelodera teres*. Червей выделяли из свежих лошадиных пометов и культивировали. Изучены метрические и морфологические структуры самцов и самок нематоды. Так как эта нематода может переживать в пищеварительном тракте лошадей, ее дифференциальный диагноз имеет значение при копрологическом обследовании.

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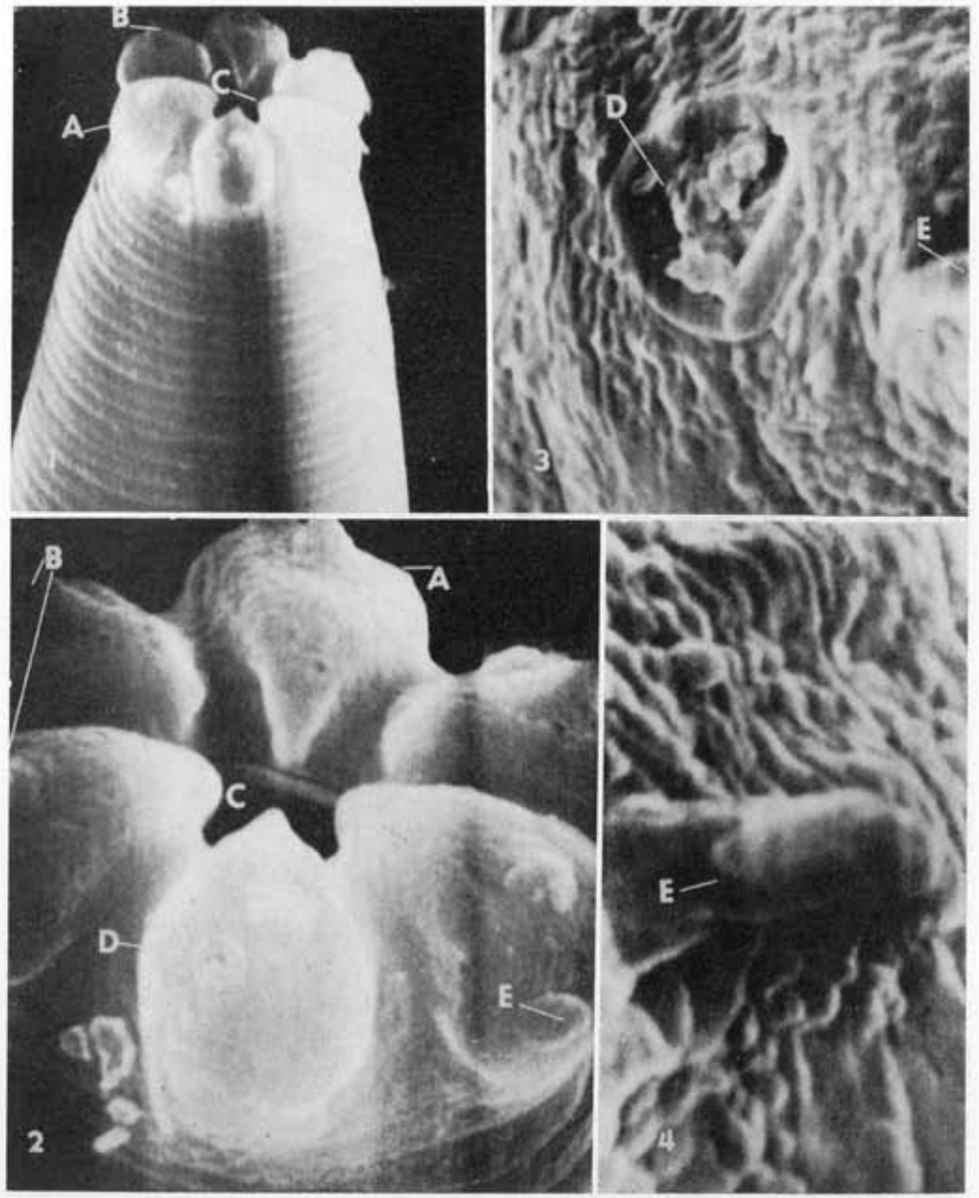

Fig. 1. Head part of female of *P. teres* with six conspicuous lips around the permanently opened mouth opening (×2 800). **Fig. 2.** Lateral view of six lips with apical, dorso-lateral and ventro-lateral papillae and amphid (×8 300). **Fig. 3.** Amphid on lateral side of head with a close small papilla (×41 500). **Fig. 4.** Conspicuous long and thin papilla near the amphid (×50 000).

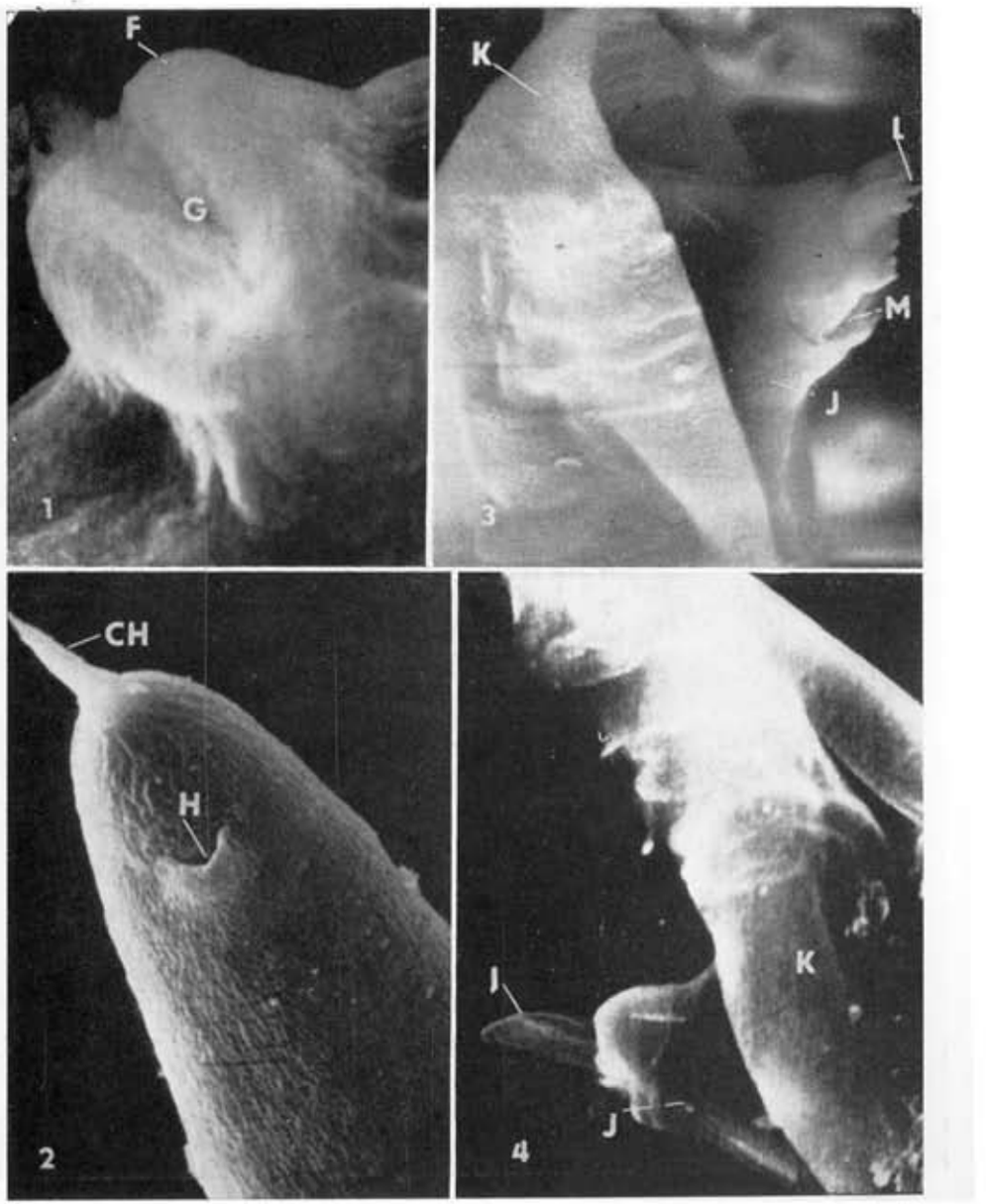

Fig. 1. Vulva opening above which is a large lip (lateral view) (×12 000). **Fig. 2.** Dome-like female tail with a tip surrounded by a fold at the base. The fold is elevated above the transverse anus (×2 200). **Fig. 3.** Male tail terminating in an opened bursa (lateral view). The spicules are united distally on a marked process (×3 800). **Fig. 4.** Opened bursa from which protrudes a process provided with papillae on which opens a cloaca (×5 400).

Explanations: A — lip, B — apical papilla, C — mouth opening, D — amphid, E — ventrolateral papilla, F — lips around vulva, G — vulva, H — anus, CH — dome-like tail process, I — united spicules, J — process of cloaca, K — peloderal bursa, L — papillae, M — opening of cloaca.