

Filariid Nematodes in Birds and Reptiles of Cuba

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Abstract. Seven species of nematodes of the suborder Filariata (*Diplotriaena americana*, *D. attenuatoverrucosa*, *D. serratospicula*, *D. thomasi*, *Oswaldofilaria brevicaudata*, *Aprocotella stoddarti* and *Piratuba*, sp.) were found in birds and reptiles of Cuba. All mentioned species were recorded in the territory of Cuba for the first time and likewise the mentioned bird species were first ascertained as the hosts of these nematodes. *Aprocotella carinii* (Pereira et Vaz, 1933) was demonstrated to be the synonym of the species *A. stoddarti* Cram, 1931. The species *Macdonaldius carinii* Vaz et Pereira, 1935 and *M. pflugpfelderi* Frank, 1964 have been transferred to the genus *Oswaldofilaria*. Information on the morphology and metric variability of all mentioned species is added.

Nematodes of the suborder Filariata Skrjabin, 1915 have been the least studied group of parasites in Cuba until recently. Their occurrence in birds living in this region was reported only by PÉREZ VIGUERAS (1934, 1936) and BARUŠ (1966) who recorded two species (*Diplotriaena bermudezi* Pérez Vigueras, 1934 and *Diplotriaena* sp. Baruš, 1966). No data have been reported on the occurrence of filariae in reptiles from this territory until now.

In 1965 and 1966 the scientific workers of the Institute of Parasitology, Czechoslovak Academy of Sciences and the Biological Institute of the Cuban Academy of Sciences collected a number of nematodes of the suborder Filariata during autopsy of 599 birds (of various species) and 40 reptiles (of the species *Anolis equestris*). A systematical classification of this material has yielded new data on the morphology, zoogeography and the range of definitive hosts and has also elucidated some taxonomic problems of nematode species, as stated in the following text.

SYSTEMATIC SURVEY

Family: *Diplotriaenidae* Anderson, 1958

1. *Diplotriaena americana* Walton, 1927

Fig. 1

Host: *Centurus superciliaris superciliaris* and *C. s. florentinoi* (Piciformes - Picidae).

Localization: air sacs, body cavity.

Locality: Soroa (province Pinar del Río); Cayo Quin and Mandinga — Baracoa (province Oriente) and Cayo Largo del Sur (province Las Villas).

This nematode species was found in 4 out of 16 examined woodpeckers *C. s. superciliaris* (intensity of invasion 5, 8, 9 and 44 nematodes per one host) and in one woodpecker *C. s. florentinoi* (intensity of invasion 25 nematodes). BARIŠ (1966) recorded this species as *Diplotriaena* sp. in *C. s. superciliaris* at the locality of Topes de Collantes (province of Las Villas).

The original description was given by WALTON (1927) according to material obtained from woodpecker *Colaptes auratus* in the United States. Later ANDERSON (1959) added a redescription of this species according to the material from typical host. The nematodes studied by ANDERSON differ from WALTON's original description in the length of tridents (0.10—0.12 mm and 0.14—0.15 mm, respectively) and in the measurements of right spicule (0.76 and 0.25 mm, respectively). ANDERSON, however, does not attribute any significance to the difference in measurements of tridents and presumes that WALTON has made a mistake in determining the length of the right spicule. In their morphology the parasites found by us almost fully correspond with ANDERSON's description of *D. americana*. The only difference is the presence in the male of 11 pairs of caudal papillae and not 10 pairs, as stated by ANDERSON. (Measurements of *D. americana* according to the data of various authors and our data are given in Table 1. Six male and 5 female specimens were measured.)

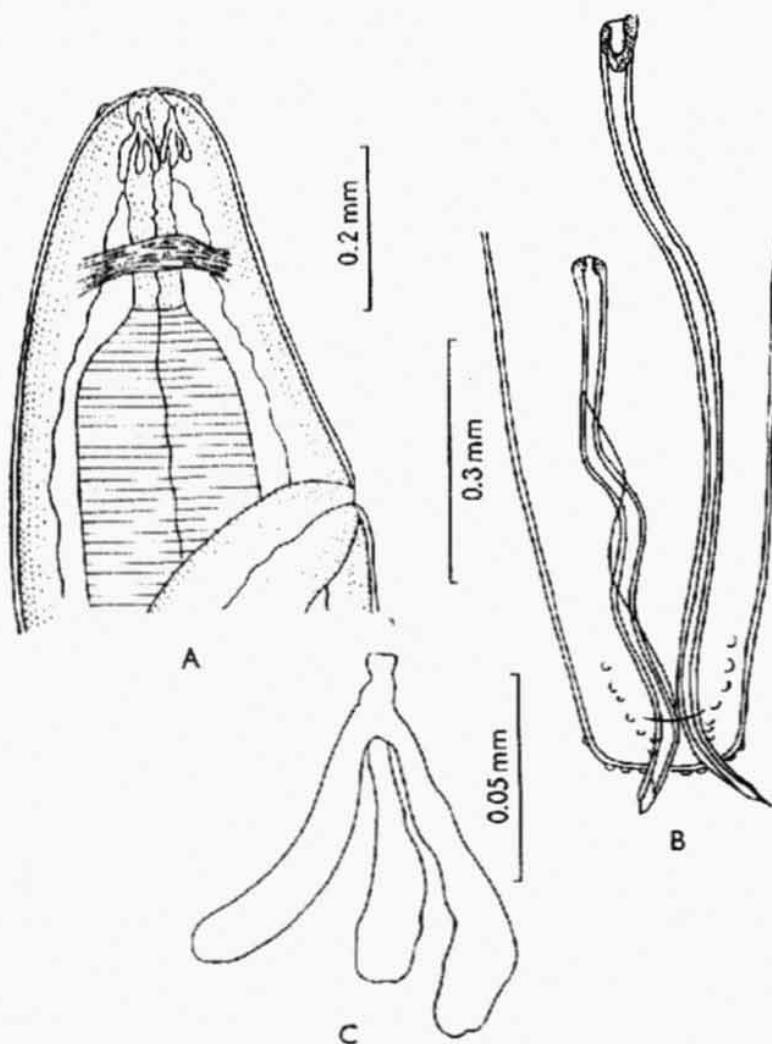


Fig. 1. *Diplotriaena americana* Walton, 1927.

A — anterior end of female; B — posterior end of male; C — trident.

Table 1. Measurements of *D. americana* WALTON, 1927 according to the data of various authors (in mm):

Measurements	according to WALTON (1927)		according to ANDERSON (1959)		according to our data	
	♂	♀	♂	♀♀	♂	♀♀
Body length	40	270	47	—	25—56	70—105
Maximal body width	0.9	1.80	0.55	0.96—1.0	0.41—0.66	0.85—1.06
Length of oesophagus	3.50	3.81	2.61	—	3.86—5.71	5.34—6.66
Length of muscular part of oesophagus	0.25	0.31	0.21	0.22—0.34	0.29—0.37	0.34—0.41
Length of glandular part of oesophagus	3.25	3.50	2.40	2.1—3.2	3.56—5.34	4.97—6.30
Length of tridents	0.14—0.15	0.2—0.22	0.10	0.10—0.12	0.09—0.11	0.12—0.14
Length of spicules	1. 2.	1.32 0.25	— —	1.20 0.76	— —	1.09—1.30 0.61—0.80
Distance to vulva	—	—	1.02	—	0.43—0.48	— — 0.34—0.62

2. *Diplotriaena attenuatoverrucosa* (Molin, 1858)

Fig. 2

Host: *Tyrannus caudifasciatus flavescens* (Passeriformes — Tyrannidae).

Localization: chest cavity.

Locality: Carapachibey (Isla de Pinos).

In one of the two *T. c. flavescens* dissected 8 nematode specimens of this species were found. In 1858 MOLIN described the species *Filaria attenuato-verrucosa* from *Thamnophilis canadensis* (family Formicariidae) captured in Brazil. Due to the presence of pseudochitinized tridents HENRY and OZOUX (1909) placed this species in the genus *Diplotriaena*. DÍAZ-UNGRIÁ (1964) gave a more detailed description of the parasite from *Sakesporus* sp. captured in Venezuela and belonging to the family Formicariidae. As this nematode species is registered in the representative of the family Tyrannidae for the first time, we are giving its description according to our material.

Description: Body cylindrical, tapering to end. The body extremities rounded, cuticula with a delicate transverse striation. The oesophagus is divided into a muscular part, which is shorter, light and narrow, and a glandular part, which is longer, wide and dark. Tridents are long (0.24—0.27 mm in males and 0.25—0.31 mm in females), its branches covered with transverse crests. The top of the handle in trident is shaped as a somewhat blunted arrow-head.

Male: The body length 43 mm, maximal width 0.78 mm, the width at level of nerve ring 0.30 mm, at level of oesophagus 0.71 mm, at level of cloaca 0.23 mm. The length of oesophagus 3.99 mm; the muscular part 0.43 mm long, at level of nerve ring 0.06 mm wide; the glandular part 3.56 mm long, maximally 0.20 mm wide.

The nerve ring 0.27 mm distant from the anterior extremity. The tridents are 0.24 mm long. The cloaca is opening at a point 0.09 mm distant from the posterior body extremity. The left spicule sabre-shaped, 0.98 mm long, 0.06 mm wide at proximal end. The curved right spicule is 0.61 mm long, provided with a small

pseudochitinized wing. The terminal part of tail is somewhat expanded laterally, bearing 11 pairs of caudal papillae, out of which 7 pairs are arranged in a ventral row and 4 pairs are situated at margins.

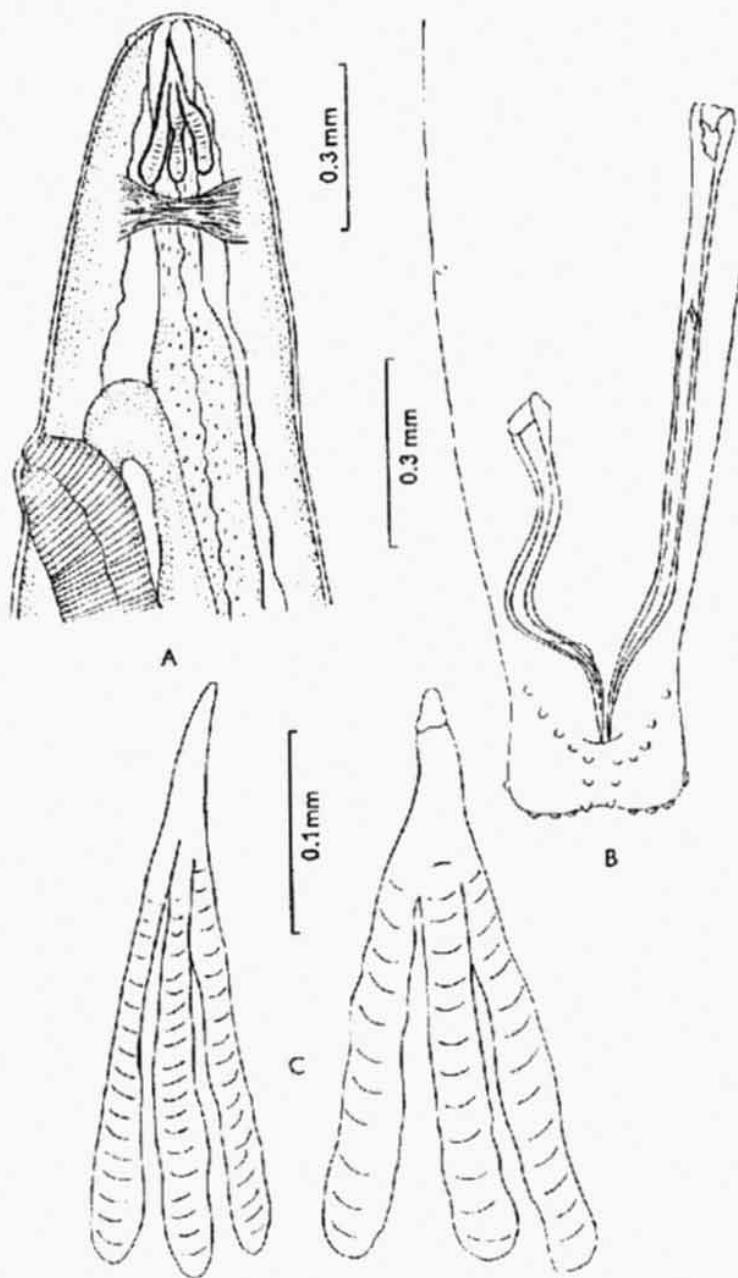


Fig. 2. *Diplotriaena attenuatoverrucosa* (Molin, 1858). A — anterior end of female; B — posterior end of male; C — trident.

Female: The body length 62.2 mm, maximal width 0.89 mm, the width at level of nerve ring 0.39 mm, at level of vulva 0.50 mm, at level of terminal part of oesophagus 0.80 mm. The length of oesophagus 5.39 mm; the muscular part 0.58 mm long, at level of nerve ring 0.11 mm wide; the glandular part 4.81 mm long, maximally 0.23 mm wide. The distance between nerve ring and anterior body extremity is 0.39 mm. The tridents are 0.31 mm long. The vulva slightly prominent. The distance between vulva and the anterior body extremity is 0.85 mm. The eggs measure 0.04×0.05 mm. (The measurements of *D. attenuatoverrucosa* according to data of various authors are given in Table 2.)

Table 2. Measurements of *D. attenuatoverrucosa* (Molin, 1858) according to the data of various authors (in mm):

Measurements	according to DÍAZ-UNGRÍA (1964)		according to our data	
	♂	♀	♂, ♀	♀♀
Body length	22	44	38-46	58-67.5
Maximal body width	0.61	0.89	0.78-0.91	0.89-1.35
Length of oesophagus	2.875	3.25	3.74-4.10	4.80-5.39
Length of muscular part of oesophagus	0.480	0.40	0.37-0.46	0.48-0.58
Length of glandular part of oesophagus	2.395	2.85	3.29-3.65	4.30-4.81
Length of tridents	0.188-0.192	0.23	0.24-0.27	0.25-0.31
Length of spicules	1. 0.75 2. 0.49-0.57	-	0.98-1.16 0.53-0.61	-
Distance to vulva		0.688	-	0.71-0.85

Table 3. Measurements of *D. serratospicula* Wehr, 1934 according to the data of various authors (in mm):

Measurements	according to WEHR (1934)		according to our data	
	♂	♀	♂, ♀	♀♀
Body length	33	75	25-46	68-90
Maximal body width	0.39	0.75	0.45-0.55	0.71-0.89
Length of oesophagus	2.77	4.874	3.38-4.72	6.05-7.47
Length of muscular part of oesophagus	0.22	0.224	0.23-0.37	0.30-0.57
Length of glandular part of oesophagus	2.55	4.650	3.15-4.40	5.62-6.90
Length of tridents	0.11	0.12	0.09-0.11	0.11-0.12
Length of spicules	1. 1.60 2. 0.675	-	1.80-2.18 0.69-0.89	-
Distance to vulva		0.30-0.375	-	0.36-0.46

3. *Diplotriaena serratospicula* Wehr, 1934

Host: *Xiphidiopicus percussus percussus* (Piciformes — Picidae).

Localization: air sacs in the chest and abdomen cavities.

Locality: Soroa (province Pinar del Río) and Cayo Tío Pepe — Isabela de Sagua (province Santa Clara).

This species was found in 2 out of 12 examined woodpeckers *X. p. percussus* (intensity of invasion 4 and 8 nematodes per one host).

The original description was given by WEHR (1934) according to the material obtained from *Chryserpes striatus* in the Dominican Republic. We found this species in a new host and our data considerably extend its dimensional variability (Table 3; 4 males and 7 females were measured).

4. *Diplotriaena thomasi* Seibert, 1944

Fig. 3A

Hosts: *Quiscalus niger caribaeus*, *Dives atroviolaceus* (Passeriformes — Icteridae), *Dendroica dominica dominica*, *Seiurus aurocapillus* (Passeriformes — Parulidae).

Localization: chest and abdomen cavities.

Localities: La Habana (province Habana); Soroa (province Pinar del Río); Laguna del Tesoro — Ciénaga de Zapata (province Las Villas) and Cayo Piedras (Isla de Pinos).

We discovered this nematode species in the following dissected birds: in 1 out of 22 *Q. n. caribaeus* (11 specimens), in 1 out of 10 *D. atroviolaceus* (2 specimens), in 1 out of 6 *D. d. dominica* of (14 specimens) and in 1 out of 3 *S. aurocapillus* (1 specimen).

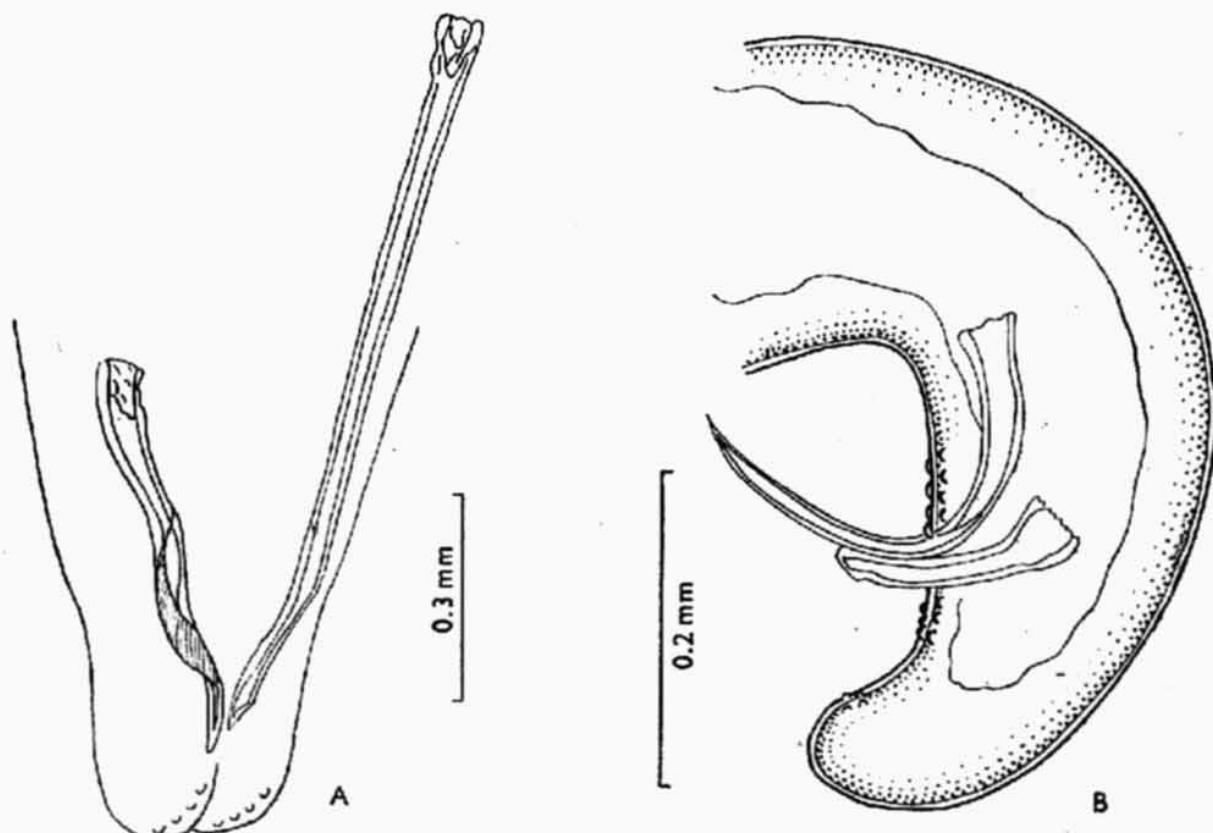


Fig. 3. *Diplotriaena thomasi* Seibert, 1944. A — posterior end of male; B — *Osvaldofilaria brevicaudata* (Rodhain et Vuylsteke, 1937) — posterior end of male.

The species *D. thomasi* was described by SEIBERT (1944) from birds of the family Fringillidae, captured in the USA. Later this species was registered in the USA by OGREN (1950) and in Canada by ANDERSON (1959), who also first discovered it in birds of the family Icteridae. In 1963 HODASI found *D. thomasi* in other bird species of the family Icteridae.

All mentioned bird species from Cuba are new definitive hosts of this nematode and in hosts of the family Parulidae it was recorded for the first time. A survey of dimensional variability of this species according to our material is given in Table 4 (7 males and 5 females were measured).

Table 4. Measurements of *D. thomasi* Seibert, 1944 from different definitive hosts according to our data (in mm):

Measurements	Males	Females
Body length	49–66	60–110
Maximal body width	0.62–0.78	0.77–1.03
Length of oesophagus	3.21–7.17	4.45–6.23
Length of muscular part of oesophagus	0.34–0.45	0.32–0.41
Length of glandular part of oesophagus	3.92–6.76	4.13–5.82
Length of tridents	0.03–0.06	0.04–0.06
Length of spicules 1. 2.	1.00–1.10 0.55–0.66	— —
Distance to vulva	—	0.55–0.75

Family: Oswaldofilariidae Sonin, 1966

5. *Oswaldo filaria brevicaudata* (Rodhain et Vuylsteke, 1937)

Fig. 3B

Host: *Anolis equestris* (Squamata — Iguanidae).

Localization: body cavity.

Locality: Sabanilla and Mandinga — Baracoa (province Oriente).

The filariae of the species *O. brevicaudata* were discovered in 5 out of 40 specimens of *A. equestris* examined. Intensity of invasion ranged between 1 to 7 specimens per one host.

The species *O. brevicaudata* was described by RODHAIN and VUYLSTEKE (1937) from the host *Iguana tuberculata*. The authors misplaced this species in the genus *Breinlia* Yorke et Maplestone, 1926, the representatives of which parasitize marsupials (Marsupialia). FREITAS and LENT (1937) found nematodes of this species in the

same definitive host captured in Brasil and after a detailed study stated that this species should be listed in the genus *Oswaldoilaria* Travassos, 1933. Later the species *O. brevicaudata* was registered in the hosts *I. iguana* in Mexico (CABALLERO 1939) and *Ctenosauria* sp. in Quatemala (CABALLERO 1948). (The measurements of *O. brevicaudata* according to data of the above-mentioned authors and to our data are given in Table 5. Six male and female specimens each were measured.)

Table 5. Measurements of *O. brevicaudata* (Rodhain et Vuylsteke, 1937) from different definitive hosts (in mm):

Hosts	from <i>Iguana</i> spp.		from <i>Ctenosauria</i> sp.		from <i>Anolis equestris</i>	
According to	RODHAIN, VUYLSTEKE (1937) FREITAS, LENT (1937) CABALLERO (1939)		CABALLERO (1948)		our data	
Measurements	males	females	males	females	males	females
Length of body	11.60—18.94	18.60—42.87	12.49—14.29	17.65—29.70	8.72—11.39	19.3—30.5
Maximal width	0.14—0.21	0.17—0.50	?	?	0.33—0.37	0.46—0.62
Length of oesophagus	2.32—3.21	2.70—4.22	?	?	1.48—1.80	1.64—2.31
Distance to vulva	—	12.75	—	?	—	6.68—13.00
Length of spicules	1. 2.	0.11—0.16 0.21	—	0.18—0.19 0.34	— —	0.15—0.18 0.29—0.34

It is necessary to note the following. While studying *O. brevicaudata* we also analyzed the species included in other genera of filariae, the representatives of which are parasitic in reptiles. In this connection we arrived at the conclusion that the species *Macdonaldius carinii* Vaz et Pereira, 1935 and *M. pflugpfelderi* Frank, 1964 should be entered in the genus *Oswaldoilaria* under the names *O. carinii* (Vaz et Pereira, 1935) n. comb. and *O. pflugpfelderi* (Frank, 1964) n. comb. It is quite possible that the species *M. carinii* Vaz et Pereira, 1935 is a synonym of the species *O. brevicaudata*, and the species *M. pflugpfelderi* Frank, 1964 is the synonym of *O. chlamydosauri* (Breinl, 1913), but this assumption must be further analyzed yet.

6. *Aprocotella stoddardi* Cram, 1931

Fig. 4

Hosts: *Glaucidium siju vittatum* (Strigiformes — Strigidae); *Amazona leucocephala leucocephala* (Psittaciformes — Psittacidae); *Xiphidiopicus percussus insulaepinorum* (Piciformes — Picidae); *Icterus dominicensis melanopsis* (Passeriformes — Icteridae); *Catharus fuscescens fuscescens*, *Mimocichla plumbea schistacea* (Turdidae); *Dendroica patechiae aestiva*, *D. discolor discolor*, *Parula americana americana*, *Wilsonia citrina*, *Oporornis formosus*, *Protonotaria citrea* (Parulidae); *Vireo griseus noveboracensis* (Vireonidae); *Contopus virens virens* (Tyrannidae).

Localization: body cavity.

Locality: La Habana (province Havana); Pen. Guanahacabibes (Pinar del Río); Mandinga — Baracoa (Oriente); La Vega (Isla de Pinos).

We found this nematode in 14 bird species, belonging to four orders: Strigiformes, Psittaciformes, Piciformes and Passeriformes. In representatives of the first three orders *A. stoddardi* was recorded for the first time and all Passeriformes were also found to be new hosts of this species. Despite the wide range of definitive hosts *A. stoddardi* occurs more often in Passeriformes than in the representatives of other orders. Out of 83 examined specimens of above-mentioned species of Passeriformes 23 (27.7%) were found to be invaded (intensity of invasion 1—25 nematodes) and out of 34 bird specimens belonging to the other three orders *A. stoddardi* was discovered in only three birds (8.8%) — (intensity of invasion 1 nematode per one host) each bird belonging to these three orders respectively.

The species *A. stoddardi* was described by CRAM (1931) according to the material collected from Galliformes, captured in North America. In 1957 ANDERSON described nematodes of this species from a number of Passeriformes, belonging to the families Fringillidae and Turdidae. ANDERSON refers the genus *Carinema* Pereira et Vaz, 1933, including the single species *C. carinii* Pereira et Vaz, 1933 to the synonyms of the genus *Aprocotella*. He points out that *A. carinii* is closely related to *A. stoddardi*, but differs from the latter mainly in larger measurements and in the presence of two small caudal papillae. In 1961 ANDERSON specified some details in the morphology of *A. stoddardi*, revealing in nematodes of this species the caudal papillae and demonstrated that distal end of left spicula is pointed and not rounded as stated earlier. ANDERSON paid a special attention to the wide circle of definitive hosts and considerable variation in the measurements of these nematodes parasitic in various hosts.

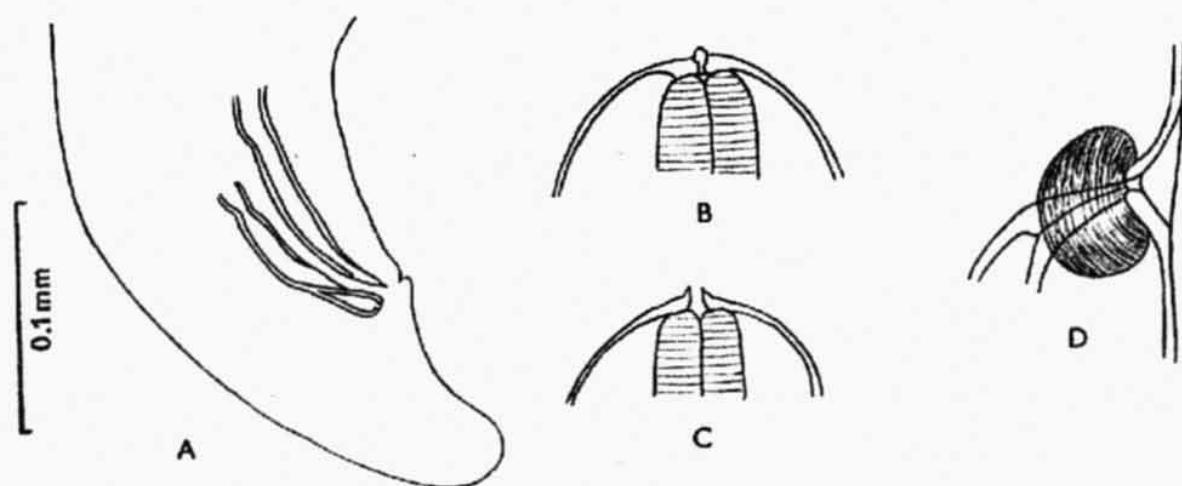


Fig. 4. *Aprocotella stoddardi* Cram, 1931. A — posterior end of male; B, C — anterior end of body; D — vulva.

In their morphology the parasites discovered by us correspond with the descriptions of both *A. stoddardi* and *A. carinii* and therefore we consider it suitable to regard these two species as synonyms. We noticed in our material an interesting morphological peculiarity in the structure of the reproduction system of females —

a very short muscular part of vagina and vulva enveloped by a round muscular sphincter. Examples of *A. stoddardi* according to our and literary data are given in Table 6 (16 males and 10 females were measured).

Table 6. Measurements of *A. stoddardi* Cram, 1931 according to data of various authors (in mm):

Measurements	according to ANDERSON (1957, 1961)		according to PEREIRA et VAZ (1933)		according to our data	
	♂♂	♀♀	♂	♀	♂♂	♀♀
Length of body	5.6—7.6	8.1—16.5	11	16.5	4.8—11.4	7.12—17.5
Length of oesophagus	0.34—0.36	0.30—0.41	0.47	0.48	0.30—0.51	0.31—0.66
Distance to nerve ring	0.14—0.16	0.11—0.13	0.18	—	0.11—0.20	0.12—0.20
Length of tail	0.05—0.09	0.06—0.18	0.066	0.12	0.05—0.09	—
Length of spicules	1. 2.	0.07—0.09 0.05—0.06	— —	0.10 0.08	— —	0.07—0.12 0.06—0.10
Distance to vulva	—	0.84—1.60	—	2.10	—	1.37—2.19

Family: Splendidofilariidae Sonin, 1962

7. *Piratuba* sp.

Host: *Anolis equestris* (Squamata — Iguanidae).

Localization: body cavity.

Locality: Sabanilla — Baracoa (province Oriente).

A fragment of the posterior body part of male filaria was discovered in the body cavity of one of 40 dissected iguanas *A. equestris*. The presence of equal and simply arranged spicules and a high number of caudal papillae testify that the found parasite belonged to the genus *Piratuba* Lent et Freitas, 1941.

Description: The length of tail 0.05 mm, the body width at level of cloaca 0.14 mm. The spicules equally long and straight, the distal end of spicules rounded. The length of spicules 0.16 mm. Twelve pairs of tail papillae, including 4 pairs of pre-anal and 8 pairs of post-anal papillae.

The genus *Piratuba* contains 3 species of nematodes parasitic in iguanas of the South America: *P. digiticauda* Lent et Freitas, 1941; *P. lanceolata* Pelaez et Peres-Reyes, 1960 and *P. prolifica* Pelaez et Peres-Reyes, 1960. All three species are closely related morphologically, differing only in the number of caudal papillae, but the two last mentioned species also differ in the measurements of microfilariae. According to the measurements of spicules and the number of caudal papillae the specimen discovered by us is similar to the species *P. digiticauda*, but most probably all three above-mentioned species are synonyms.

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