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Arctic Health Research Center

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**Studies on the Helminth Fauna of Alaska. XIV. Some
Cestode Parasites of the Aleutian Teal (*Anas crecca* L.)
With the Description of *Diorchis longiovum* n. sp.**

EVERETT L. SCHILLER¹

The Aleutian teal (*Anas crecca nimia* Friedmann²) has been relatively unavailable for helminth investigations by American workers because its range in North America is restricted to the western-most Aleutian Islands.

During some parasitological studies on Amchitka, Aleutian Islands, Alaska, in May and early June 1952, in connection with sea otter mortality, the writer had the opportunity to collect 20 adult Aleutian teal. These birds, consisting of 16 males (average weight, 392 grams) and 4 females (average weight, 353 grams) were taken at the beginning of the nesting season. Autopsies revealed that 16 (80%) of these ducks were parasitized by cestodes. All infections were considered to be relatively light—the numbers of cestodes recovered ranged from one to 25. Subsequent taxonomic study disclosed that the cestodes represented three genera and four species; viz., *Hymenolepis collaris* (Batsch, 1786); *Fimbriaria fasciolaris* (Pallas, 1871); *Diorchis acuminata* Clerc, 1902; and a new species, herein described, of the genus *Diorchis*.

H. collaris was found most frequently, occurring in 10 of the 16 parasitized ducks. This cestode comprised the only species present in 7 of the 10 birds and occurred together with another species in three—once with *D. acuminata* and twice with *Diorchis* n. sp.

F. fasciolaris was found in only one of the ducks which, at the same time, harbored the new species of *Diorchis*.

D. acuminata was found in two birds, once with *H. collaris* and once with the new species.

The cestode herein described occurred as the only species in four of the ducks and together with other cestodes as indicated above, in four.

No other helminth parasites were obtained from the Aleutian teal examined in this study.

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²This host has been identified by Dr. H. Friedmann, curator, Division of Birds, U. S. National Museum, Washington, D. C.

Diorchis longiovum n. sp.

(Figs. 1-5)

DIAGNOSIS: (Hymenolepididae.) Length of strobila about 85-100 mm.; maximum width 1.2 mm. attained in post-mature proglottids. Scolex 224 x 308 μ . Suckers 90 x 135 μ . Suckers spinose. Pocket of sucker covered with minute spines. Margin of sucker beset with coarse spines. Evaginated rostellum 279 μ in length from base and 72 μ in diameter at base. Rostellum provided with a single row of 10 hooks, 57 μ in length. Strobila 150 μ wide immediately posterior to base of scolex. Genital pores unilateral and dextral. Genital ducts between dorsal and ventral excretory canals. Muscular cirrus sac averages 530 μ in length by 39 μ in width. Cirrus sac extends aporad to ventral excretory canal. External seminal vesicle well developed, spherical and lies ventrally upon aporal end of cirrus sac in late-mature proglottids. Cirrus sparsely armed with coarse spines at proximal end for a distance approximately one-third the length of cirrus when extended. Testes, two in number, subspherical to ovoid, about 126 μ in diameter in mature proglottids. One testis occurs poral and the other aporal to ovary and vitelline gland. Poral testis lies in a plane slightly more ventral than aporal testis. Ovary irregular to trilobate, located in middle of proglottid. Vitelline gland ovoid to irregular in shape, lies ventral to and on posterior surface of ovary. Vagina lies ventral and slightly posterior to cirrus sac. Ovoid seminal receptacle lies dorsal to poral ventral excretory canal between cirrus sac and poral testis. Uterus extends as an irregular tube transversely across middle of proglottid and develops by enlargement, becoming sacculate and filling entire proglottid when completely gravid. Eggs of elongate spindle shape. Spindles drawn out into long filamentous processes. Eggs average (from tip to tip of spindles) 96 μ in length by 15 μ in maximum diameter. Embryo measures 52.5 x 11 μ . Embryo hooks 7.5 μ in length. Ventral longitudinal excretory canals 45 μ in diameter; dorsal canals 9 μ in diameter.

HOST: *Anas crecca* L.

LOCALITY: Amchitka, Aleutian Islands, Alaska.

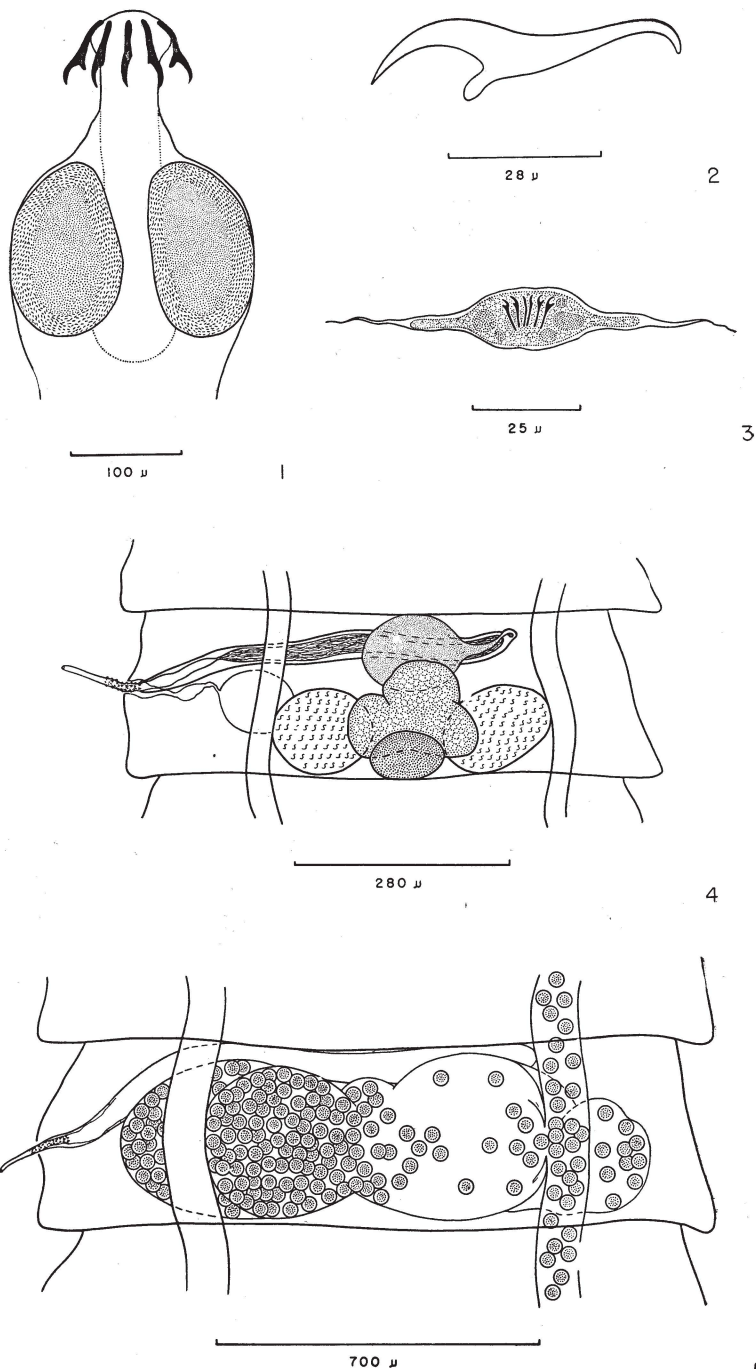
HABITAT: Small intestine.

TYPE: One slide, No. 47860, containing an entire specimen, has been deposited in the Helminthological Collection of the U. S. National Museum, Washington, D. C.

PARATYPE: One slide, No. 47861.

DISCUSSION: Schultz (1940) reviewed the genus *Diorchis* and compiled a list of 23 species belonging to this group. Two species previously described by Johri (1939), *D. alvedea* from *Streptopelia orientalis* (Latham, 1790) and *D. chalcophapsi* from *Chalcophaps indica* (Linnaeus, 1758), apparently did not come to the attention of Schultz in time to be included in his treatment of the genus. Insofar as the writer is aware, only three additional species have been described since the work of Schultz. These are *D. anomala* Schmelz, 1941 (from an anseriform bird), *D. ralli* Jones, 1944 (from *Grui-formes*), and *D. reynoldsi* Jones, 1944 (from a mammal). The species herein described brings the total number in this genus to 29.

SYNONYMY: Of the 29 species assigned to the genus *Diorchis*, only one, *D. reynoldsi*, is reportedly found in a mammalian host (*Blarina brevicauda* in Virginia). Rausch and Kuns (1950), in their studies on North American shrew cestodes, did not find this species in *Blarina* nor any other shrew species. They stated that, "It [*D. reynoldsi*] appears to have a restricted distribution." In a discussion of shrew cestodes in the Hocking County area



Morphological details of *Diorchis longiovum* n. sp. Fig. 1. Scolex. Fig. 2. Rostellar hook. Fig. 3. Egg. Fig. 4. Mature proglottid (ventral view). Fig. 5. Early gravid proglottid showing entry of eggs into lumen of ventral excretory canal from uterus through abnormal passage formed between these organs.

of Ohio, Oswald (1951) observed that, "... *Diorchis reynoldsi* Jones, 1944, and *Protogynella blarinae* Jones, 1943, are of common occurrence in *Blarina brevicauda* in this area."

Examination of the type specimen of *D. reynoldsi*, made possible through the kindness of Dr. E. W. Price, Assistant Chief, Zoological Division, Agricultural Research Center, Bureau of Animal Industry, revealed the presence of three testes rather than two as reported by Jones in the original diagnosis. Inasmuch as testes number constitutes a generic character in the family Hymenolepididae, removal of this species from the genus *Diorchis* and assignment to the genus *Hymenolepis* is recommended. This recommendation is substantiated on the basis of the rostellar armature in this species (more than 100 minute hooks) which is more characteristic of the genus *Hymenolepis* than of the genus to which it has been assigned. The mascerated condition of the type specimen precludes much detailed analysis of specific characters necessary to differentiate it from other closely related species of the genus *Hymenolepis*; therefore determination of its specific status must remain questionable at present, pending the study of additional material in a more favorable condition.

Long and Wiggins (1939) described a species of the genus *Diorchis* for which they proposed the name *Diorchis nyrocae*. The specific name of *nyrocae* was pre-occupied by a member of this genus described by Yamaguti in 1935. Schultz (1940) recognized the existence of these identical names for the two different species and because the *D. nyrocae* of Yamaguti had priority, proposed the new name *D. wigginsi* for the *D. nyrocae* of Long and Wiggins. Schmelz (1941) also noted that these two species had the same name and, apparently unaware that Schultz (1940) had already changed the nomenclature, proposed the name *D. longae* for the *D. nyrocae* of Long and Wiggins (1939). As a result the literature now contains the two names for the species described by Long and Wiggins; however, the name *D. wigginsi*, established by Schultz (1940) has priority by virtue of the first reviser principle and the names *D. nyrocae* Long and Wiggins (1939) and *D. longae* Schmelz (1941) are synonyms.

DIFFERENTIATION: Although such characters as spinose suckers and spinose cirri are not uncommon in the genus *Diorchis*, according to descriptions, only three species, viz., *D. nyrocae* Yamaguti, 1935, *D. spiralis* Szpotanska, 1931, and *D. flavescens* (Kreff, 1871) Johnston, 1912, are provided with both. *D. longiovum* is readily differentiated from *D. nyrocae* and *D. spiralis* on the basis of rostellar hook size and shape as well as size and extent of the cirrus sac. *D. longiovum* is most comparable to *D. flavescens*; however, the latter has a smaller scolex (195 μ), a much shorter rostellum (130 μ) and a considerably shorter cirrus sac (270-350 x 50 μ). The cirrus of *D. flavescens* is finely spinose whereas that of *D. longiovum* is coarsely spinose and the spines occur only at the proximal end. There is no indication that the pocket and margin of the suckers of *D. flavescens* differ in spine sizes as in *D. longiovum*.

Because of frequent loss of spines from suckers and cirri under certain conditions prior to, or during preparation of specimens for study, spinose condition of these organs may not have been observed and consequently not reported in original descriptions. The new species was therefore compared with other members of the genus *Diorchis* having rostellar hooks of similar size and a cirrus sac which extends beyond the median line of the proglottid. The three species comprising this category were found to differ from *D. longiovum* as follows:

D. americana Ransom, 1909 (parasitic in Gruiformes and Galliformes) has a smaller scolex (160 x 250 μ), a less prominent rostellum (50 x 135 μ when extended) and somewhat larger rostellar hooks (65 μ) of a different shape. The cirrus is reported to be unarmed.

D. spinata Mayhew, 1929 (parasitic in Anseriformes) has an ovary which is only slightly lobed, a much smaller cirrus (150 x 20 μ), and smaller rostellar hooks (46-48 μ). The spinose condition of the cirrus illustrated by Mayhew (1929) is similar to that of *D. longiovum*, but sucker armature is not indicated. The eggs are similar in size (69-94 x 12-16 μ) but have a cylindrical shape.

D. formosensis Sugimoto, 1934 (parasitic in Anseriformes) has a much larger scolex (336-392 x 370-420 μ), slightly lobed testes, and a much smaller cirrus sac (233-280 x 21-28 μ). According to the description of this species, only the margin of the sucker is spinose. Cirrus spination is not indicated. The rostellar hooks are only slightly larger (60 μ) but are of a distinctly different shape.

The differential sucker spination found in *D. longiovum* and the characteristic structure of the eggs are distinguishing features which facilitate ready recognition of this species.

AN UNUSUAL OCCURRENCE OF EGGS IN THE VENTRAL EXCRETORY CANAL IN A PARATYPE SPECIMEN OF *D. longiovum*: During routine morphological study of whole-mount specimens of *D. longiovum*, the writer observed rather uniform bodies occurring in an antero-posterior line on the poral side of the majority of the proglottids throughout the strobila of a paratype specimen. These bodies were first noted in the anterior region of the strobila and could not be associated with any genital *Anlagen* characteristic of this species and were thought to be of extra-strobilar origin. Closer examination under oil immersion revealed that these objects seen under lower magnification were the dense constituents comprising the central mass of incompletely developed eggs. These eggs were contained within the lumen of the ventral excretory canal. The spherical egg mass, averaging 30 μ in diameter, was surrounded by a translucent substance, and the whole enclosed by a thin, almost imperceptible membrane. The egg dimensions at this stage of development averaged 32 x 36 μ . In an effort to determine how these immature eggs had escaped the uterus and gained access to the lumen of the ventral excretory canal, the canal was carefully traced throughout the entire strobila. A single early gravid proglottid, 24.5 mm. from the posterior end of the strobila, was partially empty of eggs and proved to be the source of the eggs found in the excretory duct. Critical examination of this proglottid disclosed that an opening existed between the ventral wall of one of the aporal sacculations of the uterus and the poro-ventral wall of the ventral excretory canal about 78 μ in diameter (fig. 5). The smooth appearance of the juncture of the walls of the uterus and excretory duct surrounding the opening indicated the development of abnormal tissue adhesion of these organs in such a manner that an enclosed passage had been formed between them. The eggs remaining within the uterus were quite abundant at the poral end, gradually becoming less numerous towards the middle, leaving the uterus nearly empty in the vicinity of the opening to the excretory duct. Eggs appeared in the passage between the uterus and excretory canal and were distributed discontinuously anteriorad throughout the canal for a distance of 51.8 mm. (including 380 proglottids) and posteriorad for a distance of 9.1 mm. (including 33 proglottids). The eggs found in the excretory canal were identical

in size, shape and stage of development with those remaining in the partially evacuated uterus.

There were no crushed or distorted eggs, ragged parenchyma or other evidence of rupture due to mechanical damage of the proglottid which exhibited this peculiar phenomenon. In consideration of this, together with the extent of distribution of eggs throughout the excretory canal, it is indicated that this unusual development occurred in the living worm.

If it could be assumed that the eggs were washed out of the uterus and transported by the movement of the fluid within the excretory canal, it would seem, in view of the much greater distance anteriorad that the eggs were found in the excretory canal, that the flow of the contents, at least in the poral canal, is in an anterior direction. This is contrary to the usual concept concerning the direction of flow of fluid in the ventral canals. Wardle and McLeod (1952, p. 24), in their discussion of the excretory system of cestodes, stated that, "On each side, a vessel lying somewhat ventrally in the parenchyma and usually of wide lumen carries a fluid—presumably water—in a direction *away from* the holdfast. This is commonly termed the ventral vessel or ventral canal." It is possible that a differential pressure exists between the contents of the uterus and that of the excretory ducts which may, in part, account for the unequal anterior and posterior distribution of eggs in the excretory canal in this instance. There appeared to be no evidence that the eggs were forced out of the uterus and into the excretory canal due to segmental contraction in this unusual proglottid.

There probably are other factors involved in the mechanics of egg movement and distribution seen in this specimen, although they are not apparent in the preserved state. If it can be considered that the fluid in the excretory canal is primarily responsible for the transport of the eggs in this specimen, it would seem that this condition is strong presumptive evidence to support the theory that the excretory system of a cestode is not exclusively excretory in function, but may serve to maintain a hydrostatic pressure within the worm and to regulate its water balance. The differential and discontinuous distribution of eggs in the excretory canal suggests that the direction of flow of the fluid may be anteriorad as well as posteriorad, depending upon the physiological requirements of the worm in different parts of its strobila at any given time.

This specimen of *D. longiovum*, designated a paratype, has also been deposited in the Helminthological Collection of the U. S. National Museum, slide No. 47861.

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