Tetrameres (*Tetrameres*) *nouveli bodrogensis* n. ssp. (*Spirurata*) and other nematodes of three species of shorebirds (*Charadriiformes*) in the Slovak Republic

J.K. MACKO, A. ŠTEFANČÍKOVÁ, A. MACKOVÁ¹

Parasitological Institute of the Slovak Academy of Sciences, Hlinkova 3, 040 01 Košice, Slovak Republic,
E-mail: astefan@saske.sk; ¹Institute of Science, P. J. Šafárik University, Mánesova 23, 041 54 Košice, Slovak Republic; E-mail: amacko@kosice.upjs.sk

Summary

Eight taxons of nematode parasites were recovered from three species of charadriid shorebirds (*Charadriiformes*) from Slovakia: common ringed plover - *Charadrius hiaticula* (L.) (No=9), little ringed plover - *Charadrius dubius* Scop., 1786 (No=56) and golden plover - *Pluvialis apricaria* (L.) (No=14). New host record (*Ch. dubius*) were registered for *Tetrameres* (*Tetrameres*) *nouveli* (Seurat, 1914), described as so far unknown *Tetrameres* (*T.*) *nouveli bodrogensis* n. ssp. New data on *Victorocara charadrii* Belopolskaja, 1953 have been pointed out. Besides the taxons mentioned above, the following species were registered: *Eucoleus contorta*, *Eucoleus obtusiuscula* and in Slovakia so far not described *Capillaria limicolae*, *Tetrameres* (*T.*) sp., *Capillaridae* gen. sp. and *Anisakidae* gen. sp.

Key words: Nematoda; *Tetrameres* (*T.*) *nouveli bodrogensis* n. ssp.; *Victorocara charadrii*; *Charadriiformes*; *Charadrius dubius*; *Charadrius hiaticula*; *Pluvialis apricaria*; Slovak Republic

Introduction

Nematodes of common ringed plover - *Charadrius hiaticula* (L., 1758) little ringed plover - *Charadrius dubius* Scop., 1786 and golden plover - *Pluvialis apricaria* (L., 1758) belong to the group of not researched helminths in Slovakia. The mentioned hosts are members of our avifauna, in particular during their migration time (Ferianc, 1977), when the research of their parasites has been carried out. The presented study follows up the data on plathelminthes of shorebirds by Macko *et al.* (2004), Hanzelová *et al.* (in press.), containing also information about recent studies of parasites of *Charadriiformes* in other distribution areas. In former Czechoslovakia, the revisions of registered nematodes were done in particular by Moravec (1982), Baruš (1964), or Baruš and Sergejeva (1989a,b). The findings

of nematodes in plovers from the 50's and 60's in Slovakia are not only of historical importance, but they have contributed to the understanding of the species composition and abundance as well as to specification of their morphology.

Material and Methods

A total of 79 shorebirds were collected from the localities of Eastern and south-western Slovakia in 1957 – 1969. Out of them 38 investigated bird hosts originated from Senné wetland, which has recently been designated as an internationally significant “Ramsar locality” in Slovakia. Other birds were obtained from the localities of water gates on the Topľa River near Bardejov, Domaša, Stropkov, Moča and others. As many as 9 specimens of *Charadrius hiaticula*, 56 specimens of *Ch. dubius* and 14 individuals of *Pluvialis apricaria* were examined. Nematodes were fixed and conserved in Barbagallo solution. The males of the genus *Tetrameres* were mounted into liquido faure (Hovorka, 1954). Due to the fact that they had been in this medium for more than 35 years, the nematodes had to be demounted and separately examined in lactic acid. Then they were mounted into 4 % glycerol formol as “liquid” permanent slides. The helminths are deposited at the Parasitological Institute SAS in Košice. Measurements are in micrometers (µm), unless otherwise stated.

Results

Nematoda

Tetrameres (*Tetrameres*) *nouveli bodrogensis* n. ssp. (Plate I., Figs 1 – 7, Plate II., Figs 1 – 4)

Type host: *Charadrius dubius* Scop., 1786

Type locality: Senné (East Slovakia)

Other localities: Domaša, Stropkov

Site of infection: Proventriculus

Plate I. *Tetrameres* spp.

1 – 7. *Tetrameres* (*T.*) *nouveli bodrogensis* n. ssp. from *Ch. dubius*. 1 – 2. Variability of males, general view, spines omitted. Bar. 200 μ m. 3 – 4. Variability of anterior end of males. Bar 100 μ m. 5. Anterior end of female. Bar 30 μ m. 6. Apical view of female – sketch 7. Egg. Bar 30 μ m. 8 – 9. *Tetrameres* (*T.*) sp. from *Pluvialis apricaria* 8. Anterior end of female. Bar 30 μ m. 9. Egg. Bar 30 μ m.

Plate II. *Tetrameres* spp.

1,3,4. *Tetrameres* (*T.*) *nouveli bodrogensis* n. ssp. from *Ch. dubius*. Females various size and shapes. Bar 200 μ m. 2. *Tetrameres* (*T.*) *nouveli bodrogensis* n. ssp. Posterior end from fig. 1. Bar 100 μ m. 5. *Tetrameres* (*T.*) sp. from *Pluvialis apricaria*. Comparative size of female *Tetrameres* (*T.*) sp. with females of *T. (T.) nouveli bodrogensis* n. ssp. fig. 1, 3, 4.

Prevalence: 9/56 i.e. 16 %

Intensity of infection: 1 – 14 specimens

Etymology: New subspecies was named on base river basin Bodrog on East Slovakia.

Males (based on 8 specimens). Body length 826 – 1190. Maximum width 31 – 59 in anterior part of the spicule (Pl.I/1, 2). Lateral alae unclear, even doubtful. Mouth surrounded by feebly developed lateral pseudolabia. Buccal cavity 6 – 8 x 5 – 10. A total oesophagus length 335 – 370. Maximum width 24 – 31 in the posterior part. Neither nerve ring, nor margin between muscular and glandular oesophagus was reliably identified. Cuticular spines in four longitudinal rows. Spines with disc-like bases 7 – 10 long. In some males, spines are arranged in 2 – 5 distances, in another in 17 – 25 or more (Pl.I/3, 4). In central part of the body the distance between spines in longitudinal rows grows, while spine length is reduced on 3 – 4. In middle of the body of some cases spines missing. In area of cloacal opening

spines 5 – 7 long. A single spiculum (260) 303 – 406 long. The males with spiculum 260 long regarded as juvenile (Pl.I/2). Proximal part of spiculum 27 – 31, maximum width up to 7. In middle part, width of spiculum 3 – 4. Cloacal opening situated on 79 – 123 from the body end. Behind this opening are 3 – 5 pairs of ventrolateral spines. The postcloacal spines are invisible. Visible papillae were not observed.

Females (based on 7 specimens). Gravid females 1100 – 1687 long, 880 – 1537 width. Forepart of the body include muscular oesophagus and a part of glandular oesophagus 140 – 312 x 125 – 188. The mouth surrounded by an inconspicuous circumoral membrane with unclear several pairs of cephalic papillae and 2 amphides (Pl. I./6). Buccal capsule 11 – 15 long and 9 – 12 wide. Muscular oesophagus 115 – 136 x 27 – 38. Whole oesophagus 663 – 740 x 60 – 72. Nerve ring 66 – 72 from an anterior end. Posterior extremity is with maximum length 94 – 204, and maximum width 55 – 165. Vulva inconspicuous located approximately 187 and anus 74 – 100 from posterior end. Eggs with developed larvae 39 – 50 x 21 – 28 with a bundle of 30 – 40 polar filaments up to 55 long. In older material filaments probably shatter rather quickly, as they were detected only in a small number of eggs after their releasing from uterus. The egg wall 2 – 3 thick. (Pl.I./7).

Subspecies-holotype: Males permanent preparation No. 269/65b. Size 918 x 48. Buccal capsule 7 x 10. The post-buccal spines 7, postcloacal 5 – 6 long. The whole oesophagus is 335 x 24. Spiculum 369 long, in mid part 7 wide. The cloacal opening 88 from posterior part of the body (Pl.I./1). Suitable allotype of subsp. from No.269/65 not available.

Comments: Great metrical and morphological variability of subsp. n. has probably been caused also by change of nematode generations in hosts in April and May in the Slovak areas (Macko & Birová, 1969, 1976; Birová & Macko, 1976). This phenomenon is connected with the change of individuals, representing specific phenotype composition, adapted on different environmental conditions, i.g. at nesting and wintering sites of birds (cfr. Špakulová & Mutařová, 1987).

Discussion

Original description of *Tropidocerca nouveli* Seurat, 1914 was formed based on isolated nematodes from the host *Himantopus himantopus* in Algeria (Skryabin and Sobolev, 1963). Another forms of this species were registered from various Charadriiformes in the former USSR by Borgarenko (1965, ex Mollhagen 1976), in Australia by Mawson (1968), in Cuba by Baruš and L. Hernandez (1971), Otero and L. Hernandez (1982) and in the USA by Mollhagen (1976). According to Mollhagen (l.c.) and the data of cited authors, the parameters of the *T. nouveli** males were as follows: length 1.0 – 2.40 mm, anterior spines 15 – 17. Tail 98 – 140. Variable number of caudal papillae. Buccal capsule 7 – 10 x 8 – 10. A total length of oesophagus 420 – 787. Left spiculum 312 – 587. Right one absent or rudi-

Plate III. *Victorocara charadrii* Belopolskaja, 1953 from *Ch. hiaticula*

1. Anterior end of female. Bar. 100 μ m. 2. Lateral views of females head. Bar 30 μ m.
3. Posterior end of female. Bar 200 μ m. 4. Vulvar region. Bar 200 μ m. 5. Vulvar opening, ventral views. Bar 200 μ m. 6 – 7. Spicules of male. Bar 100 μ m.

mentary – 28 long. Eggs embryonated, thick shelled 50 – 55 x 26 – 30 with 6 – 8 polar filaments 70 – 117 long. (Only the most important parameters have been selected).

It is not possible to unambiguously classify our tetramerids in any of the species, or a host from the genus of *Tetrameres*. On the other hand, several overlapping morphological features of our specimens with other taxons *T. (T.) nouveli* Seurat (1914), *T. (T.) paraaraliensis* Oschmarin, 1965; *T. prozeskyi* (Ortlepp, 1964)* do not refer to a new species.

T. (T.) nouveli bodrogensis n. ssp. differs from the male of Seurat's form by smaller measurements of body, organs, spicules and shape of their anchorage. Besides that also by the length of left spicule (in our form 260 – 406 in contrast to 480). Seurat also mentions an atrophied right spicule and gubernaculum.

New subspecies differs from the host form of *T. nouveli** from *Ch. alexandrinus* from Australia (Mawson 1968) by:

1.) smaller cuticular anterior spines 7 – 10 in comparison to 15 – 17 (Mollhagen, 1976).

2.) disc-like anchoring of cuticular spiculae – unlike ill-defined basis in *T. (T.) nouveli*.

3.) eggs with developed larva and a bundle of 30 or 40 polar filaments up to 55 long in comparison to 6 – 8 polar filaments 70 – 117 long listed for *T. nouveli**.

Described new subspecies is similar in particular to *T. (T.) paraaraliensis* Oschmarin, 1956 sensu Jögis (1974)* from hosts *Charadrius hiaticula* and *Ch. dubius*. Males 1.1 – 1.3 x 0.05 – 0.06 mm. Anterior cuticular spines 12 long. Buccal capsule 8 x 8. Spicule 310 – 380. In three males, a slightly sclerotised formation a 10 – 18 long rudiment of the second spicule was found. Females were not described. The original male form *T. (T.) paraaraliensis* described by Oschmarin from *Vanellus vanellus* (Skryabin and Sobolev, 1963), differing from *T. (T.) nouveli bodrogensis* n. ssp. in: 1.) Body size. 2.) Spicule length 420, in our tetrameres 260 – 406. 3.) In females. Oschmarin examined only immature female with no eggs. Without their description it is not possible to classify our tetramerids into *T. (T.) paraaraliensis*. In case of these forms being “identical”, several authors would consider

Oschmarin's species as synonym of *T. (T.) nouveli*. (cfr. Mollhagen, 1976). *author did not use three nominal nomenclature

The spiculum of our one male of *T. (T.) nouveli bodrogensis* n. ssp. (260) overlaps with the spiculum of *T. prozeskyi**, its left one long 230 – 260. Around 10 % of males have two spiculae. Right one measuring 190 – 220. Eggs oval and morulated without filaments (Ortlepp, 1964).

Tetrameres (T.) sp.

(Plate I., Fig. 8 – 9; Plate II., fig. 5)

Host: *Pluvialis apricaria* (L., 1758.)

Locality: Senné

Site of infection: Proventriculus

Prevalence: 1/14, i.e. 7.1 %

Intensity of infection: 3 specimens (females)

Male: unknown

Females (based on 3 specimens). Gravid females: length 2150 – 2482, width 1275 – 1320. Forepart of body 487 – 731 long. Buccal capsule 18 – 20 x 12 – 15 (Pl. I./8). Muscular oesophagus 256 – 271 x 27 – 33. Nerve ring 130 – 165 from anterior body end. Glandular oesophagus 745 – 772. Anus 94 – 105 from posterior body end. Eggs with larvae 41 – 45 x 25 – 27 (Pl. I./9). Only in small number of eggs, the bundle of 15 – 20 filaments, length of 15 – 20 was preserved on the poles.

Comments: Affiliation of *Tetrameres (T.)* sp. to above mentioned form is rather doubtful due to larger buccal capsule, small number of shorter filaments on the egg poles. The females of *T. (T.) nouveli bodrogensis* n. ssp. and *Tetrameres (T.)* sp. often have at fore and hind body a pouch-like margins, suggesting that the anterior and posterior extremity may to a certain extent protrude (Pl. II./1,2,-4,5). One female of *T. (T.) nouveli** bodrogensis n. ssp. was found with such a short extremity that without brightening they were almost invisible.

Victorocara charadrii Belopolskaja, 1953

(Plate III., Figs 1 – 7)

Host: *Charadrius hiaticula* (L., 1758)

Locality: Senné

Site of infection: beneath cuticle of muscular stomach

Prevalence 1/9 i.e. 11.1 %

Intensity of infection: 10 specimens

Body often in spiral shape. Anterior end with eight cephalic papillae, two pseudolabia and four lateral cuticular projections.

Males (based on 3 specimens). Body length 6.3 – 7.3 mm. Maximum body width 7 – 10.1. Cuticular projections on the anterior end, 12 – 13 long. Vestibule 124 – 142 x 7 – 9. Muscular part of oesophagus 421 – 499 x 21 – 23 and glandular part 889 – 1116 x 31 – 45 long. Cone-like cervical papillae situated in anterior part of muscular oesophagus in the distance of 171 – 173 from anterior end of the body. Nerve ring (width of 14), 172 – 175 from anterior end. The spiral male tail with relatively narrow caudal alae. Cloaca opening 121 from posterior end of body. Five pairs of preanal papillae observed. The sixth pair on the deformed material unclear. Five pairs of postanal papillae present. Left spiculum 452 – 486 long at proximal end with cone-like widening, 31 wide. Other parts of long spicule - width of 15. The short right spiculum bowl-shaped 120 – 135 x 26 (Pl. III./6,7).

Mature females (based on 5 specimens). Body length 13087 – 18150. Maximum body width 120 – 179. The length of cephalic cuticular projections 13 – 14 (Pl. III./1,2). Vestibule 138 – 158 x 10 – 14. Muscular part of oesophagus 499 – 585 x 25 – 31 and glandular part 1057 – 1305 x 46 – 59 long. Cone-like cervical papillae 181 – 200 from anterior end of the body. Sometimes one papilla situated lower than the other. Nerve ring (width 28) 193 – 210 from anterior end. Slit-shaped vulva in the posterior part of body 9300 – 10238 from anterior end (Pl. III./4-5). Anus 164 – 179 from posterior body end. Mature eggs 45 – 52 x 26 – 28 contain a larva.

Comments: Our nematodes differ from the original description of *V. charadrii* in some body and organs measurements and mainly in position of cervical papillae. Cfr. Belopolskaya (1953, Fig. 7a) and Skryabin *et al.* (1965). Further species *V. schejkini* Guschanskaja, 1950; *V. guschanscoi* Leonov, 1958 and *V. limosae* Mawson (1968) differ in particular in spiculae measurements or length of cuticular projections at the head end and some organs measurements. (Table 1). The studied females of *V. guschanscoi* were according to Leonov (in Skryabin *et al.*, 1965) immature, as their uterus did not contain completely formed eggs. Mature females were described by Macko and Baruš (1973).

Our findings contribute to the knowledge on organs measurements of mature *V. charadrii* and on occurrence of the species in Slovakia during *Ch. hiaticula* migration.

Eucoleus contortus (Creplin, 1839)

Host: *Charadrius hiaticula* (L., 1758)

Site of infection: oesophagus

Locality: Senné

Prevalence: 1/9, i.e. 11.1 %

Intensity of infection: 3 specimens (females)

Parasitising in aquatic poultry and in many species of aquatic birds, or such birds which are vicinity living to the water. The obtained capillariids are not fully grown, however, their uterus contains relatively large eggs 62 – 72 x 27 – 31. Baruš and Sergejeva (1989b) report 55 – 67 x 22 –

27.

Eucoleus obtusiuscula (Rudolphi, 1819)

(Plate IV., Fig. 1-10)

Host: *Charadrius dubius* Scop., 1786

Locality: Senné, Domaša, Stropkov, the Topľa River near Bardejov

Site of infection: beneath cuticle of the muscular stomach

Prevalence: 8/56, i.e. 14.2 %

Intensity of infection: 2 – 15 specimens

Male (based on 5 specimens). Body length 6.8 – 8 mm, maximal body width 51 – 55. Three bacillary bands observed. Oesophagus including stichosome 2405 – 2562 long. Length of oesophagus to body length ratio is 1: 2.6 – 2.96. Stichocytes in one row, 29 – 34 in number. At stichosome end measuring 76 – 86 x 29. Spiculum indistinct 320 – 340 long, in medium part 3.5 – 4.5 wide, towards the end narrowed to more or less pointed end. Spicular sheath 310. Spines of proximal part of sheath thick short and relatively sparsely spread. Towards the distal end more dense and longer. Distal end of everted sheath armed with elongated, thin, bristle-like spines 8 – 10 long. Posterior end of the male with pseudobursa, 26 – 28 in average forms two lobes each with a papilla (PL., IV./1).

Female (based on 9 specimens). Body length 16.5 – 20.2 mm. Width of body in vulva region 72 – 76, maximal body width 95 – 121 mm. Oesophagus including stichosome 2812 – 3376 long. The ratio of oesophageal part to female length 1 : 5.88 – 5.96. Stichocytes 33 to 35 in number at a

Plate IV. *Eucoleus obtusiuscula* (Rud., 1818) from *Ch. dubius*

1. Posterior end of male. Bar 50 μ m. 2. Stichocytes. Bar 100 μ m. 3. Vulva region. Bar 100 μ m. 4-5. Eggs. Bar 25 μ m. 6-7. Vulvar region of atypical form. Bar 50 μ m. 8-10. Eggs of atypical form. Bar 25 μ m.

Tab. 1 A comparison of closely related males of *Victorocara* spp.

Nematode species	<i>V. charadrii</i> Belopolskaja, 1953	<i>V. charadrii</i> Belopolskaja, 1953	<i>V. schejkini</i> Guschanskaja, 1950	<i>V. guschanscoi</i> Leonov, 1958	<i>V. limosae</i> Mawson, 1968
Host	<i>Ch. hiaticula</i>	<i>Ch. hiaticula</i>	<i>Terekia cinerea</i>	<i>Sterna sandvicensis</i> , <i>Hydroprogne</i> <i>Tschegrava</i> (former)USSR	<i>Limosa lapponica</i>
Region	Senné-Eastern Slovakia	Eastern Murman	Komi (former) USSR	(former)USSR	Queensland (Australia)
Source of data	Present results	Belopolskaja (1953)	ex Skryabin <i>et al.</i> (1965)	ex Skryabin <i>et al.</i> (1965)	Mawson (1968)
Total length (L)	6300 – 300	5300-5500	5943 – 6006	6240	6500 – 10200
Max. width	79 – 101	110 at gland. oes.		93	
Length of cephalic cuticular projections	12 – 13		17.4	22	
Length of vestibule	124 – 142 x 7 – 9	110	104 – 109	93	130 – 160
Cervical papillae	171 – 173 from ant.end	660 from ant. end	144 – 152		
Nerve ring	172 – 175 from ant. end				180 – 230 from ant. end
L. musc. oesophagus	421 – 499 x 21 – 23	270	470 – 483	496 x 18	650 – 820
L.gland. oesophagus.	889 – 1116 x 31 – 45	- 830	880 – 987	1736 x 55	1600 – 1800
Cloaca (Anus)	121 from posterior end		83 from post. end		
Preal anal papillae	Confused min. 5 pairs	6 pairs	6 pairs	6 pairs	
Postanal papillae	5 pairs	5 pairs	5 pairs	5 pairs	
Left large spicule	452 – 486 x 15 – 31	470 x 25	326 – 348	496	760 – 780
Right small spicule	120 – 134.5 x 26	102	83 – 87	124	150

* Measurements are in micrometers

level of stichosome end with measurements 93 – 121 x 50 – 69. Slotted vulva, slightly exceeding ventral body surface, is situated 117 – 280 behind oesophagus (Pl. IV/3). Vagina muscular 600 – 722 long. Thin wall eggs with granules measured from *Ch. dubius* 62 – 69 x 24 – 26 (Pl. IV/4-5), from *Ch. hiaticula* 74 – 76 x 24 – 28. The anus is situated terminally.

Atypical form: From the host *Ch. dubius* examined 7 females 20.1 – 22.8 long were found beneath the cuticle of muscular stomach. Oesophagus including stichosome is 3792 – 3950 long. The vulva takes the form of a transverse slit, or the anterior lip of vulva is raised 5 – 16 mm above the surface of borders (Pl.IV/6-7). Vagina 605 – 928 long. The thin wall eggs of female with the largest anterior vulvar lip 48 – 62 x 24 – 30. Majority of eggs are without typical plugs in the poles. Only a few eggs were found with typical capillarid form. Surface of eggs is as in form standard (PL.IV/8-10).

Comments: Owing to unstable dimension of anterior lip of vulva we classify this “atypical” form as *E. obtusiuscula*, even though the mentioned structure of vulva has not been described in this species. The eggs without polar plugs are considered as abnormalities.

”Our” *E. obtusiuscula* differed more from those reported by Baruš and Segejeva (1989b) in measurement of stichosome in males. According to these authors, *E. obtusiuscula* has also been recorded in *Anas querquedula*.

Capillaria limicolae (Gubajev et Mamajev, 1964)

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Host: *Pluvialis apricaria* (L., 1758)

Locality: Senné

Site of infection: small intestine (probably duodenum)

Prevalence: 1/14 i.e. 7.1 %

Intensity of infection: 3 specimens (females)

Comments: In Charadriiformes in Palearctic region the following nematodes of the genus *Capillaria* (Zeder, 1800) were registered: *Capillaria anatis* Schrank, 1790 and *C. limicolae* Gubajev and Mamajev, 1964. As for taxonomic features of capillarids, the structure of egg shells was important. In *C. limicole* the membrane in our eggs is thin 1 – 2 and its surface is strewn with small granules. In *C. anatis* this membrane is 4 thick and the surface shows irregular pits (Baruš & Sergejeva, 1989a) So far, this species has not been registered in Slovakia.

Capillariidae gen. sp.

(Plate V., Figs 1, 2)

Host: *Charadrius dubius* Scop., 1786

Site of infection: beneath cuticle of muscular stomach

Locality: Senné

Prevalence: 1/56, i.e. 1.7 %

Intensity of infection: 2 specimens (1 male, 1 female)

Male: 8.5 long. Maximum body width 86. Oesophagus inclusive stichosome 2962 long. Stichocytes at the level of stichosome end 117 – 124 x 38. Spiculum 164 x 2 – 3. Seventy nine micrometers from the anterior spiculum end situated a small bulbous part (abnormality?) (Pl. V/1). Spicular sheath 185 x 12. Its armament has not been observed.

Plate V. Nematoda spp. from *Ch. dubius*
1 – 2 Capillariidae gen. sp. Posterior end of male. Bar 50 μ m. 2 Posterior end of female. Bar 100 μ m. fig. 3 Anisakidae gen. sp. The area of the „tiny stomach“ Bar 200 μ m.

Female: Stichocytes 74 – 119 x 42 Thin walled eggs 51 – 57 x 24 – 26. Anus terminal.

Anisakidae gen. sp.

(Plate V., Fig. 3)

Host: *Charadrius dubius* Scop., 1786

Locality: Senné

Site of infection: sediment of body cavity

Prevalence: 1/56 i.e. 1.8 %

Intensity of infection: 11 specimens

Developmental forms of nematodes, only one male 16.3 mm x 644 μ m. Anterior and posterior end with cuticular alae. Organs incompletely developed. The form of oesophagus linked with intestine via “tiny stomach” a typical (Pl. V./3). Tail end possess four preanal and 2 – 3 postanal pedunculated papillae. Following four? preanal papillae without peduncles. Other nematodes are shorter, different in stage of ecdysis.

The members of the genus *Porrocaelum* Raillet and Henry, 1912 (Mozgovoy, 1953) are registered in studied hosts.

Conclusion

The identification of *Tetrameres (T.) nouveli bodrogensis* n. ssp. showed that *T. (T.) nouveli* Seurat, 1914 has been registered in various species of Charadriiformes on all continents and displays greater host-geographic variability (Mawson, 1968; Mollhagen, 1976) as it is reported in other description of the species of the genus (Skryabin and Sobolev, 1963; Ortlepp, 1964; Mawson, 1968; Pence *et al.*, 1975; Digiani & Cremonte, 2001; Cremonte *et al.*, 2001 and others).

With regards to the above we suggest:

1.) To revise original Seurat's material or at least redescribe *T. (T.) nouveli* on the basis of new material from type host *Himantopus himantopus* from Algeria. If the revision clarifies Seurat's disputable morphological data and if the hypothesis on great variability of *T. (T.) nouveli* is confirmed, then its subspecies classification (sensu Mayr, 1963) is justified. This taxonomy facilitates the fact that *T. (T.) nouveli* belongs to the species with heteroxenous life cycle (cfr. Chabaud and Bain, 1994) – as example can serve *Tetrameres (Petrowimeres) crami asiatica* (Ryjkov, 1963 in Skryabin and Sobolev, 1963). Disadvantage is in this case the quadrinomial nomenclature.

2.) Besides other features in various tetramerid species to pay a greater attention to egg morphology in relation to presence of their filaments, their number and length. With regards to the rapid loss of filaments it is highly probable, that eggs of more species are covered with these structures than it has been reported in literature.

Apart from that we have found the following:

3.) *Tetrameres (T.) nouveli* Seurat, 1914 parasitising in *Ch. dubius* described as unknown *T. (T.) nouveli bodrogensis* n. ssp.; *Tetrameres (T.) sp. Victorocara charadrii* Belopolskaja, 1953; *Capillaria limicolae*; *Capillaria* gen. sp. and Anisakidae gen. sp., were for the first time registered in Slovakia.

4.) It has been shown that nematode fauna of three shorebirds species is poorer than plathelminthes fauna (Macko *et al.*, 2004). Similar findings result also from the studies of Bondarenko and Kontrimavichus (1999), Canaris and Kinsella (2001) and Canaris *et al.* (2003).

5.) Common nematode species in studied shorebirds and aquatic poultry is *Eucoleus contorta*. *E. obtusiuscula* were detected besides that in Charadriiformes also in a duck *Anas querquedula* (Baruš and Sergejeva, 1989 b).

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