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A TAXONOMIC REVISION OF THE GENUS *TAENIA* LINNAEUS, 1758 *S. STR.*

ANNA VERSTER, Veterinary Research Institute, Onderstepoort(1)

CONTENTS

ABSTRACT

ANNA VERSTER. A taxonomic revision of the genus *Taenia* Linnaeus, 1758 *s. str. Onderstepoort J. vet. Res.* 36 (1), 3–58.

The genus *Taenia* Linnaeus, 1758 *sensu strictu* is revised. Besides the type species, *Taenia solium* Linnaeus, 1758, the valid species are: *T. acinonyxi; T. brachyacantha; T. crassiceps; T. crocutae; T. endothoracicus; T. gonyamai; T. hyaenae; T. hydatigena; T. ingwei; T. laticollis; T. macrocystis; T. martis; T. multiceps; T. mustelae; T. omissa; T. ovis; T. parenchymatosa; T. parva; T. pisiformis; T. polyacantha; T. rileyi; T. regis; T. saginata; T. selousi; T. serialis; T. taeniaeformis; T. taxidiensis; T. twitchelli.* "*T. laticollis*" of Skinker (1935) and Joyeux (1945) is renamed, *T. pseudolaticollis. T. brauni* is considered a subspecies of *T. serialis* and *T. krabbei* a subspecies of *T. ovis.* Invalid species and *species inquirendae* are also listed.

INTRODUCTION

Although 70 species, belonging to the genus *Taenia* Linnaeus, 1758 *sensu strictu* have been described, it would appear, from some of their descriptions, that not all of them are valid. Consideration of the present nomenclature makes it apparent that taxonomists adopted different morphological features as well as the host range of immature and mature stages as criteria for the creation of genera and species. The status of these species according to various workers is analysed in Table 1.

(1) Temporarily assigned to Institut de Zoologie, Université-Mail, Neuchâtel

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TABLE 1.—*Analysis of the status of* Taenia *spp. according to various authors*

Number	Species	Hall (1919)	Baer (1926)	Joyeux & Baer (1929)	Ortlepp (1938)	Abuladse (1964)	Verster (1967)	This Paper
1	*Taenia solium* Linnaeus, 1758	T	T	T	T	T	T	T
2	,, *acinonyxi* Ortlepp, 1938	—	—	—	T	T	—	T
3	,, *africana* von Linstow, 1900	—	—	O	—	TR	O (1,57)	—
4	,, *antarctica* Fuhrmann, 1922	—	T	—	T	T	—	O (60)
5	,, *balaniceps* Hall, 1910	T	T	—	T	T	—	O
6	,, *brachyacantha* Baer & Fain, 1951	—	—	—	—	—	—	T
7	,, *brachysoma* Setti, 1899	T	O	—	T	O	—	? (60)
8	,, *brauni* Setti, 1897	T	T	—	T	M	—	0 (60)
9	,, *bremneri* Stephens, 1908	—	?	O	T	O	O (57)	—
10	,, *bubesei* Ortlepp, 1938	—	—	—	T	T	—	O (55)
11	,, *cervi* Christiansen, 1931	—	—	—	—	T	—	O (45)
12	,, *confusa* Ward, 1894	—	?	O	—	TR	O (57)	—
13	,, *crassiceps* (Zeder, 1800) Rudolphi, 1810	—	T	—	T	T	—	T
14	,, *crocutae* Mettrick & Beverley-Burton, 1961	—	—	—	—	—	—	T
15	,, *cylindrica* Leon, 1922	—	—	O	—	O	O (57)	—
16	,, *djeirani* Boev, Sokolova & Tazieva, 1964	—	—	—	—	—	—	O (45)
17	,, *endothoracicus* (Kirschenblatt, 1948)	—	—	—	—	M	—	T
18	,, *erythraea* Setti, 1897	—	?	—	T	—	—	?
19	,, *gaigeri* (Hall, 1916)	M	T	—	T	M	—	O (40)
20	,, *gonyamai* Ortlepp, 1938	—	—	—	T	T	—	T
21	,, *hlosei* Ortlepp, 1938	—	—	—	T	T	—	O (20)
22	,, *hominis* von Linstow, 1902	—	—	O	—	TR	O (57)	—
23	,, *hyaenae* Baer, 1926	—	T	—	T	T	—	T
24	,, *hydatigena* Pallas, 1766	T	T	—	T	T	—	T
25	,, *hyperborea* von Linstow, 1905	—	O	—	—	H	—	O/(13)
26	,, *ingwei* Ortlepp, 1938	—	—	—	T	T	—	T
27	,, *infantis* Bacigalupo, 1922	—	T	O	T	O	O (64)	—
28	,, *intermedia* Rudolphi, 1810	—	O	—	—	T	—	O (37)
29	,, *jakhalsi* Ortlepp, 1938	—	—	—	T	T	—	O (24)
30	,, *krepkogorski* (Schulz & Landa, 1934)	—	—	—	—	H	—	? (64)
31	,, *krabbei* Moniez, 1879	T	T	—	T	T	—	O (45)
32	,, *laruei* Hamilton, 1940	—	—	—	—	T	—	O (60)
33	,, *laticollis* Rudolphi, 1819	T	T	—	T	T	—	T
34	,, *lycaontis* Baer & Fain, 1955	—	—	—	—	T	—	O (23)
35	,, *lyncis* Skinker, 1935	—	—	—	T	T	—	O (54)
36	,, *macrocystis* (Diesing, 1850) Lühe, 1910	T	T	—	T	T	—	T
37	,, *martis* (Zeder, 1803)	—	—	—	—	O	—	T
38	,, *melesi* Petrov & Sadychow, 1956	—	—	—	—	T	—	? (37)
39	,, *monostephanos* von Linstow, 1905	T	O	—	T	F	—	? (33)
40	,, *multiceps* Leske, 1780	M	T	—	T	M	—	T
41	,, *mustelae* Gmelin, 1790	—	—	—	—	O	—	T
42	,, *novella* Neumann, 1896	O	—	—	—	—	—	O (50)
43	,, *omissa* Lühe, 1910	—	T	—	T	T	—	T
44	,, *ovata* Molin, 1858	—	—	—	—	T	—	? (51)
45	,, *ovis* (Cobbold, 1869) Ransom, 1913	T	T	—	T	T	—	T
46	,, *packi* (Christensen, 1929)	—	—	—	T	M	—	O (60)
47	,, *parenchymatosa* Pushmenkov, 1945	—	—	—	—	T	—	T
48	,, *parva* Baer, 1926	—	T	—	T	T	—	T
49	,, *phillipina* Garrison, 1907	—	—	O	T	O	O (57)	—
50	,, *pisiformis* (Block, 1780) Gmelin, 1790	T	T	—	T	T	—	T
51	,, *polyacantha* Leuckart, 1856	—	T	—	T	TT	—	T
52	,, *polycalcaria* von Linstow, 1903	—	O	—	—	T	—	? (50)
53	,, *pungutchui* Ortlepp, 1938	—	—	—	T	T	—	?
54	,, *rileyi* Loewen, 1929	—	—	—	T	H	—	T
55	,, *regis* Baer, 1923	—	T	—	T	T	—	T
56	,, *retracta* von Linstow, 1903	—	T	—	T	T	—	? (13)
57	,, *saginata* Goeze, 1782	—	T	—	T	TR	T	T
58	,, *secunda* Olssen, 1893	—	—	—	—	T	—	?
59	,, *selousi* Mettrick, 1962	—	—	—	—	—	—	T
60	,, *serialis* (Gervais, 1847) Bailliet, 1863	M	T	—	T	M	—	T
61	,, *sibirica* Dubnitzky, 1952	—	—	—	—	T	—	O (37)
62	,, *skrjabini* (Popov, 1937)	—	—	—	—	M	—	? (40)
63	,, *smythi* (Johri, 1957)	—	—	—	—	M	—	? (50)
64	,, *taeniaeformis* (Batsch, 1786) Wolffügel, 1863	T	T	—	T	H	—	T

TABLE 1.—*Analysis of the status of* Taenia *spp. according to various authors* (continued)

Number	Species	Hall (1919)	Baer (1926)	Joyeux & Baer (1929)	Ortlepp (1938)	Abuladse (1964)	Verster (1967)	This Paper
65	,, *taxidiensis* Skinker, 1935.....	—	—	—	T	F	—	T
66	,, *tenuicollis* Rudolphi, 1819....	—	—	—	—	T	—	O (41)
67	,, *tonkinensis* Railliet & Henry, 1905.....	—	—	O	—	O	O (57)	—
68	,, *triserrata* Meggitt, 1928.....	—	—	—	—	T	—	O
69	,, *twitchelli* Schwartz, 1924.....	—	—	—	—	M	—	T
70	,, *ursina* von Linstow, 1893.....	—	—	—	—	T	—	O (24)

T = *Taenia* TR = *Taeniarhynchus* TT = *Tetratirotaenia* M = *Multiceps*
H = *Hydatigera* F = *Fossor* ? *Species inquirendae* O = *Invalid*
() = The number in parenthesis denotes the number in this list of the species with which it is synonymous.

By using the larval morphology as criterion authors such as Hall (1919) and Abuladse (1964) place some of the *Taenia* spp. in either the genus *Multiceps* Goeze, 1782, *Hydatigera* Lamarck, 1861 or *Tetratirotaenia* Abuladse, 1964. Freeman (1956), however, shows that the larvae of *T. mustelae* may be mono- or poly-cephalic in the same host. Although such diversity has not been found in other species.it does indicate that the structure of the larva is a variable character. As the criteria used for distinguishing between the adults of these four genera are variable it is impossible to assign to any of these an adult of which the larval stage is unknown. The genera *Taeniarhynchus* Weinland, 1858 and *Monordotaenia* Little, 1967 (synonym: *Fossor* Honess 1937) are differentiated from *Taenia* only on the absence of rostellar hooks in the former and on a single row in the latter. A single character may justify the creation of a new species but it cannot be the sole criterion for the erection of a new genus. If the practice of basing a genus on a single character were to be consistently followed, it would necessitate the erection of four more genera to accommodate the eight species in which the genital ducts pass the longitudinal excretory vessels ventrally, to cross into the cortex. This is, however, clearly unwarranted and the continued use of *Taeniarhynchus*, and *Monordotaenia* as well as *Multiceps*, *Hydatigera* and *Tetratirotaenia* at the generic level would only lead to further confusion.

By present day standards the descriptions of many species are incomplete thus leaving their status in doubt. Yet other species have been differentiated from existing ones using characters which are invalid. Only too frequently descriptions are based on the assumption that fragments of cestodes recovered from the same host represent a single species, whereas subsequent work has shown them to be fragments of two or more species parasitizing the host simultaneously. In one instance fragments of cestodes from such diverse hosts as the dog and the lynx were empirically thrown together to create yet another "composite" species (e.g. *T. balaniceps*).

In the present study it was found that most of the characters used for specific identification are subject to some variation and that it is rarely possible to use a single character as the only criterion for specific diagnosis.

The size and shape of the strobila, scolex, rostellum and suckers, as well as the presence or absence of a "neck" are dependent on the method of fixation and are thus invalid criteria.

The number and size of the rostellar hooks are reliable criteria, but in the case of small differences, should be used in conjunction with other characters. The number and size of these structures should be determined on rostella which are mounted *en face* and only those which are in profile, measured. Hall (1919) states that in *Multiceps* the handles of the large rostellar hooks are usually sinuous, but this is variable and also occurs in species in which the larval stage is not a coenurus. Clapham & Peters (1941) show that the rostellar hooks of some species do not increase in size after ingestion by the definitive host and also that adjacent scolices in a coenurus show little variation in size. When measuring larval rostellar hooks, scolices should therefore be removed from different parts of the coenurus and only hooks that are fully developed, measured.

It is rarely possible to make accurate counts of the number of testes in the species of this genus. Their number can be determined by estimating the number in frontal sections and correcting this by the number of layers determined in the transverse sections. In severely contracted material there may be as many as three layers whereas there is only one layer in relaxed material. The size of the cirrus pouch is not constant throughout the length of the strobila; ideally it should therefore be measured in proglottids of varying age. The shape of this structure may also change with the age of the proglottids.

The ovary has two lobes except in *T. solium* which has three. The relative size of the two lobes appears to be constant in any one species. In some species the vagina is surrounded by a well developed sphincter muscle similar to that described by Guyer (1898) in *T. saginata* and by Hall (1919) in *T. taeniaeformis*, but does not occur in others. In one species, *T. multiceps*, there is a "pad" of muscular tissue in the anterior wall of the vagina. With the exception of *T. rileyi* where vaginal sphincters and "pads" may occur haphazardly in the same strobila, they are consistently present or absent in all other species. Hall (1919) states that in *Multiceps*: "The vagina usually shows a reflexed loop in the vicinity of the

lateral excretory canals". This neither occurs throughout the length of the strobila nor in all members of the same species. Verster (1967) shows the number of primary branches of the uterus to be subject to marked variation and that they are often difficult to determine. *T. omissa* appears to be the only species in which the uterus shows so characteristic a shape that it has been used as a criterion for specific diagnosis. The size of the ova should be determined in the terminal proglottid only. This character is subject to extreme variation and different authors rarely, if ever, record the same measurements.

From the evidence available at present, it appears that the adult shows a greater host-specificity than that displayed by the larval stage. Although it has been shown that adult *T. solium* may become established in the golden hamster [*Mesocricetus auratus* (Waterhouse, 1839)] by Gnezdilov (1957) and in the chacma baboon [*Papio ursinus* (Kerr, 1792)] by Verster (1965), it is known to attain patency only in man and the lar gibbon, *Hylobates lar* Linnaeus, 1771 [Cadigan, Stanton, Tanticharoenyos & Chaicumpa (1967)]. *Cysticercus cellulosae*, the larval stage has, however, been recorded from a wide range of mammals other than its normal intermediate host, the pig. Buljevic (1960) records *T. hydatigena* from an experimentally infested domestic cat, but Sweatman & Williams (1962) found that although this cestode can establish itself in cats it does not attain patency. They also showed that *T. ovis* can establish itself in the domestic cat and attain patency in animals fed on horse meat. The evidence of host-specificity in the larval stages of these cestodes is rather less convincing. Sweatman & Henshall (1962) found that there are no morphological differences between *T. ovis* and *T. krabbei* and that sheep are susceptible to infestation with the former but refractory to the latter species. In the absence of other criteria, Boev, Sokolova & Tazieva (1964) used the host preferences of *T. djeirani* to distinguish it from *T. ovis* and *T. cervi*. In view of the fact that species such as *T. solium* and *T. hydatigena* are known to utilize a wide range of animals as intermediate hosts, it is advisable that host-specificity should not be the sole criterion for the diagnosis of a species. It is therefore preferable, that forms showing such preferences be considered subspecies rather than species.

Synonyms and host lists of the species are not given in this paper. The lists given by Abuladse (1964) are accepted; where, however, the writer's findings disagree with those of Abuladse, they are included.

In the text the current names of African states will be used instead of those mentioned in the literature. They are:

Botswana—Bechuanaland.
Congo (Democratic Republic)—Belgian Congo.
Rhodesia—Southern Rhodesia.
Somalia—Italian Somaliland.
Tanzania—Tanganyika.
Zambia—Northern Rhodesia.

Diagnosis of the Genus

The genus *Taenia* Linnaeus, 1758 *sensu strictu* is here defined to read as follows:—

Taeniidae of large size. Rostellum usually present; armed with one or two crowns of hooks. Testes numerous, confluent anterior to female genitalia. Adults parasitic in the intestine of carnivorous mammals and man, rarely in birds. Larval stage a monocephalic cysticercus, or a strobilocercus or a tetra hyridium or a polycephalic coenurus. Type species *Taenia solium* Linnaeus, 1758.

The valid species of this genus may be divided into two groups*:

Group I: Taenia solium

The genital ducts pass between the longitudinal excretory vessels when they cross from the medulla into the cortex. This includes *T. solium* and *T. saginata* from man; all the species from canines and all those from felines with the exception of *T. taeniaeformis*.

Group II: Taenia taeniaeformis

The genital ducts pass the longitudinal excretory vessels ventrally when they cross from the medulla to the cortex. In addition to *T. taeniaeformis* of the domestic cat this group includes the older species which parasitize mustelids and viverids.

Valid Species

Group I

Taenia solium Linnaeus, 1758

Synonym: *Taenia africana* von Linstow, 1900—*pro parte*
Definitive host: Man
Intermediate host: Pig; various mammals
Distribution: Cosmopolitan

Material:

1. Adults from man (Chile, Mexico, Republic of South Africa)
2. Larval stage from pig (Poland, unknown European locality, Brazil, Senegal, Republic of South Africa); man (France, Angola, Republic of South Africa); dog; vervet monkey *Cercopithecus aethiops* (Cuvier, 1821); bushbaby *Galago* sp.; rock hyrax, *Procavia capensis* (Pallas, 1766)

Description (according to Verster, 1967)

Scolex, rostellum and suckers: In an adult from Chile these structures are 937 μ, 375 μ and 411 μ in diameter. The number and size of the rostellar hooks of adult and larval stages are summarized in

* The available material does not permit the determination of this character in *T. endothoracicus* and *T. parenchymatosa*, but for convenience they are included in Group I.

TABLE 2.—*Number and length (in μ) of rostellar hooks of adult and larval* T. solium

Stage	Host	Number	Large Hook			Small Hook		
			n*	Range	Mean ± S.D.**	n	Range	Mean ± S.D.
Adult...	Man.....	27–28	10	159–173	165·7 ± 5·0	10	93–127	120·3 ± 10·0
Larva...	Pig.....	22–36	499	139–200	171·6 ± 10·7	410	100–159	125·2 ± 10·2
	Man.....	24–32	39	163–198	183·6 ± 9·2	35	104–134	123·1 ± 8·0
	Dog.....	25–32	47	160–198	176·6 ± 11·9	42	111–143	122·6 ± 6·2
	Vervet monkey..	32	3	170–175	171·8	3	115·8	115·8
	Bushbaby.....	28	3	170–177	173·3	3	100–114	108·0
	Rock hyrax.....	24–28	12	163–177	168·2 ± 5·1	12	114–139	125·3 ± 6·6

*n = number **S.D. = Standard Deviation

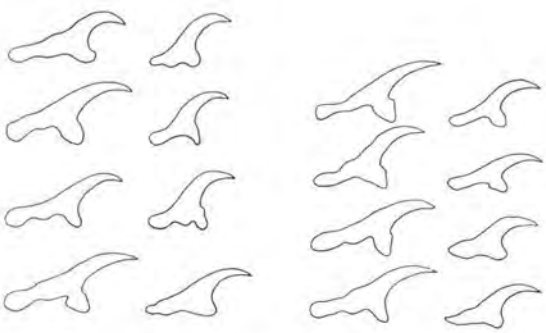
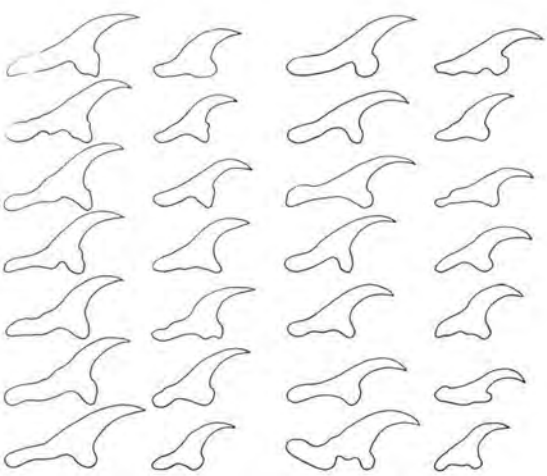


FIG. 1.—*T. solium.* Rostellar hooks of adult (From Verster, 1967)



a b

FIG. 2.—*T. solium.* Rostellar hooks of larval stage from pig. a. from Poland, b. Brazil (From Verster, 1967)

FIG. 3.—*T. solium.* Rostellar hooks of larval stage from man (From Verster, 1967)

Table 2. The rostellar hooks (Fig. 1 to 3) are usually arranged in two rows but in both adult and larval stages there may be from one to three hooks in a third row posterior to and alternating with the small hooks of the second row. These accessory hooks are from 86 to 118 μ long. (Fig. 4).

Male genitalia: There are 375 to 575 testes, 64 to 91 μ by 52 to 73 μ in size, usually in a single layer but in severely contracted specimens there may be two or even three layers. They extend from the anterior to the posterior margin of the segment and are confluent posterior to the vitellarium. Both

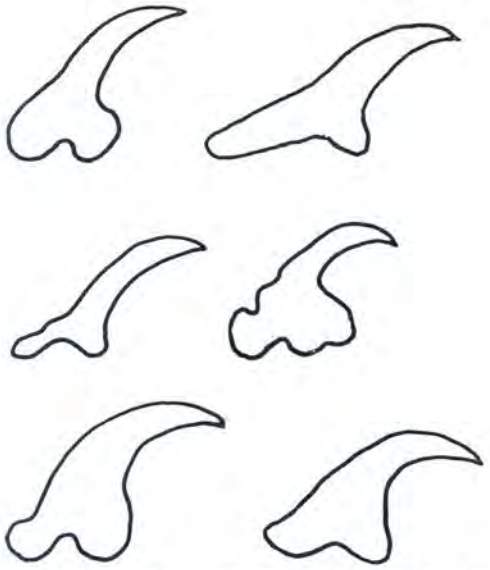


FIG. 4.—*T. solium.* Accessory rostellar hooks (From Verster, 1967)

male and female genital ducts pass between the ventral and dorsal longitudinal excretory vessels to cross into the cortex. The cirrus pouch extends to the longitudinal excretory vessels but not into the medulla. In the sexually mature segment it is 320 to 640 μ long and 114 to 229 μ wide; in the early gravid segment it is 398 to 491 μ by 105 to 160 μ and in the gravid one 519 to 786 μ by 137 to 251 μ. The unarmed cirrus is 25 to 37 μ in diameter.

Female genitalia: The aporal lobe of the ovary is larger than the poral one and gives off an accessory lobe which is situated on the poral side of the uterus, between it and the genital ducts (Fig. 5). The

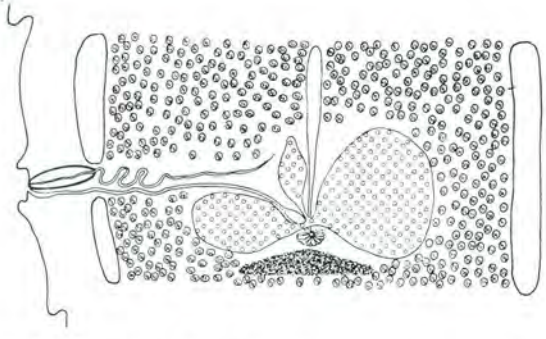


FIG. 5.—*T. solium.* Sexually mature segment (From Verster 1967)

looping of the vagina is more marked in the cortex than in the medulla; it loops anteriorly before opening posteriorly to the cirrus pouch in the genital atrium. There is no vaginal sphincter (Fig. 6). The uterus has 7 to 16 lateral branches which redivide. The ova are spherical, 29 to 34 μ in diameter with an embryophore 4·5 to 5·6 μ thick.

Taenia acinonyxi Ortlepp, 1938

Definitive host: *Acinonyx jubatus* (Schreber, 1775); *Panthera pardus* (Linnaeus, 1758)
Intermediate host: Unknown
Distribution: Africa

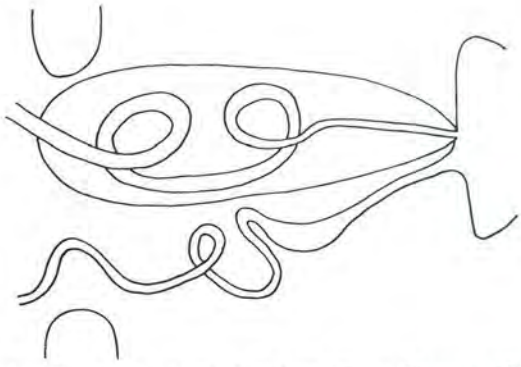


FIG. 6.—*T. solium.* Genital atrium (From Verster, 1967)

Material:

1. Type specimens from cheetah, South West Africa (Veterinary Research Institute, Onderstepoort)
2. Adults from leopard, Congo (Democratic Republic)

Redescription

Scolex, rostellum and suckers: These structures are 900 μ, 435 μ and 350 μ in diameter in the type specimen (Ortlepp, 1938) and 650 μ, 390 μ and 274 μ in the Congo leopard material (Mahon, 1954). The type specimen has 38 rostellar hooks; there are 34 to 42 in the Congo material (Mahon, 1954). In the type specimen the large hook is 209 to 219 μ long and the small hook 119 to 133 μ; in the Congo material they are 205 to 209μ and 119 to 133 μ respectively (Fig. 7).

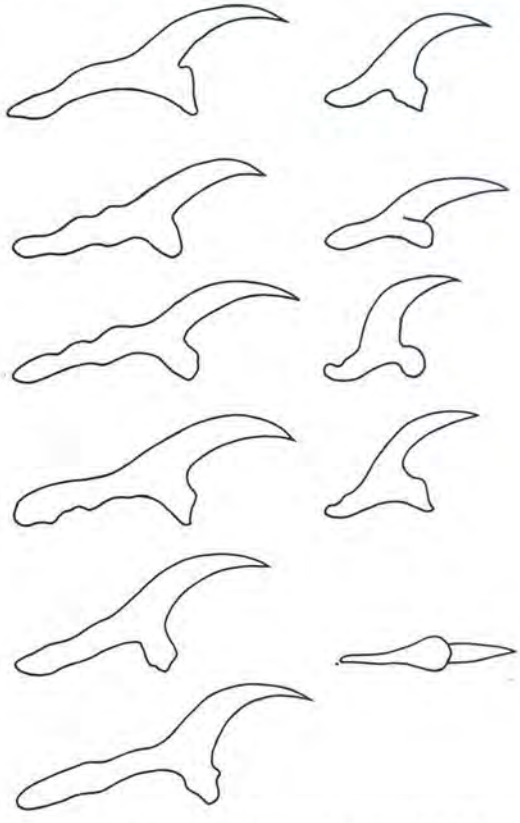


FIG. 7.—*T. acinonyxi.* Rostellar hooks of adult

Male genitalia: There are 250 to 400 testes which are elongated dorsoventrally, 69 to 78 μ by 46 to 55 μ in diameter. They are in a single dorsal layer, mainly in two lateral fields which are united anteriorly by a few testes; posteriorly they extend to the level of the vitellarium. The cirrus pouch, which extends to the longitudinal excretory vessels, is 201 to 366 μ long and 69 to 114 μ wide in the sexually mature segment.

Female genitalia: The two lobes of the ovary are of equal size. The vagina has no sphincter and is not dilated before opening in the genital atrium (Table 3; Fig. 8).

TABLE 3.—*Comparison of* T. acinonyxi *described by various authors*

	Ortlepp (1938)	Mahon (1954)	This Paper	
			Types	Congo Material
Scolex	900	650	—	—
Rostellum	350	390	—	—
Suckers	435	274	—	—
No. Hooks	38	34–42	38	34–38
Large Hook	218–227	216–232	209–219	205–209
Small Hook	128–136	133–148	119–133	119–133
Testes	250–300	—	250–400	—
Cirrus Pouch L*	335	—	201–366	—
W**	125	—	69–114	—
Uterus	8–10	6	—	—

*L = Length **W = Width

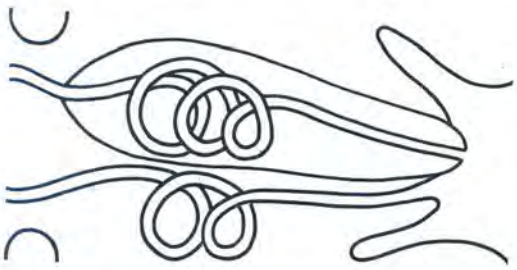


FIG. 8.—*T. acinonyxi.* Genital atrium

Discussion

Ortlepp (1938) differentiated this species from *T. hydatigena* on the shape of the strobila and on the number and distribution of the testes. It is agreed that the shape of the strobila is not a valid criterion for specific diagnosis, nor does the distribution of the testes differ significantly from that of *T. hydatigena.* The two species, however, do differ in the number of testes (250 to 400 vs. 600 to 700) and in the relative size of the two ovarian lobes.

Abuladse (1964) lists *T. hydatigena* from various hosts including felines and mustelids, but some of these records are doubtful. Buljevic (1960) records *T. hydatigena* from an experimentally infested domestic cat. Sweatman & Williams (1962) found that *T. hydatigena* may establish itself in some cats but does not become patent in these animals. Thus despite its close morphological resemblance to *T. hydatigena, T. acinonyxi* is to be considered a distinct species.

Its life-cycle is unknown. Cysticerci which macroscopically resemble those of *T. solium* and *T. ovis* but which have rostellar hooks resembling those of the adult of this species in number, size and shape, have been recovered from the muscles of various herbivores: impala [*Aepyceros melampus* (Lichtenstein, 1812)], sable antelope [*Hippotragus niger* (Harris, 1838)], gemsbok [*Oryx gazella* (Linnaeus, 1758)], grey duiker [*Sylvicapra grimmia* (Linnaeus, 1758)] African buffalo [*Syncerus caffer* (Sparrman, 1779)] and warthog [*Phacochoerus aethiopicus* (Pallas, 1766)] in South Africa and from gereneuk [*Litocranius walleri* (Brooke, 1879)] in East Africa.

Taenia crassiceps (Zeder, 1800) Rudolphi, 1810

Synonyms: *Taenia hyperborea* von Linstow, 1905
Hydatigera hyperborea (von Linstow, 1905) Abuladse, 1964

Definitive host: *Vulpes* spp.; *Alopex* spp.
Intermediate host: Various rodents (Abuladse, 1964)
Distribution: Northern Hemisphere.

The adult of this species parasitizes *Vulpes* spp. and *Alopex* spp. in the northern hemisphere. Rausch (1959a) showed that it is often confused with *T. polyacantha* which also occurs in both these hosts.

Material:

1. Adults from naturally infested foxes: *Vulpes vulpes* (Linnaeus, 1758) from Switzerland; *Alopex lagopus* (Linnaeus, 1758) from Alaska.
2. Larval stage from an experimentally infested golden hamster, *Mesocricetus auratus* (Waterhouse, 1839) from Switzerland.

Redescription

Scolex, rostellum and suckers: In the Alaskan material these are 960 μ, 261 μ and 366 μ in diameter. The larval stage has 30 to 34 rostellar hooks. The large hooks are 178 to 200 ($188{\cdot}2 \pm 4{\cdot}6$) μ and the small hooks 130 to 155 ($143{\cdot}6 \pm 5{\cdot}4$) μ long (Table 4; Fig. 9).

TABLE 4.—*Size of rostellar hooks of* T. crassiceps

Stage	Large Hook			Small Hook		
	n	Range	Mean ± S.D.	n	Range	Mean ± S.D.
Larva	25	178–195	$187{\cdot}2 \pm 4{\cdot}0$	25	142–155	$146{\cdot}0 \pm 3{\cdot}2$
Adult: ex *V. vulpes*	12	183–195	$189{\cdot}8 \pm 4{\cdot}2$	11	136–150	$145{\cdot}3 \pm 4{\cdot}5$
ex *A. lagopus*	12	180–200	$189{\cdot}2 \pm 5{\cdot}9$	12	130–145	$137{\cdot}1 \pm 4{\cdot}5$
Total	49	178–200	$188{\cdot}2 \pm 4{\cdot}6$	48	130–155	$143{\cdot}6 \pm 5{\cdot}4$

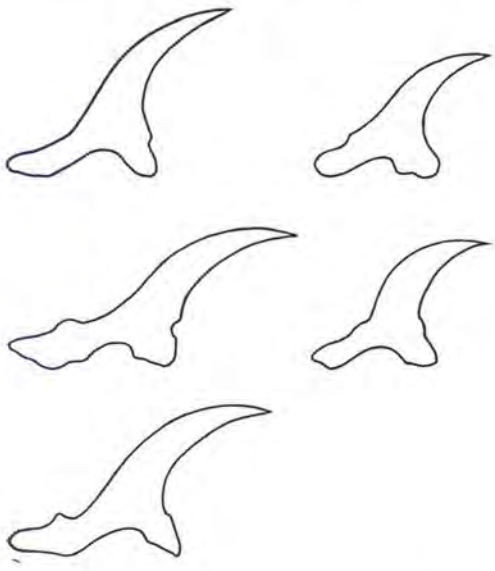


FIG. 9.—*T. crassiceps.* Rostellar hooks of adult

Male genitalia: There are 200 to 220 testes, 45 to 55 μ by 18 to 37 μ in diameter. They are mainly in two layers which are confluent posterior to the vitellaria as well as anterior to the ovary but do not extend to the extreme anterior margin of the segment. The vas deferens arises posteriorly to the level of the genital atrium and, like the vagina, runs obliquely forward to this point. The cirrus pouch extends into the medulla; in the sexually mature segment it is 183 to 218 μ long and 78 to 110 μ wide; in the gravid one 146 to 320 μ by 50 to 105 μ.

Female genitalia: The two lobes of the ovary are of equal size. On entering the cortex, the lumen of the vagina dilates to 23 μ and does not narrow again before opening in the genital atrium. There is no vaginal sphincter (Fig. 10). The uterus has 11 to 18 lateral branches which redivide. The ova are oval, 21 to 26 μ by 19 to 22 μ in diameter, with an embryophore 2·2 to 3·4 μ thick.

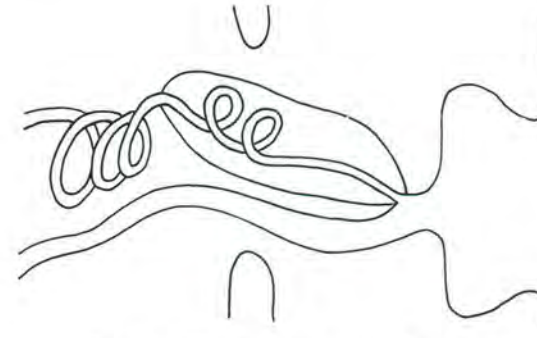


FIG. 10.—*T. crassiceps.* Genital atrium

Discussion

Kirschenblatt (1949) records 30 to 36 rostellar hooks 180 to 197 μ and 130 to 157 μ long on larvae from the hamster while Müller (1965) records hooks 177 to 183 μ and 132 to 141 μ long from the muskrat, *Ondatra zibethica* (Linnaeus, 1766), in Europe. Leiby & Whittaker (1966) found 32 to 34 hooks 183 to 187 μ and 124 to 136 μ long in *Microtus pennsylvanicus* Ord, 1815.

Funikova (1940, according to Abuladse, 1964) found 32 to 34 hooks 170 to 195 μ and 126 to 147 μ long on adult specimens (Table 5).

Rausch (1959a) considers *T. hyperborea* a synonym of this species. Kolmakov (1937) and Petrov & Kosupko (1959), however, regard *T. hyperborea* a valid species differing from *T. crassiceps* in the shape of the strobila, the number, size and distribution of the testes and the secondary branching of the uterus. These criteria are, however, not valid in that the presence or absence of a "neck" as well as the ratio of length to width of the segments is dependent on fixation; the size of the testes may vary considerably in different parts of the strobila. The material of Von Linstow (1905) undoubtedly had more testes than the 94 illustrated, as the illustration of the transverse sections shows three layers of testes. In addition, as pointed out by Rausch, the illustration shows the testes confluent in the posterior part of the segment. The absence of secondary branches in Von Linstow's material may be due to the disension of the branches by eggs. Finally the rostellar hooks

TABLE 5.—*Comparison of* T. crassiceps *described by various authors*

Synonym	*T. crassiceps*							*T. hyperborea*	
Author	Leuckart (1856)	Joyeux & Baer (1936)	Rausch (1952; 1959a)	Romanov (1955; in Abuladse, 1964)	Petrov & Kosupko (1959)	This Paper		Von Linstow (1905)	Kolmakov (1937)
						European	Alaskan		
Scolex	750	760	700	624–702	610–720	—	960	790	710
Rostellum	280	—	—	364–406	—	—	261	—	268–273
Suckers	280	209	200	—	180–210	—	366	—	264
No. Hooks	32–34	30– 34	28– 32	32	30– 34	30– 34	28– 34	30– 32	28– 34
Large Hook	186	185–190	172–178	186–192	176–186	178–195	180–200	170	172–188
Small Hook	135	140–144	121–136	137–139	130–138	136–155	130–145	120	132–154
Testes	—	175–180	200	200	200	200–220	—	—	183–230
Cirrus Pouch L	—	—	160–250	182–272	210–230	146–320	—	180	243
W	—	—	50– 70	126–162	130–148	50–110	—	27	130
Uterus	8	15– 20	16– 20	18– 20	16– 18	11– 18	—	16	10– 12

illustrated by Von Linstow are of the same shape as those of *T. crassiceps*; *T. hyperborea* is therefore to be considered a synonym of this species.

Taenia crocutae Mettrick and Beverley-Burton, 1961

Definitive host: *Crocuta crocuta* (Erxleben, 1777); *Hyaena brunnea* Thunberg, 1820

Intermediate host: Unknown

Distribution: Africa

Mettrick & Beverley-Burton (1961) describe this species from the spotted hyaena in Rhodesia. They show that the cestodes from the brown hyaena described by Baylis (1937) from Tanzania and by Baer & Fain (1955) from the Congo, were assigned to the wrong species as they are *T. crocutae* and not *T. hyaenae*.

Material:

1. Co-type from *C. crocuta* (British Museum).
2. Adults from *C. crocuta*, Congo (Democratic Republic).
3. Adults from *H. brunnea*, Republic of South Africa.

Redescription

Rostellum and suckers: In the co-type these are 457 μ and 306 μ in diameter. The co-type has 38 rostellar hooks and the South African specimen 40; the large hooks are 159 to 201 (185·1 $\pm$ 5·5) μ and the small ones 107 to 123 (116·0 $\pm$ 4·6) μ long (Table 6; Fig. 11).

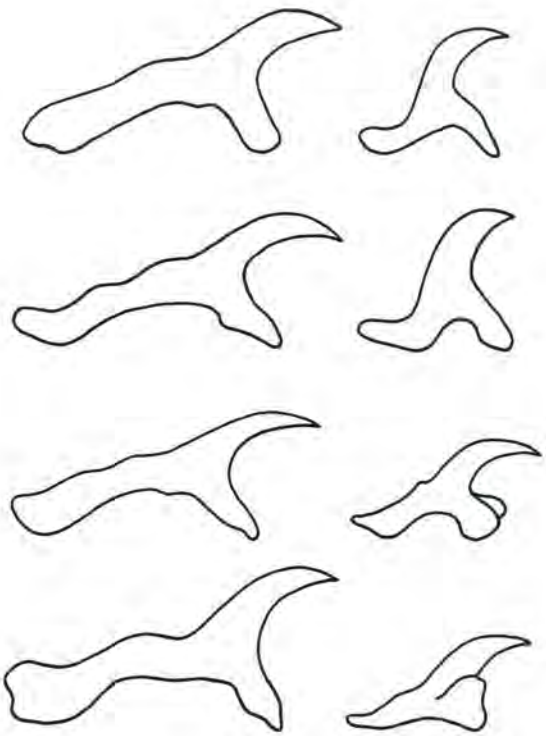


FIG. 11.—*T. crocutae*. Rostellar hooks of adult

Male genitalia: There are 400 to 500 testes in one to two dorsal layers; anteriorly they do not extend to the margin of the segment and posteriorly they extend to the posterior border of the ovary. In the co-type the cirrus pouch extends halfway across the cortex but in the severely contracted Congo material it extends into the medulla. In the sexually mature segment it is 297 to 334 μ long and 105 to 114 μ wide; in the gravid segment 320 to 374 μ by 101 to 114 μ; in the Congo material it is 265 to 329 μ by 73 to 91 μ and 320 to 343 μ by 101 to 114 μ respectively in the mature and the gravid segment. The cirrus is 13 μ in diameter.

Female genitalia: The two lobes of the ovary are of equal size. After passing into the cortex, the vagina loops two or three times but then straightens until it opens in the genital atrium. When it straightens the lumen of the vagina dilates to 46 μ and then narrows to 11 μ to pass through the sphincter, which is 37 to 46 μ in diameter, situated

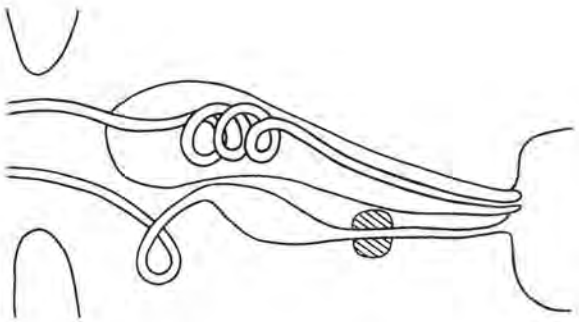


FIG. 12.—*T. crocutae*. Genital atrium

64 to 105 μ from the opening in the genital atrium (Fig. 12). The uterus has 24 to 27 lateral branches which redivide; in the Congo material there are 22 to 28 uterine branches. The ova of the co-type were

TABLE 6.—*Size of the rostellar hooks of* T. crocutae

Origin of specimen	Large hook			Small hook		
	n	Range	Mean $\pm$ S.D.	n	Range	Mean $\pm$ S.D.
Co-type	5	159–170	165·7	5	109–116	113·0
Congo	10	168–198	189·3	10	107–120	113·6
South Africa	5	192–201	195·3	5	114–123	117·9
Total	20	159–201	185·1 $\pm$ 5·5	20	107–123	116·0 $\pm$ 4·6

immature; in the Congo material they are oval, 36 to 38 μ by 31 to 34 μ in diameter, with an embryophore 4·5 to 5·6 μ thick (Table 7).

Discussion

This species, like *T. hyaenae*, parasitizes both the spotted and the brown hyaena. It may be differentiated from the latter species by the shape of the rostellar hook; the testes number is greater and they do not extend to the posterior margin of the segment; the cirrus pouch is smaller; the ovarian lobes are of equal size and the uterus has a greater number of branches, viz. 22 to 28 vs. 10 to 13.

As mentioned later, the adult cestode described by Pellegrini (1949) as *T. hyaenae* which resulted from *Cysticercus dromedarii*, shows some similarity to this species. Cysticerci resembling *T. crocutae* in number, size and shape of the rostellar hooks have been recovered from impala [*Aepyceros melampus* (Lichtenstein, 1812)]; blue wildebeest [*Connochaetes taurinus* (Burchell, 1823)]; tsesseby [*Damaliscus lunatus* (Burchell, 1823)]; roan antelope [*Hippotragus equinus* (Desmarest, 1804)]; sable antelope [*Hippotragus niger* (Harris, 1838)]; kudu [*Tragelaphus strepsiceros* (Pallas, 1766)]; grey duiker [*Sylvicapra grimmia* (Linnaeus, 1758)], and African buffalo [*Syncerus caffer* (Sparrmann, 1779)], in the Republic of South Africa. Similar cysticerci have been recovered from lechwe [*Kobus leche* (Gray, 1850)] in Zambia.

Taenia endothoracicus (Kirschenblatt, 1948)

Definitive host: *Vulpes vulpes* (Linnaeus, 1758)

Intermediate host: *Meriones* spp.; *Rhombomys opimus* (Lichtenstein, 1823); *Gerbillus pyramidus hirtipes* Lataste, 1882 (Abuladse, 1964)

Distribution: Asia; North Africa

Kirschenblatt (1948) described a polycephalic larva from the thoracic cavity of a gerbil, *Meriones erythrourus* Gray, 1842, as *Coenurus endothoracicus*. Dubnizky (1952a) assigns cestodes from naturally infested foxes, *V. vulpes*, to this species.

Material:

Larval stage from naturally infested *Meriones blackleri* Thomas, 1903, from Kazvin, Iran.

Redescription

[Based on larval stage available for study and on description by Dubnizky (1952a)]

Scolex, rostellum and suckers: According to Dubnizky (1952a): Scolex 1,200 to 1,600 μ and the suckers 400 to 500 μ in diameter. The rostellum has 52 to 60 hooks arranged in two crowns; the large hooks are 351 to 372 μ and the small 224 to 241 μ in length. The larval scolex available for study in this investigation has 54 hooks, 329 to 338 μ and 209 to 218 μ in length respectively (Fig. 13).

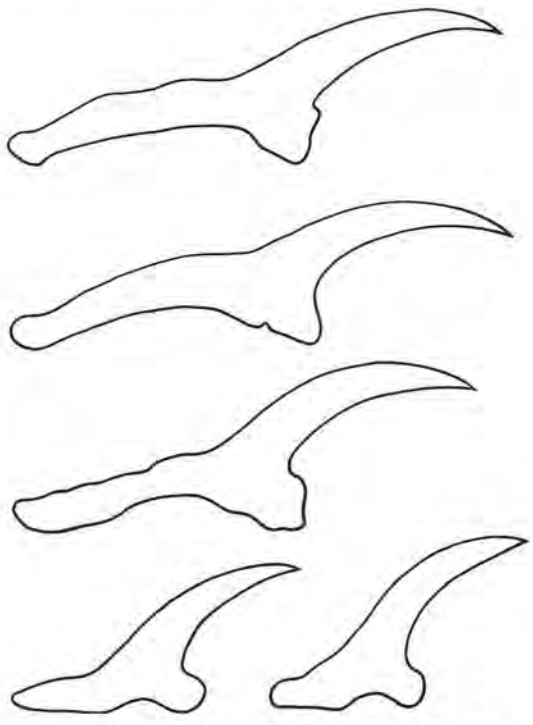


FIG. 13.—*T. endothoracicus*. Rostellar hooks of larval stage

Male genitalia: There are 300 to 400 testes, 45 to 62 μ in diameter. They are mainly anterior to the female genitalia, not confluent at the posterior margin of the segment, nor present in the area immediately surrounding the female genitalia. The cirrus pouch extends to the longitudinal excretory vessels; it is 360 to 375 μ in length and 100 μ in width.

TABLE 7.—*Comparison of* T. crocutae *described by various authors*

Synonym	*T. crocutae*			*T. hyaenae*	
Author	Mettrick & Beverley-Burton (1961)	This Paper		Bayliss (1937)	Baer & Fain (1955)
		Co-type	Congo material		
Scolex	1,240–1,410	—	—	—	—
Rostellum	430	457	—	—	—
Suckers	310– 320	306	—	—	—
No. hooks	36– 40	38	40	38	38– 40
Large hook	181– 192	159–170	168–201	200	190–200
Small hook	128– 132	109–116	107–123	127–156	110–125
Testes	390– 420	400–500	—	—	400–600
Cirrus Pouch L	310– 340	297–374	265–343	—	200–250
W	120	101–114	73–114	—	75– 85
Uterus	19– 24	24– 27	22– 28	25– 28	20– 30

Female genitalia: The two lobes of the ovary are almost spherical in shape. The uterus has 10 to 12 branches which redivide. The ova are spherical or oval, 38 to 42 μ by 33 to 42 μ in diameter (Table 8).

Discussion

This species resembles *T. laticollis* in the number, size and shape of the rostellar hooks. The most marked differences are in the size of the strobila (277 to 399 mm according to Dubnizky, 1952a), which is three to four times that of *T. laticollis*, and the distribution of the testes which do not overlie the female genitalia as they do in *T. laticollis*. Since the host preferences tend to support the morphological differences, *T. endothoracicus* being known only from foxes and *T. laticollis* appearing to be limited to felines, the two are retained as distinct species until further studies prove them to be otherwise.

Taenia gonyamai Ortlepp, 1938

Synonym: *Taenia hlosei* Ortlepp, 1938
Definitive host: *Panthera leo* (Linnaeus, 1758); *Acinonyx jubatus* (Schreber, 1775)
Intermediate host: Unknown
Distribution: South Africa

Ortlepp (1938) differentiated this species of the lion from *T. hlosei* of the cheetah on the number of uterine branches and on the number of testes.

Material:

1. Type specimens of *T. gonyamai* from lion, Republic of South Africa. (Veterinary Research Institute, Onderstepoort)
2. Type specimens of *T. hlosei* from cheetah, Republic of South Africa

Redescription

Scolex, rostellum and suckers: These are 731 to 1371 μ, 352 to 411 μ and 229 to 320 μ in diameter. There are 32 to 40 rostellar hooks arranged in two crowns (Fig. 14; Table 9).

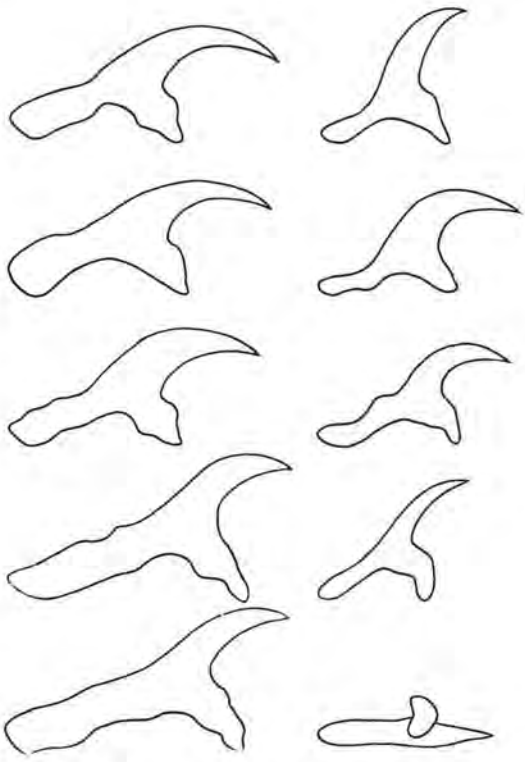


FIG. 14.—*T. gonyamai.* Rostellar hooks of adult

TABLE 8.—*Comparison of* T. endothoracicus *described by various authors*

	Kirschenblatt (1948)	Dubnizky (1952a)	Dollfus (1965)	This Paper
Scolex	830–840	1,200–1,600	—	—
Rostellum	590–600	—	—	—
Suckers	351 × 518–444 × 481	400– 500	—	—
No. hooks	52– 56	52– 60	56– 62	54
Large hook	314–332	351– 372	335–360	329–338
Small hook	203–218	224– 241	205–219	209–218
Testes	—	300– 400	—	—
Cirrus Pouch L	—	360– 375	—	—
W	—	100	—	—
Uterus	—	10– 12	—	—

TABLE 9.—*Size of rostellar hooks of* T. gonyamai

Type specimens	Large hooks			Small hooks		
	n	Range	Mean ± S.D.	n	Range	Mean ± S.D.
T. gonyamai	34	183–218	193·0 ± 9·9	23	120–143	131·2 ± 6·3
T. hlosei	21	187–209	199·0 ± 5·7	16	123–146	133·8 ± 5·7
Total	55	183–218	195·4 ± 9·0	39	120–146	132·2 ± 6·1

Male genitalia: There are 500 to 750 testes, 69 to 128 μ by 46 to 69 μ in diameter; they are in a single dorsal layer which extends posteriorly to the vitellarium and are not confluent along the posterior margin. The cirrus pouch may extend to the lateral wall of the ventral longitudinal vessel; in the sexually mature segment it is 375 to 617 μ long and 60 to 205 μ wide; in the gravid one 411 to 662 μ by 101 to 183 μ. The cirrus 18 to 23 μ in diameter, is covered with bristles.

Female genitalia: The aporal lobe of the ovary is smaller than the poral one. The vagina is relatively straight until it enters the cortex where it loops several times; its lumen dilates (50 to 78 μ in diameter) and then narrows abruptly to pass through the sphincter before opening in the genital atrium. The sphincter, 37 to 63 μ in diameter, is 55 to 91 μ from the opening in the genital pore (Fig. 15). The uterus has 17 to 30 lateral branches which redivide (Table 10).

TABLE 10.—*Comparison of* T. gonyamai *described by various authors*

Synonym	*T. gonyamai*		*T. hlosei*	
Author	Ortlepp (1938)	This Paper	Ortlepp (1938)	This Paper
Scolex	—	1,371	1,000–1,100	731
Rostellum	—	411	450	352
Suckers	—	320	500	229
No. Hooks	32– 38	32– 40	36– 40	32– 40
Large Hook	188–209	183–218	209–215	187–209
Small Hook	122–142	120–143	145–151	123–146
Testes	500–600	730–750	400	500
Cirrus Pouch L.	400–440	526–662	475–487	375–548
W	120–150	160–205	133	60–123
Uterus	14– 18	17– 22	20– 30	22– 30

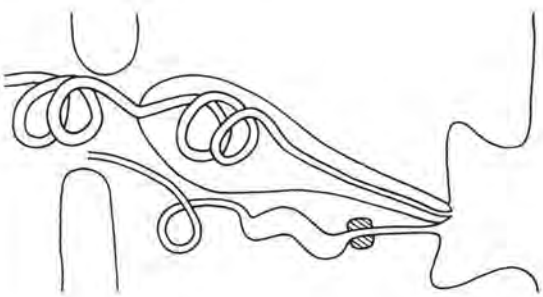


FIG. 15.—*T. gonyamai.* Genital atrium

Discussion

Ortlepp (1938) differentiated this species from *T. hlosei* on the number of uterine branches and the number of testes. Examination of the types and cotypes showed that the number of uterine branches of the two species overlaps. The type specimens of *T. hlosei* differ from those of *T. gonyamai* only in having somewhat fewer testes (500 vs 730 to 750) and in that the cirrus pouch is shorter and narrower. Since these characters are subject to marked variation in other species, *T. hlosei* must be considered a synonym of *T. gonyamai* which has page precedence.

Ortlepp (1938) differentiated this species from *T. hydatigena* on the number and shape of the rostellar hooks and on the number of uterine branches. It further differs in having a well-developed vaginal sphincter which is absent in *T. hydatigena.*

Cysticerci resembling this species in the number, size and shape of the rostellar hooks have been recovered from impala [*Aepyceros melampus* (Lichtenstein, 1812)]; blue wildebeest [*Connochaetus taurinus* (Burchell, 1823)]; African buffalo [*Syncerus caffer* (Sparrmann, 1779)], and kudu [*Tragelaphus strepsiceros* (Pallas, 1766)].

Taenia hyaenae Baer, 1926

Synonym: *Taenia lycaontis* Baer & Fain, 1955
Definitive host: *Hyaena brunnea* Thunberg, 1820; *Crocuta crocuta* (Erxleben, 1777); *Lycaon pictus* (Temminck, 1820)

Intermediate host: Unknown
Distribution: Africa

As pointed out earlier, the cestodes from brown hyaena described as *T. hyaenae* by Baylis (1937) and Baer & Fain (1955) are actually *T. crocutae.*

Material:

1. Type specimens from *H. brunnea*, Republic of South Africa (Institute of Zoology, Neuchatel)
2. Type specimens of *T. lycaontis*, from *L. pictus*, Congo (Democratic Republic) (Institute of Zoology, Neuchatel)
3. Adults from *H. brunnea* and *C. crocuta*, Republic of South Africa

Redescription

Scolex, rostellum and suckers: Baer (1926) records these as 1·2 mm, 500 μ and 400 μ in diameter; Baer & Fain (1955) as 1·0 mm, 400 μ and 310 to

TABLE 11.—*Size of rostellar hooks of* T. hyaenae

Specimens	Large hooks			Small hooks		
	n	Range	Mean ± S.D.	n	Range	Mean ± S.D.
T. hyaenae (types)	10	202–216	208·2 ± 1·4	6	132–141	136·6
T. lycaontis (types)	20	218–242	230·0 ± 5·8	16	142–165	152·0 ± 7·2
South African material	19	195–223	209·8 ± 6·7	19	128–159	143·8 ± 9·3
Total	49	195–242	217·7 ± 11·9	41	128–165	146·1 ± 9·5

330 μ in diameter. The type specimen of *T. hyaenae* has 32 rostellar hooks arranged in two crowns. The additional South African material has 28 to 36 (Table 11; Fig. 16).

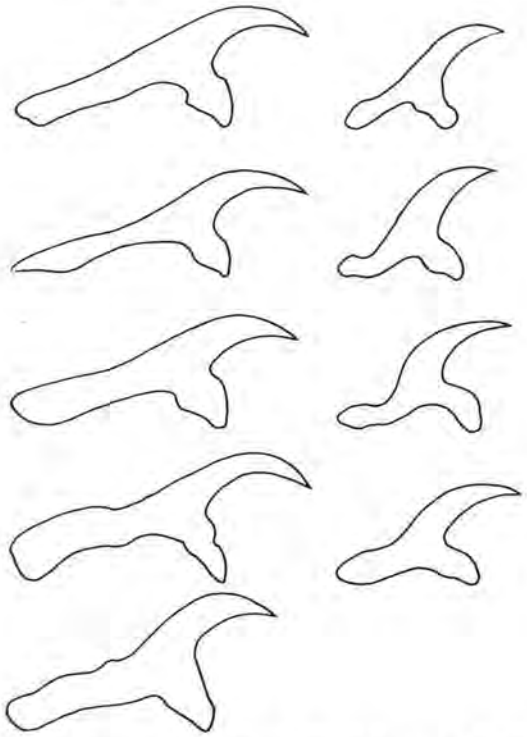


FIG. 16.—*T. hyaenae*. Rostellar hooks of adult

Male genitalia: There are 280 to 410 testes, 91 to 128 μ by 69 to 82 μ in diameter, in a single dorsal layer. They extend from the anterior to the posterior margin and are confluent posterior to the vitellarium. The cirrus pouch extends to the longitudinal vessels; in the sexually mature segment it is 366 to 457 μ long and 69 to 105 μ wide; in the gravid one 457 to 584 μ by 69 to 114 μ. The cirrus 14 to 18 μ in diameter, is covered with hairlike bristles.

Female genitalia: The poral lobe of the ovary is slightly smaller than the aporal one. The lumen of the vagina dilates to 37 μ and then narrows to pass through the vaginal sphincter, which is 27 to 41 μ in diameter and situated 64 to 105 μ from the opening in the genital atrium (Fig. 17). The uterus has 7 to 13 lateral branches which redivide (Table 12).

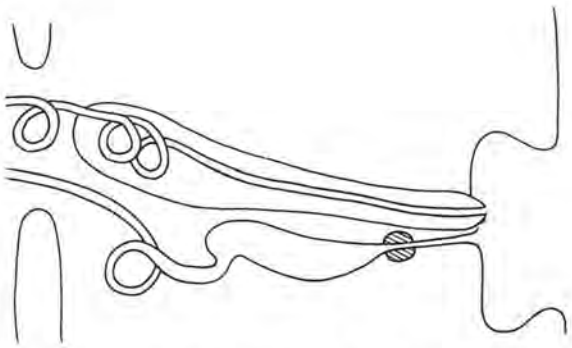


FIG. 17.—*T. hyaenae*. Genital atrium

Discussion

The rostellar hooks of the type specimen of *T. lycaontis* are somewhat larger than those of the types of *T. hyaenae*. The range of variation in the size of the rostellar hooks of the additional material from South Africa overlaps that of the type specimens of *T. hyaenae* and that of *T. lycaontis*; also the rostellar hooks of all these specimens are similar in shape.

Pellegrini (1949) infested hyaenas with *Cysticercus dromedarii* Pellegrini, 1945 which occurs in camels [*Camelus dromedarius* (Linnaeus, 1758)] and cattle in Somalia, and concludes that these are the larval stage of *T. hyaenae*. This conclusion, however, cannot be accepted as the description of the adult resulting from this infestation has characters in common with both *T. hyaenae* and *T. crocutae*. The number (34 to 44) of rostellar hooks and their size (187 to 212 μ and 112 to 137 μ) overlaps those of both species. The size of the cirrus pouch (400 to 480 μ by 110 to 140 μ) is similar to that of *T. hyaenae*, but the number of uterine branches (24 to 30) and the distribution of the testes correspond with that of *T. crocutae*. It therefore seems possible that Pellegrini was dealing with a dual infestation which may be due to a previous naturally acquired infestation of the experimental animal.

Cysticerci, which resemble this species in the number, size and shape of the rostellar hooks, have been recovered from impala [*Aepyceros melampus* (Lichtenstein, 1812)], and sable antelope [*Hippotragus niger* (Harris, 1838)], in the Republic of South Africa.

TABLE 12.—*Comparison of* T. hyaenae *described by various authors*

Synonym	*T. hyaenae*		*T. lycaontis*		
Author	Baer (1926)	This Paper	Baer & Fain (1955)	Mettrick (1962)	This Paper
Scolex	1,200	—	1,000	970–1,000	—
Rostellum	500	—	400	480	—
Suckers	400	—	310–330	440– 460	—
No. hooks	32–38	28– 36	32	30– 34	—
Large hook	223	202–216	215–240	212– 220	218–242
Small hook	127	132–141	131–165	133– 142	142–165
Testes	300	280	300–500	—	360–410
Cirrus Pouch L	400	366–503	300–450	—	389–584
W	—	91–114	80–150	—	69–105
Uterus	12–14	10– 13	8– 15	—	7– 12

Taenia hydatigena Pallas, 1766

Synonym: *Taenia ursina* von Linstow, 1893
Taenia jakhalsi Ortlepp, 1938

Definitive host: *Canis familiaris* Linnaeus, 1758 and various canines; *Ursus arctos* Linnaeus, 1758

Intermediate host: Various ruminants (Abuladse, 1964)

Distribution: Cosmopolitan

Material:

1. Adults from experimentally infested dogs, Republic of South Africa
2. Co-type of *T. ursina* from *U. arctos* (Dept. of Zoology, Royal Agricultural and Veterinary College, Copenhagen)
3. Type specimen of *T. jakhalsi* from *Canis mesomelas* Schreber, 1775. (Veterinary Research Institute, Onderstepoort)

Redescription

Scolex, rostellum and suckers: On two adults these were 601 to 682 μ, 373 to 382 μ and 228 to 273 μ in diameter. Ten adult specimens have 28 to 36 rostellar hooks arranged in two crowns. The large hooks vary from 191 to 218 ($203{\cdot}9 \pm 3{\cdot}5$) μ and the small ones from 118 to 143 ($132{\cdot}5 \pm 3{\cdot}1$) μ (Fig. 18).

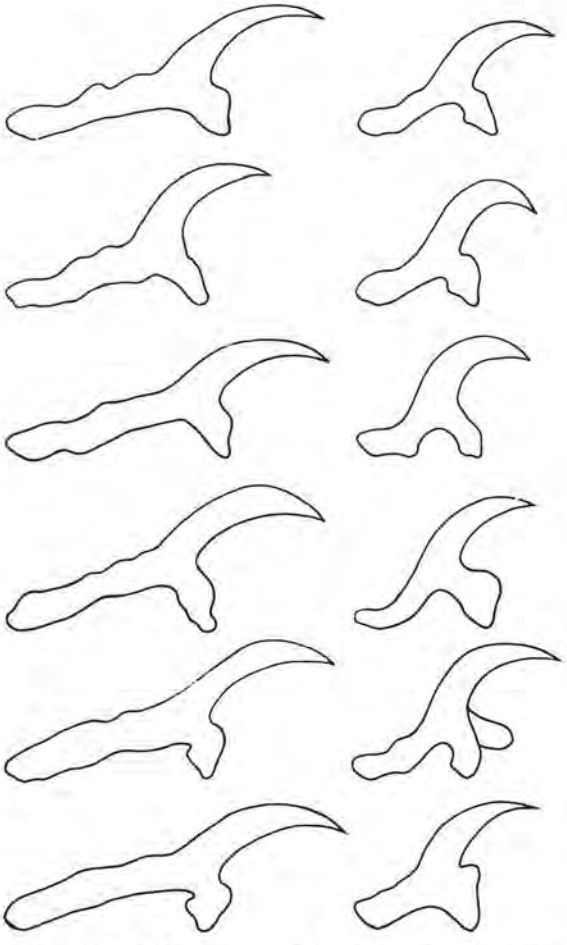


FIG. 18.—*T. hydatigena.* Rostellar hooks of adult

Male genitalia: There are 600 to 700 testes which are 69 to 91 μ by 55 to 78 μ in diameter. They are in a single dorsal layer; posteriorly they extend to the vitellarium but are not confluent. The cirrus pouch extends to the longitudinal excretory vessels but does not extend into the medulla. In sexually mature segments it is 273 to 342 μ long and 114 to 191 μ wide; in the early gravid one 319 to 376 μ by 114 to 165 μ and in the gravid one 320 to 434 μ by 160 μ. The cirrus, 41 to 46 μ in diameter, is covered with hairlike bristles.

Female genitalia: The two lobes of the ovary are of unequal size. The vagina which has a well developed muscular wall throughout, skirts the poral ovarian lobe and then runs close to and parallel with the vas deferens. After passing into the cortex, it loops posteriorly and its lumen (13 to 18 μ) forms a dilatation 40 μ wide and 215 μ long before opening in the genital atrium (Fig. 19). The uterus has 6 to 10 lateral branches which redivide. The ova are oval, 36 to 39 μ by 31 to 35 μ in diameter, with an embryophore 4·5 to 5·6 μ thick (Table 13).

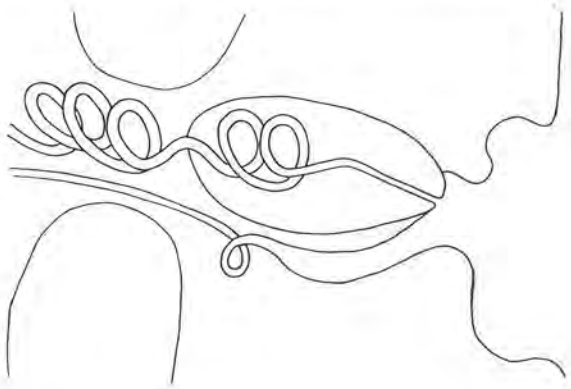


FIG. 19.—*T. hydatigena.* Genital atrium

Discussion

Abuladse (1964) lists *T. hydatigena* from a wide range of definitive and intermediate hosts. The larval stage, *Cysticercus tenuicollis*, is much larger than that of other species, and is thus easily identified; the majority of the records, particularly those in ruminants, are thus probably correct. This, however, is not true of the records of the adults listed by Abuladse (1964), which have been recorded not only from canines but also from felines and mustelids. Sweatman & Williams (1962) have shown by experimental infestation that the domestic cat is not a suitable host for this cestode. The records from lion [*Panthera leo* (Linnaeus, 1758)] and leopard [*Panthera pardus* (Linnaeus, 1758)] could be erroneous identifications implicating a number of species having the same number of rostellar hooks of comparable size; those from mustelids could be *T. martis*.

The larval stage is common and widespread in domesticated ruminants in South Africa. Ortlepp (1961) records it from springbok [*Antidorcas marsupialis* (Zimmermann, 1780)], and black wildebeest [*Connochaetus gnou* (Zimmermann, 1780)]. It has also been recovered from impala [*Aepyceros melampus* (Lichtenstein, 1812)]; hartebeest [*Alcelaphus buselaphus* (Pallas, 1766)]; blue wildebeest [*Connochaetus taurinus* (Burchell, 1823)]; blesbuck [*Damaliscus dorcas phillipsi* (Harper, 1939)] and tsesseby[*Damaliscus lunatus* (Burchell, 1823)].

TABLE 13.—*Comparison of* T. hydatigena *described by various authors*

Synonym	*T. hydatigena*							*T. ursina*		*T. jakhalsi*	
Author	Leuckart (1856)	Deffke (1891)	Ransom (1913)	Hall (1919)	Petrov (1941; in Abuladse, 1964)	Christensen & Roth (1949)	This paper	Von Linstow (1893)	This paper	Ortlepp (1938)	This paper
Scolex	—	—	—	1,000	1,000	1,000	601–682	1,106	—	922–956	—
Rostellum	340	—	—	—	—	—	373–382	480	—	315–405	—
Suckers	340	—	—	310	310	—	228–273	440	—	371–394	—
No. hooks	32– 38	36	26– 44	26– 44	26– 44	—	28– 36	26	—	30– 32	30– 32
Large hook	178	200	170–220	170–220	170–220	170–200	191–218	169	—	195–220	188–201
Small hook	114	160	110–160	110–160	110–160	110–160	118–143	130	—	131–142	124–137
Testes	—	600–700	—	600–700	600–700	—	600–700	—	890–1,000	400–500	400
Cirrus pouch L	—	450	—	450	450	—	273–434	—	—	450–464	274–366
W	—	130	—	130	130	—	114–191	—	—	133	69–114
Uterus	—	5– 8	5– 8	5– 10	5– 10	5– 10	6– 10	—	8– 9	6– 10	6– 10

Taenia ingwei Ortlepp, 1938

Definitive host: *Panthera pardus* (Linnaeus, 1758)
Intermediate host: Unknown
Distribution: Africa

Material:

1. Type specimens from leopard, Republic of South Africa (Veterinary Research Institute, Onderstepoort)
2. Additional adults from the same host and locality

Redescription

Scolex, rostellum and suckers: Ortlepp (1938) records the scolex as 720 to 790 μ, the rostellum 390 μ and the suckers 290 μ in diameter. There are 30 to 34 rostellar hooks arranged in two crowns. The large hooks are 183 to 193 (mean 187·9 μ) and the small hooks 134 to 145 (mean 140·2 μ) long (Fig. 20).

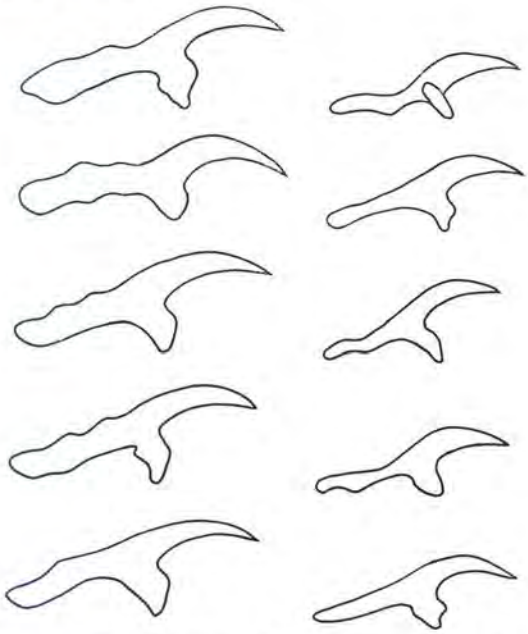


FIG. 20.—*T. ingwei.* Rostellar hooks of adult

Male genitalia: There are 600 to 670 testes, 64 to 87 μ in diameter; they are in a single dorsal layer which is confluent dorso-posteriorly to the vitellarium. The cirrus pouch almost extends to the lateral wall of the ventral longitudinal vessel; in the mature segment it is 343 to 411 μ long and 55 to 137 μ wide; in the gravid one 366 to 411 μ by 78 to 105 μ.

Female genitalia: The poral lobe of the ovary is only slightly smaller than the aporal one. The vagina has very few convolutions; in the cortex its lumen dilates gradually but narrows again to pass through the sphincter before opening in the genital atrium (Fig. 21). The sphincter, 50 to 64 μ in diameter, is 50 to 69 μ from the opening in the genital atrium. The uterus has 8 to 11 lateral branches which subdivide. (Table 14).

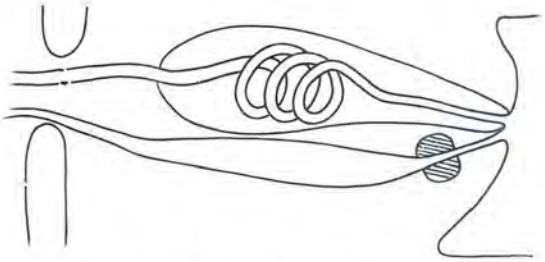


FIG. 21.—*T. ingwei.* Genital atrium

TABLE 14.—*Comparison of* T. ingwei *described by various authors*

	Ortlepp (1938)	Mettrick & Beverley-Burton (1961)	This Paper
Scolex	720–790	910–1,100	—
Rostellum	390	—	—
Suckers	290	270–280	—
No. Hooks	32– 34	36– 40	30– 34
Large Hook	197–202	195–220	183–193
Small Hook	148–151	123–135	134–145
Testes	400–500	400	600–670
Cirrus Pouch L.	435	440–450	343–411
W.	87	100	55–137
Uterus	6– 10	5– 10	8– 11

Discussion

This species has relatively few uterine branches resembling *T. hydatigena;* it differs from the latter, however, in having a well developed vaginal sphincter. It differs from *T. gonyamai* in the shape of the large rostellar hook; in that the testes are confluent posterior to the vitellarium and in having fewer uterine branches; from *T. hyaenae* in the shape and smaller size of the rostellar hooks; in having testes posterior to the vitellarium; and in having a greater number of testes.

Taenia laticollis Rudolphi, 1819

Definitive host: *Lynx lynx* (Linnaeus, 1758); *Lynx canadensis* Kerr, 1792

Intermediate host: Unknown
Distribution: Northern Hemisphere

This cestode was described in detail by Leuckart (1856). It has since been redescribed by several authors, but some of the latter descriptions do not apply to this species. These misidentifications are based on the statement of Lühe (1910) that there are 38 to 40 rostellar hooks, and not 60 as recorded by Leuckart (1856).

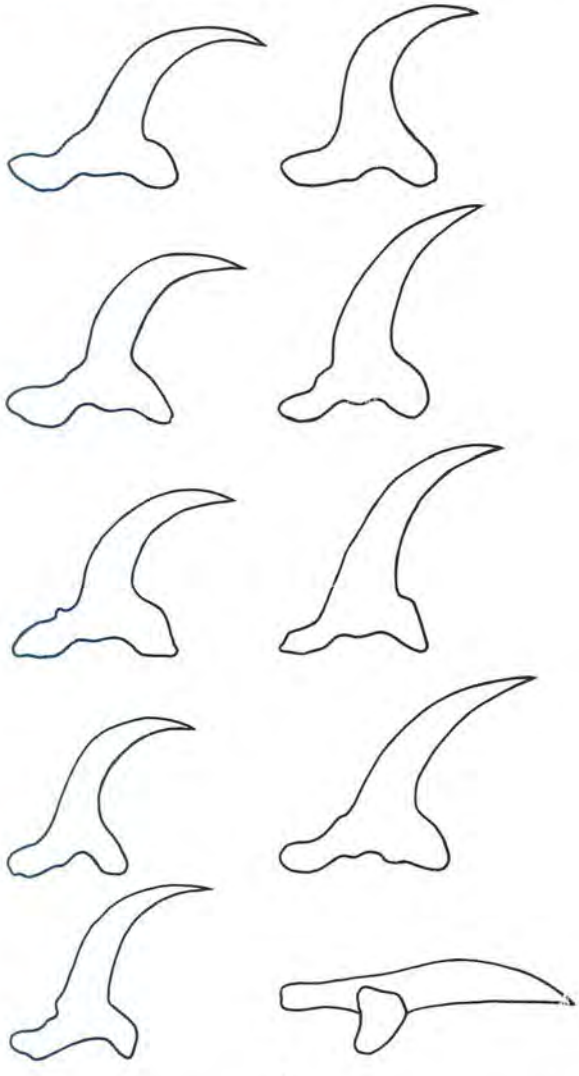
Material:

1. Type specimens from *L. lynx* (Vienna Museum)
2. Specimens from *L. canadensis*, Alaska and Canada

Redescription

Strobila: This is 55 to 65 mm long and up to 2 mm wide. The total length would be greater as the specimens are not gravid.

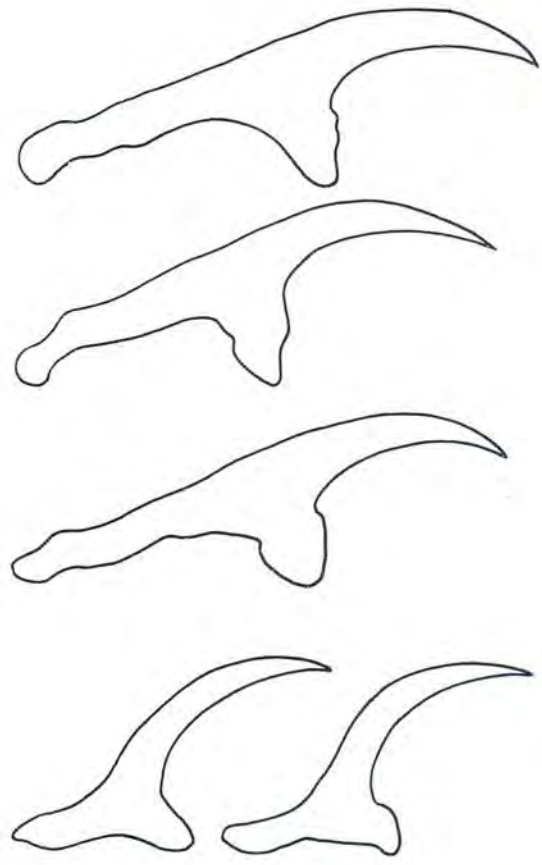
Scolex, rostellum and suckers: On two type specimens these are 892 to 910 μ, 563 to 592 μ and 346 to 364 μ in diameter. The type specimens have lost all the large and some of the small rostellar hooks. The number of rostellar hooks, determined from the remaining hooks and the "scars" of those lost, is 58 to 62. The small hooks are 183 to 247 (mean 215·7) μ long (Fig. 22a). The majority of the specimens from North America have also lost all the large hooks, but there are one to 12 large hooks remaining on four specimens. This material has 58 to 62 hooks; the large hook is 370 to 407 (mean 382·2) μ and the small hook 218 to 233 (mean 224·0) μ long (Fig. 22b).



a

FIG. 22a.—*T. laticollis.* Rostellar hooks of adult. Type specimens

Male genitalia: There are 290 to 430 testes, 50 to 69 μ by 46 to 55 μ in diameter. They are in two, sometimes three layers; extend from the anterior to the posterior margin; are also present dorsal to the female genitalia but are interrupted by the uterus.



b

FIG. 22b.—*T. laticollis.* Rostellar hooks of adult. b. American material

The vas deferens is heavily coiled and relatively large. The cirrus pouch extends to the longitudinal vessels and may just enter the medulla; in the sexually mature segment it is 218 to 320 μ long by 110 to 155 μ wide.

Female genitalia: The two lobes of the ovary are of equal size. The vagina is not surrounded by a sphincter and its lumen dilates only slightly before opening in the genital atrium (Fig. 23). In the Canadian specimens the uterus has 15 to 20 lateral branches. The ova are oval, 36 to 38 μ by 28 to 31 μ in diameter, with an embryophore 3·3 to 4·5 μ thick.

FIG. 23.—*T. laticollis.* Genital atrium

Discussion

Type specimens of *Taenia laticollis* Rudolphi, 1819, deposited at the Museums of Berlin and Vienna, appear to be two species. Lühe (1910) found 38 to 40 hooks on specimens from Berlin while those from Vienna (described above) have 58 to 62. Although Leuckart (1856) did not examine the type specimens, his description agrees with that of the only remaining type specimens in Vienna and must therefore be accepted as correct.

Hall (1919) compiled the descriptions of previous workers. The descriptions given by Skinker (1935a) and Joyeux (1945) agree with that of Lühe, but as they all have a maximum of 42 rostellar hooks they are not *T. laticollis*. Joyeux & Baer (1937) described *T. laticollis* from *Genetta genetta* (Linnaeus, 1758) but examination of these specimens has shown them to be *T. parva*. The cestodes listed as *T. laticollis* from the genet in Spain by Lopez-Neyra (1945) are also probably *T. parva* as are those described by Dollfus (1962) from *Herpestes ichneumon* (Linnaeus, 1758) in Algeria. Flores-Barroeta, Hidalgo-Ecalante & Brenes (1958) identified a cestode from the grey fox [*Urocyon cinereoargenteus* (Schreber, 1775)] as *T. laticollis*, but this is incorrect as it has only 40 hooks which, according to the illustration, are 236 μ and 148 μ long respectively. It is possible that this is actually *T. pisiformis*. Fagasinski (1961) identified cestodes from a *Felis sylvestris* × *F. catus* hybrid in Poland as *T. laticollis*, distinguishing it from *T. taeniaeformis* on the absence of a vaginal sphincter. It is possible that Fagasinski's specimens were in fact *T. taeniaeformis*, but that the vaginal sphincter was not detected due to the maceration of the material, collected several days after the death of the host. The number of the rostellar hooks, viz. 32 to 40, excludes them from being *T. laticollis*, *T. macrocystis* or *T. endothoracicus*. They agree closely with *T. pseudolaticollis* nom. nov. described as *T. laticollis* by Skinker (1935a) and Joyeux (1945), which does not have a vaginal sphincter; further study of the specimens is necessary for their final placement (Table 15).

The Canadian specimens agree in all respects with the type specimens from Vienna, but the cirrus pouch is 229 to 315 μ by 78 to 101 μ while it is 218 to 320 μ by 110 to 155 μ in the type specimens. As the type specimens are immature the number of uterine branches and the size of the ova were determined in the Canadian specimens.

This species may be differentiated from *T. macrocystis* on the following:

1. All the large hooks are embedded equidistant from the tip of the rostellum; in *T. macrocystis* alternate large hooks are situated further back than the adjacent large hooks.
2. It is the only species in which some testes are present dorsal to the ovary and not just overlapping the edge of the ovary.
3. The vas deferens is larger and more heavily coiled than in any other species.
4. The cirrus pouch does not extend into the medulla as it does in *T. macrocystis*.

The rostellar hooks of both *T. taeniaeformis* and *T. parva* resemble those of *T. laticollis* in size but differ in number. Furthermore, in *T. laticollis* the male and female genital ducts pass between the dorsal and ventral longitudinal vessels, but in *T. taeniaeformis* and *T. parva* they pass ventral to both these vessels.

T. endothoracicus is the only other species with rostellar hooks comparable both in number and size. The shape of the large rostellar hook to a certain extent resembles that of *T. laticollis;* the number of testes (300 to 400), the size of the cirrus pouch (360 to 375 μ by 100 μ) and the number of uterine branches (10 to 12) are close to those of *T. laticollis*. *T. endothoracicus* differs, however, in that the area immediately around the ovary and vitellarium is free of testes. In view of their close similarities it is desirable that these two species be studied in greater detail not only as to their anatomy but also as to their host preferences.

If these two species are shown to be distinct from one another, it is possible that the cestodes recorded from the coyote (*Canis latrans* Say, 1823) by Skinker (1935a) and Freeman, Adorjan & Pimlott (1961) and from the wolf (*Canis lupus* Linnaeus, 1758) by Freeman, *et al.*, (1961) in North America are *T. endothoracicus*. *T. endothoracicus* is known from the fox in Asia (Dubnizky, 1952a) which may have been introduced into North America via Siberia and

TABLE 15.—*Comparison of* T. laticollis *described by various authors*

	Gamtsemlidze (1941; in Abuladse, 1964)	Rodanya (1957; in Abuladse, 1964)	Riser (1956)	This Paper	
				Types	American material
Strobila	170 mm	160 mm	—	>65 mm	—
Scolex	1,950	1,420	—	892–910	1,329
Rostellum	600	900	—	563–592	746
Suckers	390	—	—	346–364	391
No. hooks	60	60	—	58– 62	58– 62
Large hook	370	378–396	380–400	—	370–407
Small hook	220	225	210	183–247	218–233
Testes	—	—	—	290–430	—
Cirrus Pouch L.	—	—	—	218–320	229–315
W.	—	—	—	110–155	78–101
Uterus	—	—	—	—	15– 20

Alaska. At present it would seem that the felines, *L. lynx* and *L. canadensis* however, are the only authentic hosts of *T. laticollis*.

Taenia macrocystis (Diesing, 1850)

Definitive host: Felines (Abuladse, 1964)
Intermediate host: Lagomorphs (Abuladse, 1964)
Distribution: North and South America

The larval stage of this cestode, *Cysticercus macrocystis* Diesing, 1850 from *Sylvilagus brasiliensis* (Linnaeus, 1758) in Brazil, was described before the adult was known. Lühe (1910) re-examined specimens from South American felines which Diesing had identified as *T. crassicollis* (synonym: *T. taeniaeformis*), and amongst these there were specimens which appeared to be the sexual stage of the cysticercus.

Material:

1. Type specimens from *S. brasiliensis*, Brazil· (Vienna Museum)
2. Larval stage from *S. brasiliensis*, Caracas, Venezuela
3. One scolex from among the type specimens of *T. omissa*. (Vienna Museum)
4. Two specimens from *Felis wiedii wiedii* Schinz, 1821 (synonym: *Felis macroura* Wied, 1823), Brazil

Redescription

Scolex, rostellum and suckers: In the specimens of Lühe's material these are 974 μ, 728 μ and 300 μ in diameter. There are 58 to 60 rostellar hooks. The large hooks are equal in number to the small hooks, but are set in a characteristic fashion: the point of attachment of alternate large hooks is behind that of the adjacent hooks so that they are intermediate in position between those in the first crown and the small hooks. The large hooks in the anterior row have thick handles while the alternating hooks have more slender handles. The total lengths of these two types of large hooks do not differ significantly; in the type specimens they are 297 to 343 μ and 306 to 338 μ long (Fig. 24; Table 16).

Male genitalia: There are 340 to 480 testes, 69 to 91 μ by 50 to 69 μ in diameter; these are in two layers extending from the anterior to the posterior margin, but are not confluent at the latter. The cirrus pouch extends into the medulla; in the sexually mature segment it is 233 to 297 μ long by 46 to 64 μ wide; in the early gravid one 242 to 297 μ by 59 to 79 μ and in the gravid segment 242 to 320 μ by 50 to 73 μ.

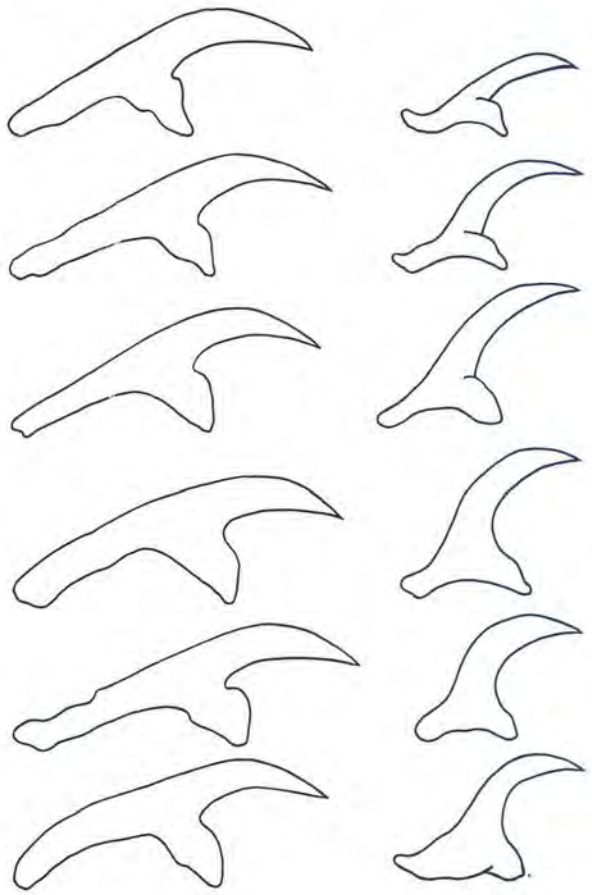


FIG. 24.—*T. macrocystis*. Rostellar hooks of larval stage (types)

Female genitalia: The two lobes of the ovary are of equal size. The vagina is wavy throughout its length, most marked in the cortex; it has no sphincter and no real dilatation although its lumen is sometimes slightly wider (Fig. 25). The uterus has 9 to 12 lateral branches. The ova are oval, 33 to 35 μ by 22 to 25 μ in diameter, with an embryophore 2·2 to 3·4 μ thick (Table 17).

TABLE 16.—*Size of the rostellar hooks of* T. macrocystis

	Large hook			Small hook		
	n	Range	Mean ± S.D.	n	Range	Mean ± S.D.
Larval stage:						
Type specimens	22	297–343	324·7 ± 12·8	11	183–196	189·0 ± 6·0
Venezuelan	5	338–352	344·6	5	201–209	204·1
Adult:						
Lühe's collection	6	356–370	363·3	3	196–223	210·9
Baer's collection	2	329–338	333·6	4	187–197	192·1
TOTAL	35	297–370	334·7 ± 18·4	23	183–223	195·7 ± 10·5

TABLE 17.—*Comparison of* T. macrocystis *described by various authors*

	Lühe (1910)	Hall (1919)	Riser (1956)	This Paper	
				Type specimen (larval)	Adults
Scolex	1,250–1,500	1,250–1,600	—	—	974
Rostellum	620	515– 690	—	—	728
Suckers	340– 350	290– 350	—	—	300
No. hooks	60	60– 74	—	58– 60	60
Large hooks	320– 340	320– 365	320–340	297–338	329–370
Small hooks	180	180– 200	190	183–196	187–223
Testes	—	Few	—	—	340–480
Cirrus pouch L	—	300– 345	—	—	233–320
W	—	35– 60	—	—	46– 79
Uterus	9– 12	8– 15	—	—	9– 12

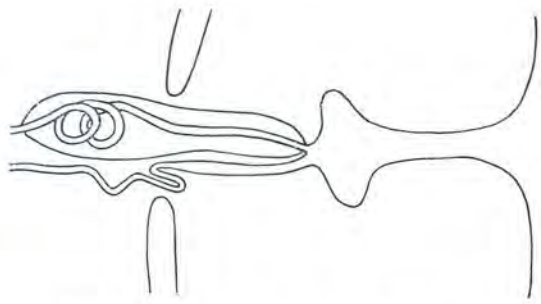


FIG. 25.—*T. macrocystis.* Genital atrium

Discussion

Moniez (1880) records 34 to 40 rostellar hooks on the type specimens but Lühe (1910) regards this as an error. It is not known whether the type specimens are all from a single animal, but it is possible that there were some *C. fasciolaris* among them, and that these were the specimens described by Moniez. The larvae of both *T. macrocystis*, which is intramuscular in leporids, and of *T. taeniaeformis* in the liver of rodents, are strobilocerci; the type specimens of *T. macrocystis* were collected not only from the back muscles but also from the body cavity and encapsulated in the liver (Lühe, 1910). While *C. fasciolaris* is not common in leporids, it has been recorded from them by Joyeux, Senevet & Gros (1936, according to Mahon, 1954b).

Hall (1919) records the larval stage of this species from *S. braziliensis* and Grundmann (1958) from *Lepus californicus* Gray, 1837. In the U.S.S.R. Abuladse (1964) states that Gubanov recorded it from *Lepus timidus* Linnaeus, 1758 in 1956 and in 1958 from *Sciurus vulgaris* Linnaeus, 1758. In Canada, Mahon (1954b) records *C. fasciolaris* from the back muscles of *Lepus americanus* Erxleben, 1777. These larvae which have 50 to 60 rostellar hooks, 380 to 392 μ and 225 to 240 μ long, are probably *T. macrocystis*. In Venezuela Lopez-Neyra & Diaz-Ungria (1956) describe a cysticercus from the muscles of *Sylvilagus floridianus* (J. A. Allen, 1890) as that of *T. rileyi*. As these cysts have 62 to 68 rostellar hooks, 310 to 350 μ and 200 to 250 μ long, they cannot be those of *T. rileyi* but are probably *T. macrocystis*.

Lühe (1910) recorded the adult from *Panthera onca* (Linnaeus, 1758); *Lynx rufus* (Schreber, 1777) and *Lynx baileyi* Merriam, 1890 and Riser (1956) from an unidentified lynx. In the present study immature specimens were found in *L. canadensis* from Alaska. According to Abuladse (1964) it has been recorded by Petrov & Potekhina (1953), Irgashev (1956) and Muminov (1962) from *V. vulpes* and by Gubanov (1956) from an experimentally infested wolf cub (*Canis lupus* Linnaeus, 1758). The records of this species in canines must be treated with some reserve, since *T. endothoracicus*, a parasite of the fox, may be confused with it. It is difficult to assess the validity of Gubanov's identification of the cestodes from the experimentally infested wolf. It is improbable that the monocephalic strobilocercus of *T. macrocystis* can be confused with the polycephalic coenurus of *T. endothoracicus*. A re-examination of these canine records is indicated.

Taenia multiceps Leske, 1780

Synonym: *Multiceps multiceps* (Leske, 1780) Hall 1919
Multiceps gaigeri Hall, 1916
Multiceps skrjabini Popov, 1937

Definitive host: *Canis familiaris* Linnaeus, 1758 and various canines (Abuladse, 1964)

Intermediate host: Sheep, goats and other ruminants (Abuladse, 1964)

Distribution: Cosmopolitan

Clapham (1942b) lists *T. serialis* and *T. packii* as well as *Taenia clavifer* (Railliet & Moque, 1919), *Taenia glomeratus* (Railliet & Henry, 1915), *Taenia lemuris* (Cobbold 1862), *Taenia polytuberculosus* (Megnin, 1880) and *Taenia ramosus* (Railliet & Marulla, 1919) synonyms of this species. She considers the other valid species to be: *T. brauni*, *T. gaigeri*, *T. twitchelli*, *Taenia macracantha* (Clapham, 1942) and *Taenia otomys* (Clapham, 1942). Nagaty & Ezzat (1947) regard *T. serialis* as a valid species, with *T. gaigeri* a synonym of *T. multiceps*. Bondareva (1953) considers *T. serialis*, *T. gaigeri* and *M. skrjabini* distinct from one another and from *T. multiceps*.

Material:

1. Type specimen of *T. gaigeri* (U.S.D.A.)
2. Adult *T. gaigeri* from an experimentally infested dog (Egypt)

3. Adults from dog, black-backed jackal and hunting dog infested with scolices originating from experimentally infested sheep; Republic of South Africa.
4. Coenuri from experimentally infested sheep, Republic of South Africa.

Redescription

Scolex, rostellum and suckers: In seven adults of South African origin these structures are 746 to 956 μ, 273 to 364 μ and 200 to 273 μ in diameter. The type specimen of *T. gaigeri* has 28 and the South African material 22 to 30 rostellar hooks arranged in two crowns (Fig. 26, Table 18).

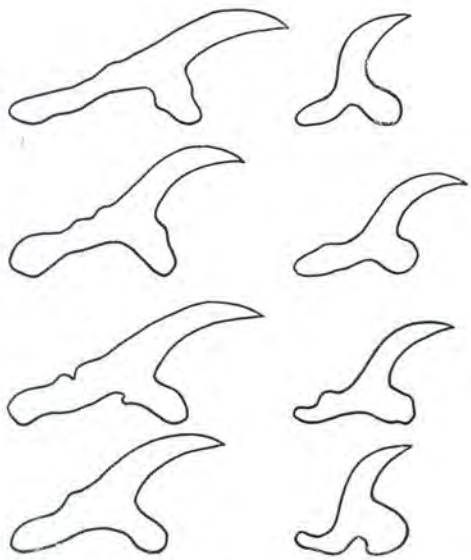


FIG. 26.—*T. multiceps.* Rostellar hooks of adult

Male genitalia: There are 284 to 388 testes in two dorsal layers. They are mainly in two lateral fields, few being present anterior to the female genitalia; posteriorly they extend to the level of the vitellarium but are not confluent at the posterior margin. The vas deferens is markedly coiled throughout its length. The cirrus pouch extends to the longitudinal vessels but not into the medulla. In the sexually mature segment it is 200 to 261 μ long and 64 to 100 μ wide; in the early gravid segment it is 227 to 295 μ by 80 to 91 μ; and in the gravid segment 238 to 306 μ by 78 to 101 μ. The cirrus is covered with hairlike bristles.

Female genitalia: The two lobes of the ovary are of equal size. There is a "pad" of muscle fibres against the anterior wall of the vagina between the latter and the cirrus pouch; this "pad", 14 to 23 μ in diameter, is 90 to 105 μ from the vaginal opening in the genital pore (Fig. 27). The uterus has 14 to 20 lateral branches which redivide. The ova are oval, 28 to 36 μ by 24 to 33 μ, and have an embryophore 3·4 to 5·6 μ thick (Table 19).

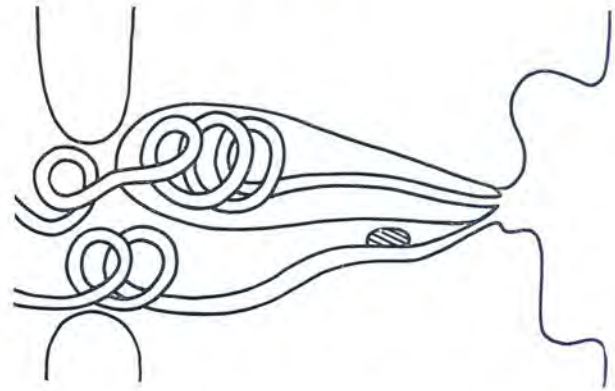


FIG. 27.—*T. multiceps.* Genital atrium

Discussion

Clapham (1942b) regards *T. serialis* as a synonym of *T. multiceps* while Nagaty & Ezzat (1947) consider them to be different species. The present findings substantiate the latter view, as among other differences, *T. serialis* has a well-developed vaginal sphincter while *T. multiceps* has a "pad" only.

Contrary to Clapham's findings, Nagaty & Ezzat (1947) regard *Taenia gaigeri*, resulting from experimental infestations, as identical to *T. multiceps*. Re-examination of these specimens has confirmed their conclusion.

Hall (1919) states that the larval stage of *T. multiceps* occurs in the central nervous system of the intermediate host and that of *T. gaigeri* in the central nervous system, other organs, intramuscularly and subcutaneously. This difference in habitat appears to be related to the species of the intermediate host involved: in sheep coenuri mature only in nervous tissue but in goats they may reach maturity in other organs. The description of the sexual stage of *Multiceps skrjabini* Popov, 1937 does not differ from that of *T. multiceps*, but in sheep the larval stage develops to maturity in the intramuscular connective tissues, subcutaneous tissues and in the thoracic and abdominal cavities (Abuladse, 1964). This parasite is probably a subspecies of *T. multiceps*, the difference in habitat being due to isolation and selection in a restricted locality (Kazakh SSR).

TABLE 18.—*Size of rostellar hooks of* T. multiceps *of S. African origin*

	Large hook			Small hook		
	n	Range	Mean ± S.D.	n	Range	Mean ± S.D.
Larval stage	50	157–177	166·7 ± 5·3	35	109–136	125·0 ± 5·8
Adult	34	157–177	168·0 ± 5·7	21	98–136	125·7 ± 9·4
Total	84	157–177	167·2 ± 5·4	56	98–136	125·5 ± 7·3

TABLE 19.—*Comparison of* T. multiceps *described by various authors*

	T. multiceps							*T. gaigeri*				*M. skrjabini*
	Deffke (1891)	Ransom (1905)	Hall (1919)	Clapham (1942b)	Johri (1950)	Dollfus (1959)	This paper	Hall (1919)	Bhaduri & Maplestone (1940)	Clapham (1942b)	This paper	Popov (1937; in Abuladse, 1964)
Scolex.....	—	800	800	—	985	750	746–956	950	690–1,270	—	—	750–900
Rostellum.....	—	300	300	—	320	—	273–364	360	—	—	—	—
Suckers.....	—	300	290–300	—	260	240–300	200–273	310–330	—	—	—	—
No. hooks.....	28	22– 32	22– 32	—	30	28	22– 30	28– 32	26– 34	—	28	32
Large hook.....	160	150–170	150–170	120–170	146	147–152·5	157–177	160–180	144–168	145–180	—	150
Small hook.....	115	90–130	90–130	76–130	73–103	87·7– 95	98–136	115–150	84–124	103–160	—	110
Testes.....	200–250	—	200	—	266	—	284–354	200–225	—	—	298–388	—
Cirrus pouch L.	250–350	—	315–350	—	300–500	255	220–306	260	—	—	200–250	—
W.	128	—	110–145	—	—	90	64–101	100–125	—	—	90–100	—
Uterus.....	18– 26	18– 26	9– 26	—	13– 16	10– 14	14– 20	12– 15	—	—	—	20– 24

Taenia omissa Lühe, 1910

Definitive host: Felines
Intermediate host: ? *Odocoileus* spp.
Distribution: North and South America

Material:

1. Type specimens (Vienna Museum): *Felis concolor* Linnaeus, 1771; scolices only
2. Adults from *F. concolor*; British Columbia, Canada

Redescription

Scolex, rostellum and suckers: In six type specimens these structures are 637 to 774 μ, 391 to 546 μ and 173 to 237 μ in diameter and on two specimens from Canada 1,229 to 1,482 μ, 610 to 626 μ and 283 to 324 μ in diameter.

In one type specimen the two crowns of rostellar hooks were complete, there being 22 in each crown. The remaining scolices had lost some of their hooks, but the number could be gauged by the "scars" where they had been attached, the number varying from 38 to 44. The two specimens from Canada each had 20 small hooks but had lost all the large ones. The large hooks are 270 to 297 μ ($284{\cdot}8 \pm 8{\cdot}0\ \mu$) and the small ones 201 to 223 μ ($216{\cdot}7 \pm 6{\cdot}5\mu$) long (Fig. 28). The small hooks of the Canadian material are 192 to 214 μ long.

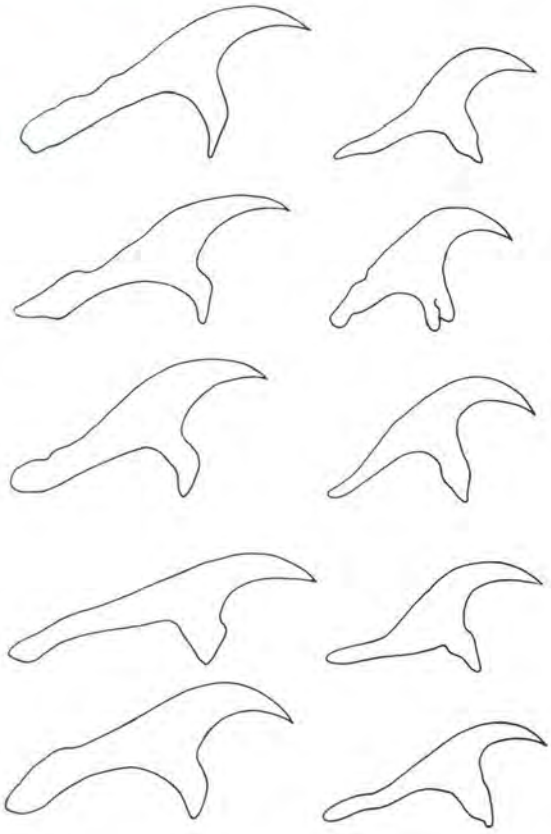


FIG. 28.—*T. omissa.* Rostellar hooks of adult (Type specimens)

Male genitalia: In the Canadian material there are 345 to 380 testes, in a single dorsal layer. They are mainly in two lateral fields with relatively few anterior to the female genitalia, posteriorly they extend slightly beyond the posterior margin of the ovary. The cirrus pouch does not quite extend to the longitudinal vessels; in the sexually mature segment it is 503 to 617 μ long by 105 to 119 μ wide, in the early gravid segment 503 to 548 μ by 114 to 137 μ and in the gravid one 448 to 594 μ by 114 to 160 μ.

Female genitalia: The poral lobe of the ovary is markedly smaller than the aporal one. The vagina is wavy throughout its length, most marked in the cortex where it loops several times before opening in the genital atrium. It is surrounded by a well developed sphincter, 46 to 69 μ in diameter, situated 91 to 110 μ from its opening (Fig. 29). The uterus has one to three main lateral branches which redivide. The ova are oval, 37 to 41 μ by 31 to 34 μ in diameter, with an embryophore $4{\cdot}5$ to $5{\cdot}6$ μ thick (Table 20).

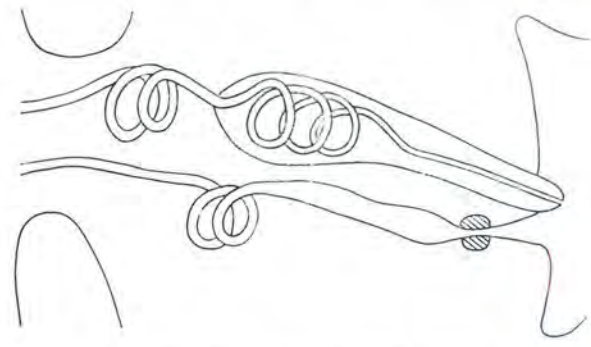


FIG. 29.—*T. omissa.* Genital atrium

Discussion

Van Zyll de Jong (1966) found that *T. omissa* and *T. rileyi* (from the lynx) could not be differentiated from one another on the number and size of the rostellar hooks, but that they could be differentiated on the length of the handles. This criterion does not, however, appear to be reliable as these lengths are seen to overlap in his illustrations; further Clapham (1942b) showed in *T. multiceps* and *T. serialis*, that handle length is subject to great variations; van Zyll de Jong also points out that these two species may be separated from one another on the number and shape of the uterine branches.

Riser (1956) records *Odocoileus hemionus* (Rafinesque, 1817) and *Dama virginianus* Zimmermann, 1780 as the intermediate hosts; Van Zyll de Jong (1966) lists the former host only. These records, however, are assumptions based on the food preferences of the definitive host and have still to be proved experimentally. The cysticercus from *Odocoileus virginianus coriacou* (Boddaert, 1784) (synonym: *Odocoileus cariacou*) described by Lopez-Neyra & Diaz-Ungria (1956) as "*T. lyncis*" (Synonym: *T. rileyi*) would be that of *T. omissa*, should this assumption be proved correct.

Taenia ovis (Cobbold, 1869) Ransom, 1913 *sensu latu*

Synonym: *Taenia krabbei* Moniez, 1879
Taenia cervi Christiansen, 1931
Taenia djeirani Boev, Sokolova and Tazieva, 1964

TABLE 20.—*Comparison of* T. omissa *described by various authors*

	Lühe (1910)	Dollfus (1944)	Riser (1956)	Van Zyll de Jong (1966)	This Paper	
					Types	Canadian
Scolex	780	—	—	—	637–774	1,229–1,482
Rostellum	470	—	—	—	391–546	610– 626
Suckers	230–280	—	—	—	173–237	283– 325
No. hooks	40	40	—	—	38– 44	40
Large hook	270–290	270–290	240–280	253	270–297	—
Small hook	190–200	190–200	180–210	203	201–223	192– 214
Testes	—	—	—	—	—	345– 380
Cirrus pouch L	—	—	—	—	—	448– 617
W	—	—	—	—	—	105– 160
Uterus	1– 2	2	—	4– 5	—	1– 3

TABLE 21.—*Size of rostellar hooks of* T. ovis ovis

	Large Hook			Small Hook		
	n.	Range	Mean ± S.D.	n.	Range	Mean ± S.D.
Cysticercus	20	173–186	177·6 ± 3·4	15	111–120	116·1 ± 3·6
Adult	50	170–191	183·1 ± 3·3	40	114–127	122·4 ± 4·2
TOTAL	70	170–191	179·9 ± 5·9	55	111–127	120·6 ± 4·9

Cobbold described the cystic stage of this parasite of sheep in 1869, but it was subsequently confused with and believed to be identical to, the cystic stage of *T. solium* of the pig. In 1913, however, Ransom proved experimentally that the cysticerci found in sheep are the larval stage of a dog tapeworm and not that of *T. solium*.

Moniez based the description *T. krabbei* on material recovered from a dog experimentally infested with cysticerci (*C. tarandi*) recovered from reindeer [*Rangifer tarandus* (Linnaeus, 1758)]. Likewise Christiansen (1931) based the description of *T. cervi* on material recovered from a dog infested with cysticerci from roedeer [*Capreolus capreolus* (Linnaeus, 1758)] and Boev, Sokolova & Tazieva (1964) that of *T. djeirani* from specimens of a dog infested with material from the Persian gazelle [*Gazella subguttorosa* (Güldenstaedt, 1780)].

Taenia ovis ovis n. comb.

Synonym: *Taenia ovis* (Cobbold, 1869) Ransom, 1913
Definitive host: *Canis familiaris* Linnaeus, 1758 and various canines
Intermediate host: Sheep and other ruminants
Distribution: Cosmopolitan

Material:

1. Larval stage from experimentally infested sheep, Republic of South Africa
2. Adults from experimentally infested dogs, Republic of South Africa and Kazakh S.S.R.
3. Adult from a naturally infested dog, New Zealand

Redescription

Scolex, rostellum and suckers: In eight adults these structures are 637 to 1092 μ, 364 to 419 μ and 319 to 455 μ in diameter. Eleven adults and three cysticerci have 30 to 34 rostellar hooks arranged in two crowns (Table 21; Fig. 30).

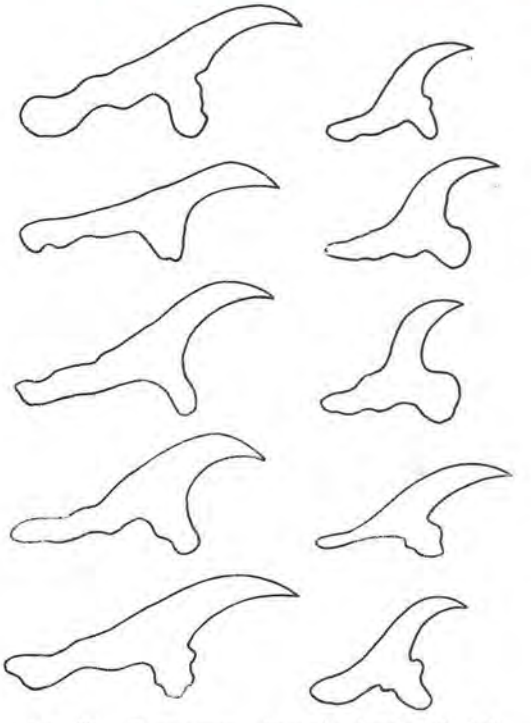


FIG. 30.—*T. ovis ovis.* Rostellar hooks of adult

Male genitalia: There are 600 to 750 testes in the South African and New Zealand material and 350 to 450 in the Kazakhstan material. They are 91 to 101 μ by 59 to 78 μ in diameter. They are mainly in a single dorsal layer, extending from the anterior margin of the segment to the posterior edge of the ovary. The cirrus pouch does not extend to the longitudinal vessels. In the sexually mature segment it is 301 to 329 μ long and 82 to 105 μ wide (but 460 to 550 μ by 130 to 150 μ in the Kazakhstan material) and in the gravid one 320 to 411 μ by 101 to 137 μ (500 to 650 μ by 130 to 150 μ in the Kazakhstan material). The cirrus, 32 μ in diameter, is provided with hairlike bristles.

Female genitalia: The poral lobe of the ovary is smaller than the aporal one. The vagina which is almost straight, just clears or touches the poral lobe of the ovary. It is surrounded by a well developed sphincter, 46 to 69 μ in diameter, from 78 to 114 μ from its opening in the genital atrium (Fig. 31). The uterus has 11 to 20 lateral branches which subdivide soon after leaving the main stem. The ova are oval, 29 to 31 μ by 24 to 26 μ in diameter with an embryophore 2·2 to 4·5 μ thick (Table 22).

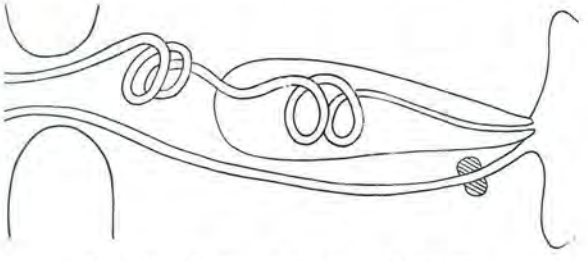


FIG. 31.—*T. ovis ovis.* Genital atrium

Discussion

Although the sheep is the type host of this species, it is doubtful that it is its normal intermediate host. Ransom (1913) records degenerate cysts in sheep 83 days after infestation while Sweatman & Henshall (1962) found similar cysts after 21 days. The author has also found degenerate cysts 28 days after infestation in South Africa. As it is improbable that a parasite in its usual host would be subject to degeneration at such an early stage, it is more than likely that another ruminant is its normal intermediate host.

Taenia ovis krabbei n. comb.

Synonym: *Taenia krabbei* Moniez, 1879
Taenia cervi Christiansen, 1931
Taenia djeirani Boev, Sokolova and Tazieva, 1964

Definitive host: *Canis familiaris* Linnaeus, 1758 and various canines

Intermediate host: *Rangifer tarandus* (Linnaeus, 1758); *Capreolus capreolus* (Linnaeus, 1758); *Gazella subguttorosa* Güldenstaedt, 1780) and other ruminants

Distribution: Northern hemisphere

Material:

1. *T. krabbei*—
   (a) Cotype (U.S.D.A.)
   (b) Adult (experimental infestation); Canada
2. *T. cervi*—
   (a) Larval and adult type specimens (Royal Agricultural & Veterinary College, Copenhagen)
   (b) Adult (experimental infestation); Kazakh S.S.R.
3. *T. djeirani*—Adult (experimental infestation); Kazakh S.S.R.

Redescription

Scolex, rostellum and suckers: These structures are 864 to 972 μ, 324 to 432 μ and 252 to 396 μ in diameter. There are 24 to 32 rostellar hooks; the large hooks are 152 to 180 μ and the small ones 87 to 115 μ long.

Male genitalia: The number of testes could not be determined in the *T. krabbei* cotype nor in the *T. cervi* material. The *T. krabbei* material of Canadian origin has 760 to 900 while *T. djeirani* has 650 testes. The cirrus pouch does not extend to the longitudinal excretory vessels. In the secually mature segment it is 320 to 560 μ long and 90 to 150 μ wide; in the early gravid segment it is 311 to 560 μ by 82 to 170 μ and in the gravid one 338 to 540 μ by 105 to 150 μ. The cirrus is 18 to 20 μ in diameter.

Female genitalia: The poral lobe of the ovary is smaller than the aporal one. The vagina is surrounded by a sphincter, 32 to 73 μ in diameter, which is situated 55 to 110 μ from its opening in the genital atrium. The uterus has 9 to 15 lateral branches which redivide. The ova are oval, 29 to 34 μ by 24 to 28 μ in diameter, with an embryophore 4·5 to 5·6 μ thick (Table 23).

TABLE 22.—*Comparison of* T. ovis ovis *described by various authors*

	Ransom (1913)	Hall (1919)	Sweatman & Henshall (1962)	Boev *et al.* (1964)	This Paper		
					S. Africa	New Zealand	Kazakhstan
Scolex	800–1,250	800–1,250	—	880–1,202	637–1,092	—	—
Rostellum	275– 375	275– 375	—	360– 430	364– 419	—	—
Suckers	240– 320	240– 320	—	270– 350	319– 455	—	—
No. Hooks	24– 36	24– 36	32– 38	24– 38	30– 34	—	—
Large Hook	156– 188	156– 188	160– 202	131– 188	170– 191	—	—
Small Hook	96– 128	96– 128	89– 157	95– 128	111– 127	—	—
Testes	—	300	301– 507	300– 465	650– 700	600–750	350–450
Cirrus Pouch L.	450– 550	450– 550	—	—	301– 411	311–366	460–650
W.	—	—	—	—	82– 137	91–128	120–160
Uterus	20– 25	20– 25	14– 31	10– 30	15– 20	11–13	12– 18

TABLE 23.—*Comparison of* T. ovis krabbei *as described by various authors*

Synonym	*T. krabbei*					*T. cervi*				*T. djeirani*	
Author	Cram (1926)	Sweatman & Henshall (1962)	Brzeskii (1962/63)	This paper		Christiansen (1931)	Boev *et al.* (1964)	This paper		Boev *et al.* (1964)	This paper
				Co-type	Canadian material			Types	Kazakhstan material		
Scolex	500	—	860–922	—	914	550–700	1,070–1,540	—	972	990–1,540	864–936
Rostellum	—	—	278–483	—	366	—	—	—	324	—	324–432
Suckers	—	—	—	—	352	—	310– 330	—	288	310– 350	252–396
No. Hooks	26– 34	26– 36	26– 32	—	—	24– 32	24– 34	26– 32	24	22– 30	26– 30
Large Hook	148–170	146–195	137–179	—	—	160–177	142– 181	152–161	160–170	147– 195	166–180
Small Hook	85–120	92–141	98–120	—	—	93–123	86– 129	87–110	110–115	95– 125	106–115
Testes	260	281–533	390–593	>300	760–900	—	355– 514	—	—	247– 532	650
Cirrus Pouch L.	400	—	252–304	410–420	311–411	—	—	320–450	410–510	—	430–560
W.	—	—	42– 94	90	82–133	—	—	90–140	120–170	—	90–150
Uterus	9– 10	18– 24	9– 10	11	12– 15	10– 12	8– 20	9– 13	—	10– 17	10– 14

Discussion

Both Cram (1926) and Brzeskii (1962/63) describe two vaginal sphincters in this species: one in the usual position close to the vagina's opening in the genital atrium and the other where it leaves the seminal receptacle. The latter structure is not a sphincter nor is it peculiar to *T. ovis krabbei* because it is present in all the species examined for it.

Sweatman & Henshall (1962) found *T. ovis ovis* and *T. ovis krabbei* indistinguishable morphologically but that the strobila of the latter matures more rapidly. The material described above as *T. ovis krabbei* differs from that of *T. ovis ovis* in that the cirrus pouch does not extend to the longitudinal excretory vessels and the testes are in two dorsoventral layers. The number of testes in the *T. krabbei* cotype could not be determined accurately as it is not possible to determine the number of layers of testes.

Sweatman & Henshall (1962) found that the two subspecies of *T. ovis* are biologically distinct, lambs, goats, calves and pigs being refractory to infestation with *T. ovis krabbei*. Lambs are susceptible to infestation with *T. ovis ovis*, but fallow deer, *Dama dama* (Linnaeus, 1758), and red deer, *Cervus elaphus* Linnaeus, 1758, are refractory to it. It is regrettable that these authors did not have reindeer available to test the viability of the *T. ovis krabbei* ova used in their infestations of domestic ruminants, nor did they attempt to infest either fallow or red deer with the same material.

Christiansen (1938) considers it probable that *T. ovis krabbei* and *T. cervi* are identical but retains the latter as a distinct species until it is possible to compare the adults of the two forms. The validity of the differences used to separate these two forms is questioned by Sweatman & Henshall (1962). Boev *et al.* (1964) found that there were no morphological differences between the adults or the cysticerci of *T. ovis sensu latu*, *T. cervi* or *T. djeirani* but consider that the intermediate host preferences of these three forms justify their specific separation. As this study also shows that there are no morphological differences they are considered synonyms (Table 23). Further investigation of their intermediate host preferences may justify a separation at the subspecific level of *T. cervi* and *T. djeirani*.

Taenia parenchymatosa Pushmenkov, 1945

Definitive host: Dog; *Canis lupus* Linnaeus, 1758; *Alopex lagopus* (Linnaeus, 1758) (Abuladse, 1964)

Intermediate host: *Rangifer tarandus* (Linnaeus, 1758); *Cervus elaphus* Linnaeus, 1758 (Abuladse, 1964)

Distribution: U.S.S.R.

Pushmenkov (1945) found that cysticerci occurring in the liver and heart of reindeer are not the cystic stage of *T. ovis krabbei*, but represent a new species, *T. parenchymatosa*.

Material:

Specimens of this species were not available for study.

Description

According to Pushmenkov (1945) and Brzeskii (1962/63).

Scolex, rostellum and suckers: These structures are 1,034 to 1,368 μ, 286 to 588 μ and 240 to 342 μ in diameter. There are 30 to 34 rostellar hooks arranged in two crowns; the large hooks are 210 to 230 μ and the small ones 124 to 160 μ long (Fig. 32).

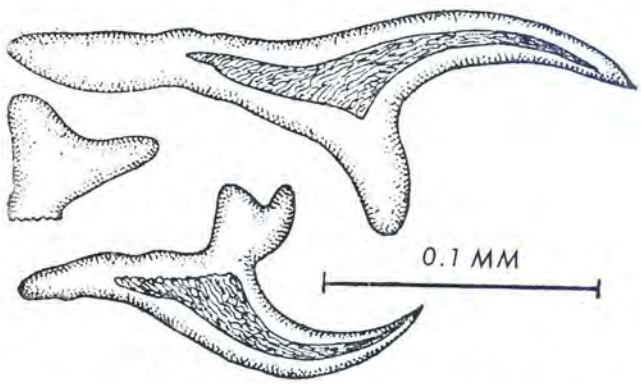


FIG. 32.—*T. parenchymatosa.* Rostellar hooks (From Brzeskii, 1962/63)

Male genitalia: There are 340 to 419 testes, 67 to 84 μ in diameter. They are confluent at the anterior margin but not at the posterior margin of the segment. The cirrus pouch extends to the longitudinal excretory vessels, and is 382 to 460 μ long by 84 to 145 μ wide.

Female genitalia: The two lobes of the ovary are of unequal size. The uterus has 9 to 10 branches which redivide. The ova are either spherical or oval: when spherical 29 to 33 μ and when oval 26 to 29 μ by 33 to 37 μ in diameter (Table 24).

TABLE 24.—*Comparison of* T. parenchymatosa *described by various authors*

	Pushmenkov (1945)	Brzeskii (1962/63)
Scolex	1,260	1,034–1,638
Rostellum	330	286– 588
Suckers	240–340	300– 342
No. Hooks	30	32– 34
Large Hook	220–230	210– 228
Small Hook	130–160	124– 145
Testes	—	340– 419
Cirrus Pouch L.	—	382– 460
W.	—	84– 145
Uterus	—	9– 10

Discussion

Brzeskii (1962/63) studied and compared *T. ovis krabbei* with this species and described the structure at the junction of the seminal receptacle and vagina, as a sphincter. As pointed out earlier, this not a sphincter and is found in all the species examined for it. Brzeskii does not describe or illustrate a sphincter surrounding the vagina proximal to its opening in the genital atrium either in *T. ovis krabbei*

or in this species. Judging by the dilatation and sudden narrowing of the lumen of the vagina, it seems probable that it is surrounded by a sphincter in this region (Fig. 33).

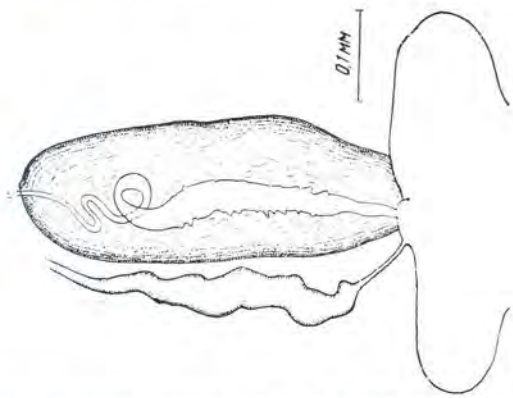


FIG. 33.—*T. parenchymatosa.* Genital atrium (From Brzeskii, 1962/63)

This species resembles *T. hydatigena* in number and size of rostellar hooks and in the number of uterine branches. *T. hydatigena* does not have a vaginal sphincter and should this structure be present in *T. parenchymatosa* it would be a valid difference for distinguishing between these species. Furthermore, the cysticerci of *T. hydatigena* are found in the abdominal cavity and only rarely remain in the liver itself. According to Pushmenkov (1945) these cysticerci (10 to 18 mm in diameter) occur either in the substance of or under the capsule of the liver.

Taenia pisiformis (Bloch, 1780) Gmelin, 1790

Definitive host: Canines and rarely felines (Abuladse, 1964)
Intermediate host: Lagomorphs and rodents. (Abuladse, 1964)
Distribution: Cosmopolitan

Material:

1. Larval stage from naturally infested *Oryctolagus cuniculus* (Linnaeus, 1758); Germany
2. Adults from a naturally infested dog; Switzerland
3. Adults from an experimentally infested dog; England

Redescription

Scolex, rostellum and suckers: In seven adults these are 864 to 1500 μ, 347 to 546 μ and 228 to 324μ in diameter. Two larvae and seven adults have 34 to 42 rostellar hooks arranged in two crowns (Table 25; Fig. 34).

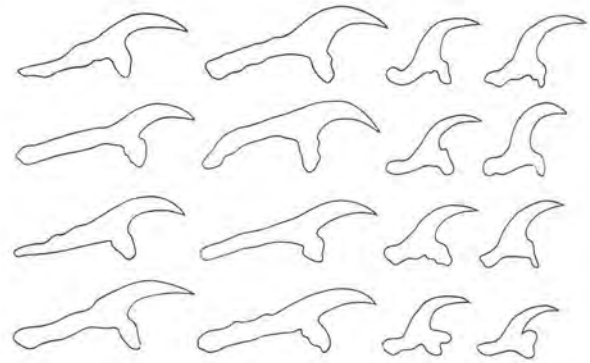


FIG. 34.—*T. pisiformis.* Rostellar hooks of adult

Male genitalia: There are 600 to 950 testes, 55 to 91 μ by 69 to 72 μ in diameter. They are in two to four layers scattered throughout the medulla. They are confluent at both the anterior and the posterior margins of the segment and are present between the ovary and vitellarium. The cirrus pouch extends to the median margin of the longitudinal vessels and in some segments into the medulla. In the mature segment it is 319 to 451 μ long by 114 to 137 μ wide, in the early gravid segment 343 to 520 μ by 114 to 180 μ and in the gravid one 411 to 457 μ by 114 to 190 μ. The cirrus, 39 μ in diameter, is covered with hairlike bristles.

Female genitalia: The poral lobe of the ovary is smaller than the aporal one. The vagina follows a straight course and loops dorso-ventrally only in the medulla; it loops posteriorly in the cortex before opening in the genital atrium dorso-posteriorly to the cirrus pouch. There is no vaginal sphincter and it does not dilate before opening in the genital atrium (Fig. 35). The uterus has 10 to 16 branches which redivide. The ova are slightly oval, 43 to 53 μ by 43 to 49 μ in diameter with an embryophore 5·6 to 7·8 μ thick (Table 26).

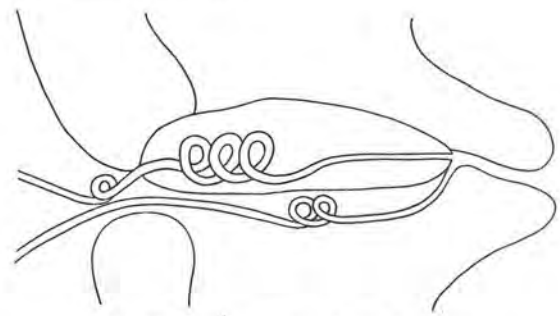


FIG. 35.–*T. pisiformis.* Genital atrium

TABLE 25.—*Size of rostellar hooks of* T. pisiformis

	Large hook			Small hook		
	n	Range	Mean ± S.D.	n	Range	Mean ± S.D.
Cysticercus	8	233–252	242·2	8	131–155	144·5
Adult	31	220–261	245·7 ± 8·2	30	128–151	137·3 ± 6·8
TOTAL	39	220–261	245·0 ± 7·8	38	128–155	138·8 ± 7·6

TABLE 26.—*Comparison of* T. pisiformis *described by various authors*

	Deffke (1891)	Hall (1919)	Ortlepp (1938)	Riser (1956)	Mettrick (1962)	Esch & Self (1965)	This Paper
Scolex	—	1,300	—	—	—	—	864–1,500
Rostellum	—	515–640	—	—	—	—	347– 546
Suckers	—	310–330	—	—	—	322·3 × 288·1	228– 324
No. hooks	42	34–48	36	—	34– 40	—	34– 42
Large hook	260	255–294	220	250–270	232–278	200 –269	220– 261
Small hook	120	132–177	150	140–150	142–169	114 –172	128– 155
Testes	400–500	400–500	400–500	—	400–500	—	600– 950
Cirrus pouch L.	700–800	460–800	—	—	—	370·6–380·4	319– 520
W.	130	130–140	—	—	—	140 –144·2	114– 190
Uterus	8– 10	8– 14	10– 12	—	9– 20	11 –15	10– 16

Discussion

In this material as well as that described by Esch & Self (1965) the cirrus pouch is shorter than recorded by Deffke (1891) or Hall (1919). Deffke records the length as 700 to 800 μ but this is probably a printing error; from his illustration it appears to be about 380 μ long. Hall (1919) states that the vesicula seminalis is well developed but Deffke (1891) found that it was not a constant feature. It was not present in this material.

Hall (1919) considers *Taenia novella* Neumann, 1896 of the domestic cat a synonym of *T. pisiformis*. This conclusion, as well as the records of this parasite in various felines, is supported by the fact that Ackert & Grant (1917) succeeded in infesting seven of eight kittens with this parasite. Jacob (1939) records *T. pisiformis* from the polecat in Germany. The identity of these cestodes is, however, doubtful; They may possibly be *T. martis*.

Johri (1957) describes a cestode from a dog in Dublin as a new species, *Multiceps smythii* (listed as a *species inquirendae*), which is most probably *T. pisiformis*. Johri places this cestode in the genus *Multiceps* Goeze, 1782 as the large rostellar hooks have sinuous handles and there is a reflexed loop in the vagina. The description of this cestode differs from that of *T. pisiformis* only in the number and distribution of the testes. The fewer testes are probably due to Johri assuming that these are in one layer only. The photograph of a section of this cestode shows that the section is markedly skew which may account for the apparent absence of testes from the postero-poral part of the segment.

Taenia polyacantha Leuckart, 1856

Synonym: *Tetratirotaenia polyacantha* (Leuckart, 1856) Abuladse, 1964
Definitive host: *Vulpes* spp., *Alopex* spp., and other canines (Abuladse, 1964)
Intermediate host: Rodents (Abuladse, 1964)
Distribution: Northern hemisphere

The adult of this species was described by Leuckart in 1856; the larval stage was unknown until Baer (1932) described it from *Clethrionomys glareolus helveticus* (Miller, 1900). Baer describes it as a type of tetrathyridium. Abuladse (1964) uses the structure of the larva as a criterion for erecting the genus *Tetratirotaenia*.

Material:

Adults from naturally infested *V. vulpes*; Switzerland

Redescription

Scolex, rostellum and suckers: In three specimens these are 868 to 960 μ, 343 to 457 μ and 256 to 285 μ in diameter. On two scolices there are 62 rostellar hooks arranged in two crowns; the large hooks are 196 to 214 μ (mean $204{\cdot}6 \pm 6{\cdot}2$ μ) and the small hooks 123 to 133 μ (mean $126{\cdot}6 \pm 3{\cdot}7$ μ) long (Fig. 36).

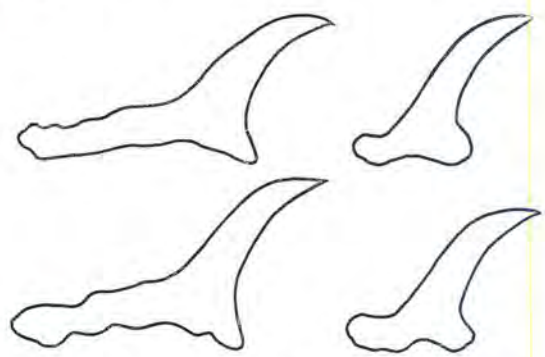


FIG. 36.—*T. polyacantha.* Rostellar hooks of adult

Male genitalia: There are 215 to 300 testes, 55 to 69 μ by 32 to 46 μ in diameter. They are in two layers which are confluent at the anterior but not at the posterior margin. The cirrus pouch extends to the longitudinal vessels, but not into the cortex; in the early sexually mature segment it is long and narrow (160 μ by 55 μ) but rapidly increases in width to become subspherical in the older segments. In the sexually mature segment it is 160 to 229 μ long and 55 to 137 μ wide, in the early gravid segment 174 to 205 μ by 124 to 137 μ and in the gravid 169 to 214 μ by 105 to 114 μ.

Female genitalia: The poral lobe of the ovary is much smaller than the aporal one. The vagina loops on crossing into the cortex but does not loop again before opening in the genital pore. There is no sphincter; its lumen dilates slightly before opening in the genital atrium (Fig. 37). The uterus has 12

to 15 lateral branches. The ova are oval, 31 to 34 μ by 28 to 30 μ in diameter, with an embryophore 3·4 to 4·5 μ thick (Table 27).

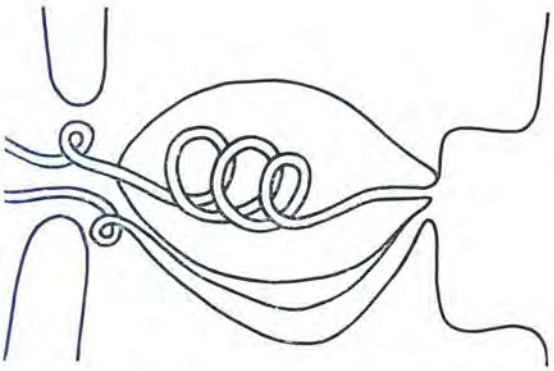


FIG. 37.—*T. polyacantha.* Genital atrium

Discussion

Both Schiller (1953) and Rausch (1959a) record fewer rostellar hooks (44 to 50) in specimens from Alaska than have been recorded in European material. It is possible that *T. ovata*, considered a *species inquirendae* in this paper, belongs here.

Taenia pseudolaticollis nom. nov.

Synonym: *Taenia laticollis* of Skinker (1935) and Joyeux (1945)
Definitive host: *Felis wiedii wiedii* Schinz, 1821; *Lynx* spp.
Intermediate host: Unknown
Distribution: North and South America

Skinker (1935a) identified and described cestodes from the lynx in the United States as *T. laticollis*; Joyeux (1945) records a similar specimen from *F. w. wiedii* (synonym: *Felis macroura* Wied, 1823) in Brazil. As pointed out earlier these are not *T. laticollis*; the name *Taenia pseudolaticollis* is proposed for this species.

Material:

1. Type specimen from *F. macroura*, Brazil, previously described by Joyeux (1945). Scolex deposited in the Stockholm Museum; strobila in Institute of Zoology, Neuchatel.
2. Specimen from lynx previously described by Skinker (1935); U.S.D.A.

Redescription

Scolex, rostellum and suckers: It is not possible to determine the size of these structures on the material available. The large rostellar hooks are 352 to 380 μ and the small ones 220 to 229 μ long (Fig. 38).

Male genitalia: There are 204 to 320 testes, 82 to 101 μ by 50 to 78 μ in diameter. They are mainly in a single dorsal layer which extends posteriorly to just beyond the limits of the ovary, being absent dorsally and laterally to the vitellarium. The cirrus pouch does not extend to the longitudinal vessels; in the sexually mature segment it is 200 to 300 μ long and 64 to 120 μ wide, while in the gravid segment it is 209 to 310 μ by 90 to 110 μ.

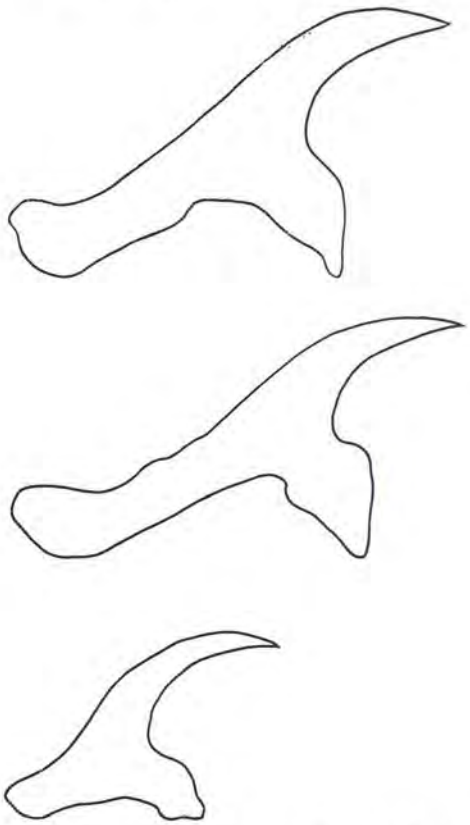


FIG. 38.—*T. pseudolaticollis.* Rostellar hooks of adult (Type specimen)

Female genitalia: The poral lobe of the ovary is slightly smaller than the aporal one. The vagina is not surrounded by a sphincter; its lumen dilates slightly before opening in the genital atrium (Fig. 39).

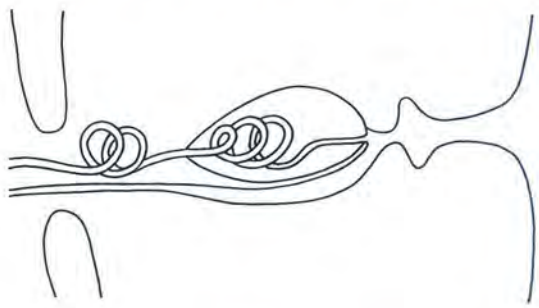


FIG. 39.—*T. pseudolaticollis.* Genital atrium

The uterus has 7 to 15 lateral branches which redivide. The ova are 24 to 27 μ by 22 to 25 μ in diameter with an embryophore 3·4 to 4·5 μ thick.

Nerve: The main longitudinal nerve is conspicuous and large, 114 μ by 91 μ in diameter; the accessory nerves are 37 μ by 55 μ in diameter (Table 28).

TABLE 27 —*Comparison of* T. polyacantha *described by various authors*

Author	Leuckart (1856)	Baer (1932)	Joyeux & Baer (1936)	Kirschenblatt (1940)	Petrov (1941; in Abuladse, 1964)	Schiller (1953)	Rausch (1959a)	Abuladse (1964)	Muller (1965)	This paper
Scolex	1,000	—	840–900	—	800–900	—	1,200	—	—	868–960
Rostellum	490	—	—	—	400–600	—	—	—	—	343–457
Suckers	350	—	230	—	229–238	—	450	—	—	256–285
No. hooks	62	60	52– 60	56	60– 62	44– 48	44– 50	60	—	62
Large hook	183(1)	200	200	200	201–217	210	200–214	200–220	195–201	196–214
Small hook	114(1)	126	126	116	127–133	140–155	142–157	120–130	132–138	123–133
Testes	—	—	500–600	—	400–600	—	220	—	—	215–300
Cirrus pouch L	—	—	220	—	201–217	—	140–215	—	—	160–229
W	—	—	—	—	77–124	—	140–180	—	—	55–137
Uterus	8	—	8– 10	—	8– 10	—	12– 16	—	—	12– 15

(1) Leuckart erroneously records these measurements as 53 μ and 34 μ respectively; the above measurements were calculated from his illustrations.

TABLE 28.—*Comparison of* T. pseudolaticollis *described by various authors*

Author	Skinker (1935a)	Joyeux (1945)	This Paper	
			Skinker's Material	Joyeux's Specimen
Scolex	1,500	1,100	—	—
Rostellum	714	450	—	—
Suckers	390	560	—	—
No. Hooks	38– 42	40	—	—
Large Hook	390–415	390	380	352–361
Small Hook	214–238	240	220	223–229
Testes	180–250	250	204–258	210–320
Cirrus Pouch L...	275–293	250	200–310	209–310
W...	66–131	120	80–120	64–110
Uterus	10– 15	8– 10	10– 15	7– 9

Discussion

These specimens were incorrectly assigned to *T. laticollis* by Skinker (1935) and Joyeux (1945) from which they differ in that:

1. There are 38 to 42 rostellar hooks instead of 52 to 62.
2. There are no testes dorsal to the ovary and vitellarium.
3. There are rather fewer uterine branches, viz. 7 to 15 vs 15 to 20.

T. pseudolaticollis resembles *T. macrocystis*, *T. endothoracicus*, *T. taeniaeformis* and *T. parva* in the size of the rostellar hooks. It can be distinguished from the first two species in having only 38 to 42 hooks while both *T. macrocystis* and *T. endothoracicus* have 58 or more. It differs from *T. taeniaeformis* and *T. parva* in that the male and female genital ducts pass between the ventral and dorsal longitudinal vessels, and not ventral to both these vessels as is the case in *T. taeniaeformis* and *T. parva*. (This criterion could be determined only on the specimen from *F. w. wiedii*).

As stated by Joyeux (1945) the cestode from *F. w. wiedii* agrees well with the description of "*T. laticollis*" by Skinker (1935). The difference in the length of the large hook from *F. w. wiedii* as recorded by Joyeux and in this paper, viz. 390 μ and 352 to 361 μ, is probably due to the fact that Joyeux measured the hooks by projection while the present data were measured directly by ocular micrometer.

As surmised earlier the cestode identified as "*T. laticollis*" by Fagasinski (1961) from a *F. silvestris* × *F. catus* hybrid, may be *T. pseudolaticollis*.

Taenia regis Baer, 1923

Synonym: *Taenia bubesei* Ortlepp, 1938
Definitive host: *Panthera leo* (Linnaeus, 1758); *Panthera pardus* (Linnaeus, 1758)
Intermediate host: Unknown
Distribution: Africa, Tadzhik S.S.R.

Material:

1. Type specimens of *T. regis*, (Institute of Zoology, Neuchatel)
2. Type specimens of *T. bubesei*, Republic of South Africa (Veterinary Research Institute, Onderstepoort)

Redescription

Scolex, rostellum and suckers: These structures are 1·0 to 1·2 mm, 519 to 646 μ and 273 to 346 μ in diameter. There are 40 to 49 rostellar hooks usually arranged in two crowns (Table 29; Fig. 40). One specimen has 49 hooks, there are 24 in each of two anterior crowns and a single accessory hook in a third more posteriorly situated crown (cf *T. solium*).

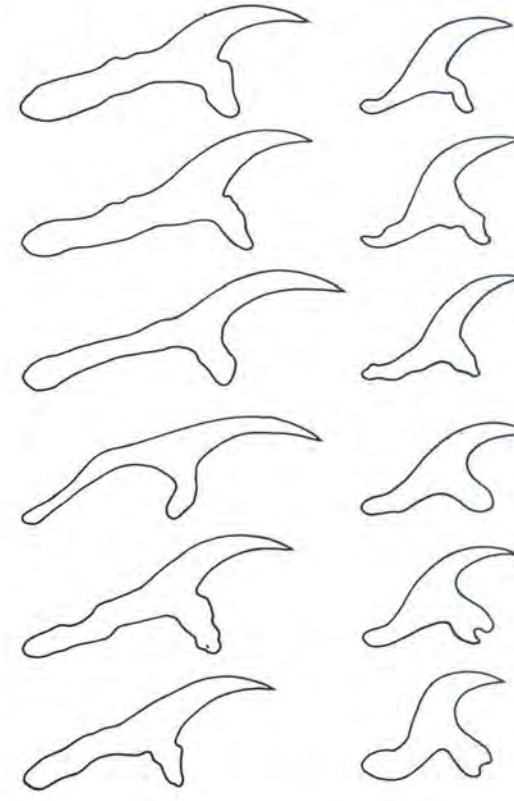


FIG. 40.—*T. regis.* Rostellar hooks of adult

TABLE 29.—*Size of rostellar hooks of* T. regis

Specimens	Large hook			Small hook		
	n	Range	Mean ± S.D.	n	Range	Mean ± S.D.
T. regis	49	229–290	257·1 ± 16·8	40	142–187	158·6 ± 14·6
T. bubesei	24	223–270	246·2 ± 13·0	15	128–174	153·4 ± 14·1
Total	73	223–290	253·5 ± 16·9	55	128–187	157·2 ± 14·7

Male genitalia: There are 350 to 544 testes, 50 to 82 μ by 46 to 69 μ in diameter, in a single dorsal layer. They are mainly in two lateral fields with relatively few anterior to the female genitalia; posteriorly they extend to the level of the vitellarium and are not confluent along the posterior margin. The cirrus pouch extends to the longitudinal vessels; in the sexually mature segment it is 366 to 503 μ long and 101 to 160 μ wide, in the early gravid segment 366 to 526 μ by 101 to 151 μ and in the gravid segment 411 to 571 μ by 111 to 160 μ.

Female genitalia: The poral lobe of the ovary is smaller than the aporal one. After the vagina crosses into the cortex its lumen dilates to 55 to 69 μ in diameter, but narrows again when it passes through the vaginal sphincter before opening in the genital atrium. The vaginal sphincter varies from 41 to 55 μ in diameter and is 46 by 69 μ from the opening in the genital atrium (Fig. 41). The uterus has 2 to 8 branches which redivide. The ova are 36 to 43 μ by 33 to 41 μ in diameter with an embryophore 3·4 to 5·6 μ thick (Table 30).

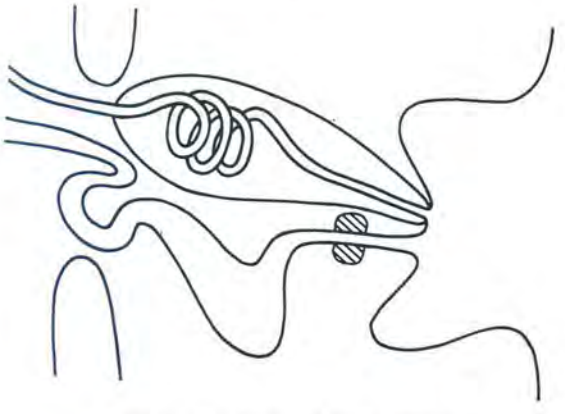


FIG. 41.—*T. regis.* Genital atrium

Discussion

Ortlepp (1938) differentiated *Taenia bubesei* from *Taenia regis* on the number and size of the rostellar hooks, number and distribution of the testes and the number of uterine branches. As the range of variation of these and other characters overlaps in the type and cotype specimens of both species, *T. bubesei* must be considered a synonym of *T. regis*.

T. regis differs from *T. pisiformis* in the number and distribution of the testes, the number of uterine branches, and the presence of a vaginal sphincter which is absent in *T. pisiformis*. *T. hyaenae* also has a vaginal sphincter, but it has fewer and somewhat smaller rostellar hooks, fewer testes and a greater number of uterine branches. *T. regis* differs from *T. omissa* in the shape of both the rostellar hooks and of the uterus. *T. omissa* has been recorded from felines in the Americas only, while *T. regis* is known from lion in Africa and from tiger in Tadzhikistan S.S.R. (Petrov & Potekhina, 1957; in Abuladse, 1964).

It has not yet been possible to prove the life cycle of this species experimentally. Cysticerci with rostellar hooks resembling those of *T. regis* have been recovered from various herbivores in South Africa (Table 31). These parasites, about 1 cm in diameter are attached to the mesentery; or are in the liver or the lung. On removal from the adventitious layer, the cysticercus is about 40 mm long by 5 mm wide with an invaginated scolex at one end. The rostellar hooks vary in number from 38 to 46, the large ones from 219 to 270 μ and the small ones from 124 to 169 μ in length. Although one cysticercus from a sable *Hippotragus niger* (Harris, 1838), had only 38 hooks, and that from a zebra (*Equus burchelli* Gray, 1824), had rostellar hooks slightly smaller than those recorded in the sexual stage, their measurements are so similar as to warrant their inclusion here (Table 31).

As no lion was available, attempts were made to infest domestic cats; these were all unsuccessful. Attempts to infest the domestic dog, black-backed jackal and hunting dog were also unsuccessful.

Taenia rileyi Loewen, 1929

Synonym: *Taenia lyncis* Skinker, 1935—*pro parte*
Definitive host: *Lynx* spp.
Intermediate host: Unknown, probably rodents
Distribution: North America

TABLE 30.—*Comparison of* T. regis *described by various authors*

Synonym	*T. regis*				*T. bubesei*	
Author	Baer (1923)	Mahon (1954a)	Baer & Fain (1965)	This Paper	Ortlepp (1938)	This Paper
Scolex	1,000	—	—	1,001–1,183	1,300	1,201
Rostellum	500	—	—	519– 646	790	526
Suckers	300	—	—	273– 346	340	290
No. hooks	32	46(1)	—	40– 49	42– 46	42– 46
Large hook	290	288	250–270	229– 290	235–273	223–270
Small hook	190	176–199	—	142– 187	136–180	128–174
Testes	200	—	—	350– 530	500–600	416–544
Cirrus pouch L.	—	—	—	366– 503	380–400	366–571
W.	—	—	—	101– 114	100	133–160
Uterus	4–10	—	4– 9	4– 7	3– 7	2– 8

(1) Mahon records 26 rostellar hooks but this is apparently a misprint as the specimen actually has 46.

TABLE 31.—*Number and size of rostellar hooks of cysticerci of* T. regis?

Host	Common name	Number of infested hosts	Rostellar hooks		
			Number	Length	
				Large	Small
Connochaetus taurinus (Burchell, 1823)....	Blue wildebeest...	3	40–46	229–261	146–169
Equus burchelli (Gray, 1824).....	Zebra.....	1	42	219	124–137
Hippotragus niger (Harris, 1838).....	Sable antelope...	3	38–46	242–270	151–169
Kobus ellipsiprymnus (Ogilby, 1833).....	Waterbuck.....	2	42–44	238–261	160–169
Oryx gazella (Linnaeus, 1758).....	Gemsbok; oryx..	2	40–42	247–261	137–165
Phacochoerus aethiopicus (Pallas, 1776)....	Warthog.....	1	42	261–265	146–160

Riser (1956) showed that Loewen (1929) described a composite species: the scolex and rostellar hooks are those of *T. laticollis* while the strobila is that of a new species. He also concluded that Skinker's (1935) description of *T. lyncis* is composite of *T. rileyi* and *T. omissa*.

Material:

1. Type specimen of *T. rileyi* (U.S.D.A.)
2. Type specimens of *T. lyncis* (U.S.D.A.).
3. Adults from *Lynx canadensis*; Alaska & British Columbia, Canada.

Redescription

Scolex, rostellum and suckers: In the type specimen of *T. rileyi* these structures are 910 μ, 420 μ and 240 μ in diameter; in the Alaskan material they vary from 1,050 to 1,140 μ, 434 to 592 μ and 274 to 297 μ in diameter. The type specimen of *T. rileyi* has lost all its rostellar hooks. Four paratypes of "*T. lyncis*" have 40 to 44 rostellar hooks arranged in two crowns; the large hooks are 207 to 230 μ and the small ones 170 to 179 μ in length. All the specimens from Alaska and Canada had lost some of their rostellar hooks. Two specimens, however, have a complete crown of small hooks, viz. 18 and 19. The two crowns would thus have 36 and 38 respectively. On four scolices 19 large hooks vary in length from 238 to 256 (mean $245{\cdot}1 \pm 4{\cdot}2$) μ; 30 small hooks on eight scolices vary from 169 to 198 (mean $185{\cdot}4 \pm 8{\cdot}5$) μ (Fig. 42).

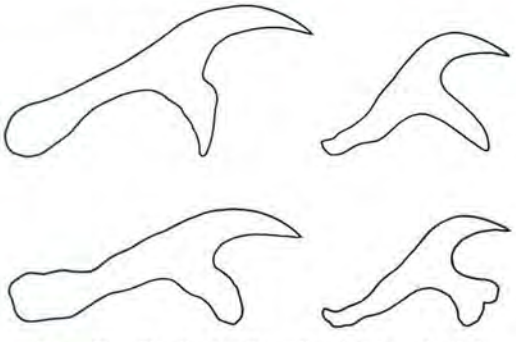


FIG. 42.—*T. rileyi.* Rostellar hooks of adult

Male genitalia: The type specimen of *T. rileyi* has 500 to 560 testes, *T. lyncis* paratypes 350 to 520. The Alaskan material has 340 to 480 testes, 46 to 69 μ by 40 to 50 μ in diameter. They are in a single dorsal layer which extends to the posterior margin of the segment; occasionally there are a few testes between the ovary and vitellarium and posterior to the latter. The cirrus pouch does not extend to the longitudinal excretory vessels. In the *T. rileyi* type specimen it is 320 to 370 μ long and 80 to 130 μ wide in the mature segment and 380 to 400 μ by 150 μ in the gravid segment. In the *T. lyncis* paratypes it is 170 to 221 μ by 69 to 115 μ in the mature segments. In the mature segment of the Alaskan material it is 247 to 320 μ long and 91 to 105 μ wide, in the early gravid segment 297 to 329 μ by 91 to 110 μ and in the gravid one 297 to 336 μ by 91 to 124 μ. In the latter material, the cirrus is 20 to 23 μ in diameter; it is covered with hairlike bristles.

Female genitalia: The poral lobe of the ovary is slightly smaller than the aporal one. The vagina is not markedly looped; in some segments it crosses the vas deferens to run anteriorly to it while passing between the longitudinal vessels but in the cortex recrosses it again to run posteriorly to the cirrus pouch. In the cortex its lumen dilates to about 40 μ and then gradually narrows again before opening in the genital atrium. Between 37 and 82 μ from this opening the vagina is either surrounded by a sphincter muscle, or a "pad" of muscle cells is situated between its anterior wall and the posterior wall of the cirrus pouch (Fig. 43). In the type specimen of *T. rileyi* and in the Alaskan and Canadian material the uterus has 6 to 9 lateral branches which redivide; in the *T. lyncis* paratypes the uterus is not fully gravid. The ova of the Alaskan material are oval, 40 to 44 μ by 34 to 38 μ in diameter with an embryophore $3{\cdot}4$ to $4{\cdot}5$ μ thick (Table 32).

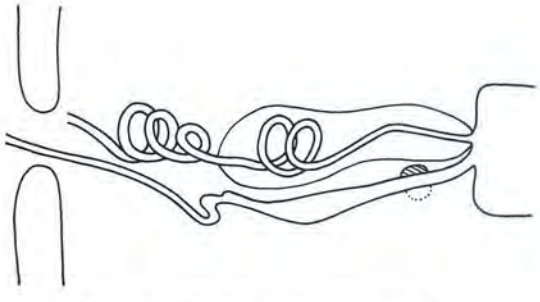


FIG 43.—*T. rileyi.* Genital atrium

TABLE 32.—*Comparison of* T. rileyi *described by various authors*

Synonym	*T. rileyi*				*T. lyncis*	
Author	Loewen (1929)	Riser (1956)	This Paper		Skinker (1935a)	This Paper Type specimen
			Type specimen	Additional material		
Scolex	—	—	910	1,050–1,140	620–1,000	—
Rostellum	—	—	420	434– 592	250– 400	—
Suckers	—	—	240	274– 297	165– 205	—
No. hooks	—	—	—	36– 38	36– 46	40– 44
Large hook	—	220–240	—	238– 256	220– 258	207–230
Small hook	—	160–170	—	169– 198	159– 208	170–179
Testes	450–550	—	500–560	340– 480	200– 500	350–520
Cirrus pouch L	425	—	320–400	247– 366	200– 375	170–221
W	120	—	80–150	91– 124	70– 110	69–115
Uterus	7– 11	—	6– 9	6– 9	4– 10	5– 6(1)

( ) Uterus not fully gravid.

Discussion

Riser (1956) showed the descriptions of both *T. rileyi* and *T. lyncis* to be composites, that of *T. rileyi* being based on a hitherto undescribed strobila but the scolex belonged to either *T. laticollis* or *T. macrocystis*, while the description of *T. lyncis* is a composite of *T. rileyi* and *T. omissa*. The type specimen of *T. rileyi* (U.S. Nat. Mus. Helminthological Collection No. 8069) has lost all its rostellar hooks. Two strobila of *T. lyncis* (U.S. Nat. Mus. Helminthological Collection No. 28482) are identical with that of *T. rileyi*. Some of the mounted rostella have hooks similar to those described as *T. rileyi* by Riser (1956) and van Zyll de Jong (1966), while others have hooks identical with those of *T. laticollis*. Paratypes of *T. lyncis* (U.S. Nat. Mus. Helminthological Collection, No. 26886) consist of cestode fragments which have a uterine structure identical with that of *T. omissa*. Skinker (1935) based the description of *T. lyncis* on specimens from lynx and from *Felis concolor* and it is probable that the *T. omissa* included amongst these type specimens are derived from the latter host. Van Zyll de Jong (1966) showed that *T. rileyi* and *T. omissa* can only be distinguished from one another by the structure of the uterus and on the length of the handle of the large rostellar hook. He found that the handle of the large rostellar hook had a mean length of 74 μ in *T. rileyi* and of 92 μ in *T. omissa*. It is apparent, however, from his illustrations that the length of this structure overlaps in the two species. The only reliable character for separating these two species is therefore the structure of the uterus, which in *T. omissa* has from one to three lateral branches.

The presence of a vaginal sphincter in *T. rileyi* is not constant, it being present in some segments while in others of the same strobila there is a " pad ".

Riser (1956) and Van Zyll de Jong (1966) are of the opinion that cysticerci from deer (*Odocoileus* spp.) are those of *T. omissa* while those from rodents (*Peromyscus* spp., *Tamiasciurus* spp., and *Clethrionomys* spp.) are those of *T. rileyi*. Riser and Van Zyll de Jong arrive at this conclusion mainly on differences in the feeding habits of the definitive hosts of these two cestodes: the cougar feeds predominantly on deer and infrequently on rodents while lynx feed predominantly on rodents and only rarely on deer. The allocation of cysticerci from deer to *T. omissa* and from rodents to *T. rileyi* must be looked upon as tentative until it is substantiated by experimental infestations.

Joyeux & Baer (1940) record the cysticercus of *T. lyncis* from *Cervus* (*Rusa*) *unicolor* Kerr, 1792 in Indo China and Lopez-Neyra & Diaz Ungria (1956) from *Odocoileus virginianus coriacou* (Boddoert, 1784) in Venezuela, but if we accept Riser and van Zyll de Jong's assumption, these are probably cysticerci of *T. omissa*. Lopez-Neyra & Diaz Ungria (1956) record the cyst of *T. rileyi* from *Sylvilagus floridianus* (J. A. Allen, 1890) in Venezuela but this is probably the cyst of *T. macrocystis*.

It is clear that the status of both *T. rileyi* and *T. omissa* is unsatisfactory, and that further investigations should be undertaken on their morphology and life cycle. It is imperative that the morphological studies be based on *intact* specimens from a single host. Thereafter, attempts can be made to determine variai ons in different hosts of the same and of different species.

Taenia saginata Goeze, 1782

Synonym: *Taenia confusa* Ward, 1896
Taenia africana von Linstow, 1900—*pro parte*
Taenia hominis von Linstow, 1904
Taenia tonkinensis Railliet & Henry, 1905
Taenia phillipina Garrison, 1907
Taenia bremneri Stephens, 1908
Taenia cylindrica Leon, 1922

Definitive host: Man
Intermediate host: Cattle
Distribution: Cosmopolitan

Material:

1. Adults from man (Switzerland, Mexico and South Africa)
2. Type specimens of *T. bremneri* from man (Nigeria)

Description (according to Verster, 1967)

Scolex and suckers: These structures are 1,420 μ and 526 μ in diameter.

Male genitalia: There are 880 to 1200 testes, 91 to 137 μ by 69 to 91 μ in diameter. They are in a single dorsal layer but as they are very closely packed, it may appear as if there is a second layer lateral to the female genitalia. They are mainly in two lateral fields with relatively few anterior to the female genitalia; they extend to the posterior margin but are not confluent posterior to the vitellarium. The cirrus pouch does not extend to the longitudinal excretory vessels; in the sexually mature segment it is 356 to 457 μ long and 91 to 160 μ wide, in the early gravid segment 374 to 457 μ by 73 to 128 μ and in the gravid segment 356 to 571 μ by 101 to 142 μ. The cirrus is unarmed, 25 to 32 μ in diameter.

Female genitalia: The two lobes of the ovary are of unequal size. In the cortex the lumen of the vagina dilates from 32 μ to 69 to 82 μ. This dilatation, 160 to 225 μ long, narrows abruptly when it passes through the vaginal sphincter which is 41 to 50 μ in diameter and situated 91 to 119 μ from the opening in the genital atrium (Fig. 44). The uterus has 14 to 32 lateral branches which redivide. The ova are oval, 46 to 50 μ by 39 to 41 μ in diameter with an embryophore 6·7 to 8·4 μ thick.

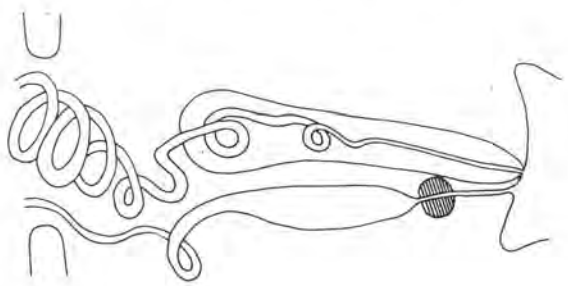


FIG. 44.—*T. saginata.* Genital atrium (From Verster, 1967)

Taenia serialis (Gervais, 1847) Baillet, 1863 *sensu latu*

Synonym: *Taenia brauni* Setti, 1897
Multiceps serialis (Gervais, 1847) Stiles and Stevenson, 1905
Multiceps glomeratus Railliet & Henry, 1915
Taenia antarctica Fuhrmann, 1922
Multiceps serialis var. *theropitheci* Schwartz, 1927
Multiceps packii Christenson, 1929
Taenia laruei Hamilton, 1940

Clapham (1942b) regards *T. serialis* and *T. glomeratus* as synonyms of *T. multiceps* but is of the opinion that *T. brauni* is a valid species. Nagaty & Ezzat (1947) and Meyer (1955), however, consider *T. serialis* to be a valid species. In the present study it was found that besides differences in their intermediate host preferences *T. serialis* has a well developed vaginal sphincter whereas *T. multiceps* has a "pad"; these two must therefore be considered distinct species. No valid morphological differences could be found between *T. serialis* and *T. brauni*, but they appear to show slight, though not consistent, differences in their intermediate host preferences. It is therefore deemed advisable that they be retained as two subspecies until further investigations should prove otherwise.

Taenia serialis serialis subsp. nov.

Synonyms: *Taenia serialis* (Gervais, 1847) Baillet, 1863
Taenia antarctica Fuhrmann, 1922
Multiceps packii Christenson, 1929
Taenia laruei Hamilton, 1940
Definitive host: *Canis familiaris* Linnaeus, 1758 and various canines
Intermediate host: Lagomorphs; more rarely rodents
Distribution: Cosmopolitan

Material:

1. Cystic stage from naturally infested *Chinchilla laniger* Molina, 1782; Republic of South Africa
2. Adults from dogs experimentally infested with scolices from the above host
3. Type specimen of *T. packii* (U.S.D.A.)
4. Type specimen of *T. laruei* (U.S.D.A.)
5. Type specimen of *T. antarctica* (Institute of Zoology, Neuchatel)

Redescription

Scolex, rostellum and suckers: In eight adults these are 582 to 774 μ, 273 to 364 μ and 228 to 346μ in diameter. There are 28 to 34 rostellar hooks in two crowns (Table 33; Fig. 45). One specimen

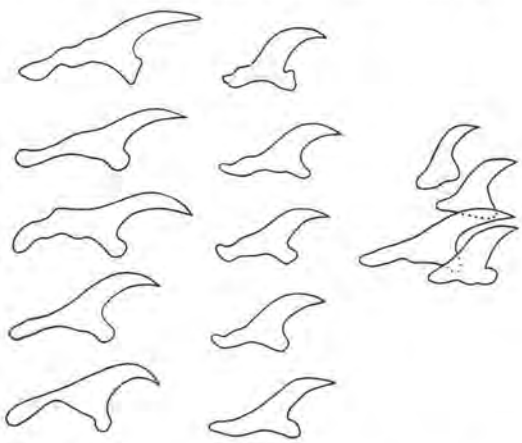


FIG. 45.—*T. serialis serialis.* Rostellar hooks of adult

with 31 hooks had one small hook in an accessory crown posterior to the first two crowns.

Male genitalia: There are 350 to 500 testes, 55 to 69 μ by 59 to 69 μ in diameter. They are in one to three, usually two layers and are mainly in two lateral fields which are confluent in the anterior part of the segment, posteriorly they extend to the level of the vitellarium but are not confluent. The type specimens of *T. antarctica* have 550 testes, those of

TABLE 33.—*Size of rostellar hooks of* T. serialis serialis

	Large hook			Small hook		
	n	Range	Mean ± S.D.	n	Range	Mean ± S.D.
Larval stage	50	145–170	155·8 ± 5·4	47	95–125	111·0 ± 6·2
Adult	37	154–175	164·6 ± 4·5	35	107–123	113·2 ± 4·5
Total	87	145–175	162·1 ± 6·3	82	95–125	112·0 ± 5·9

T. laruei 650 and *T. packii* 300 to 340. The cirrus pouch extends to the longitudinal vessels but not into the medulla. In the sexually mature segment, it is 170 to 238 μ long and 68 to 114 μ wide; in the early gravid segment, it is 233 to 284 μ by 91 to 114 μ and in the gravid segment 261 to 284 μ by 91 to 102 μ. In the mature segment the cirrus pouch is 345 to 350 μ long and 68 to 70 μ wide in the type specimens of *T. antarctica*, in *T. laruei* 290 to 400 μ by 90 to 100 μ and in *T. packii* 290 to 360 μ by 70 to 83 μ. The cirrus has hairlike bristles.

Female genitalia: The poral lobe of the ovary is smaller than the aporal one. The vagina is surrounded by a sphincter, 36 to 59 μ in diameter, which is situated 70 to 100 μ from its opening in the genital atrium (Fig. 46). Its lumen is constricted where it passes through the sphincter but widens again before it opens in the atrium. The uterus has 10 to 18 lateral branches which redivide. The ova are oval, 34 to 41 μ by 30 to 34 μ in diameter with an embryophore 3·4 to 5·6 μ thick (Table 34).

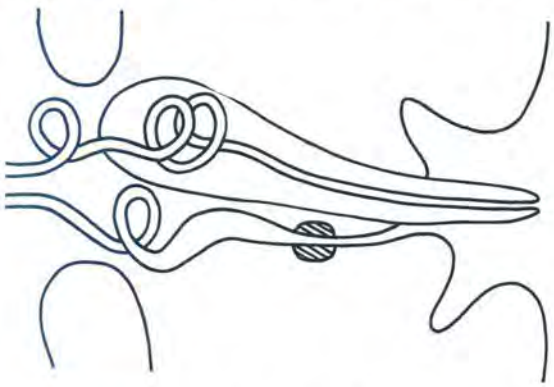


FIG. 46.—*T. serialis serialis.* Genital atrium

Discussion

The range of variations in the length of the large hook is within those given by Hall (1919) and Clapham (1942b) and Crusz (1944) but the mean length is greater (162·1 μ) than either that recorded by Clapham (1942) 136·06 μ, or Meyer (1955) 133·0 μ, or Esch & Self (1965) 139·3 μ.

Flores-Barroeta (1955) assigns cestodes from naturally infested dogs in Mexico to this species, as their rostellar hooks were 230 μ and 185 μ in length, respectively. These cestodes cannot belong to this species, but are probably *T. pisiformis.*

Taenia serialis brauni n. comb.

Synonyms: *Taenia brauni* Setti, 1897
Taenia serialis var. *theropitheci* Schwartz, 1927

Definitive host: Dog and other canines
Intermediate host: Rodents and Primates
Distribution: Africa, U.S.A. (Importation?)

Material:

1. Cystic stage from naturally infested *Rattus* spp.; Congo (Democratic Republic)
2. Adult from experimentally infested dog; Congo (Democratic Republic)
3. Adult from dog experimentally infested with *C. glomeratus*

Redescription

Scolex, rostellum and suckers: In five adults these are 737 to 892 μ, 319 to 373 μ and 273 to 364 μ in diameter; in the *T. glomeratus* material they are 910 μ, 273 μ and 255 μ in diameter. There are 22 to 30 rostellar hooks in two crowns (Table 35).

Male genitalia: There are 350 to 450 testes (430 to 550 in *T. glomeratus*); these are exceptionally large being 78 to 91 μ by 64 to 73 μ in early sexually mature segments and 142 to 169 μ by 105 to 110 μ in older segments. They are in one to two layers, and are absent immediately anterior to the female genitalia and posterior to the vitellarium. The cirrus pouch extends to the longitudinal excretory vessels. In the mature segment it is 274 to 283 μ by 101 to 114 μ, in the early gravid 334 to 347 μ by 105 to 114 μ. In *T. glomeratus* it is 384 to 434 μ by 78 to 105 μ in the gravid segment. The cirrus is 12 to 16 μ in diameter.

TABLE 35.—*Size of rostellar hooks of* T. serialis brauni

	Large hook			Small hook		
	n	Range	Mean ± S.D.	n	Range	Mean ± S.D.
Larval stage	17	139–150	144·8 ± 2·6	13	102–114	108·2 ± 2·7
Adult	40	125–148	136·9 ± 5·7	33	91–102	96·2 ± 3·3
Total	57	125–150	139·1 ± 6·2	46	91–114	99·6 ± 6·2

TABLE 34.—*Comparison of* T. serialis serialis *described by various authors*

Synonym	*T. serialis*							*T. antarctica*		*T. packi*				*T. laruei*	
Author	Hall (1919)	Yamaguti (1934)	Clapham (1942b)	Crusz (1944)	Meyer (1955)	Esch & Self (1965)	This paper	Fuhrmann (1922)	This paper	Christenson (1929)	Clapham (1942b)	Byrd & Fite (1955)	This paper	Hamilton (1940)	This paper
Scolex	850–1,500	650	—	—	—	—	582–774	750–900	—	600–750	—	660–910	—	690	680
Rostellum	390	230–260	—	—	—	—	273–364	340	—	300–350	—	230	—	174	210
Suckers	300	250	—	—	—	241·3	228–346	300–360	—	200–250	—	180–250	—	240	230
No. hooks	26– 32	26– 32	—	26 – 32	—	—	28– 34	28– 34	28	26– 32	—	26– 30	—	28	28
Large hook	135– 175	138–153	110–175	115·5–177·0	117·6–159·6	113 –157	145–175	144–156	152–170	140–150	140–150	125	—	125	—
Small hook	78– 120	96–120	68–120	75·0–129·0	63·0–109·2	67 –112	95–125	92–102	102–110	96–100	96–100	88– 96	—	90	—
Testes	Numerous	—	—	—	—	—	350–500	500	550	300	—	393–694	300–340	500–550	650
Cirrus pouch L	200– 300	—	—	—	—	320·8–338·5	170–284	350	345–350	—	—	—	290–360	300–400	290–400
W	59– 99	—	—	—	—	107·1–108·2	68–114	—	68– 70	—	—	—	70– 83	100	90–100
Uterus	20– 25	—	—	—	—	13– 18	11– 18	13– 15	10– 14	8– 12	—	19	—	13– 15	—

TABLE 36.—*Comparison of* T. serialis brauni *described by various authors*

Synonym	*T. brauni*							*T. glomeratus*			*T. serialis theropitheci*
Author	Von Linstow (1902)	Ransom (1913)	Railliet & Henry (1915)	Hall (1919)	Clapham (1942b)	Fain (1952; 1956)	This paper	Railliet & Henry (1915)	Clapham (1942b)	This paper	Schwartz (1927)
Scolex	—	—	—	1,000	—	1,000–1,500	737–892	—	—	910	—
Rostellum	—	—	—	—	—	250	319–373	—	—	273	—
Suckers	130–180	—	—	300	—	250– 300	273–364	—	—	255	—
No. hooks	30	30	30	30	—	26– 34	22– 30	18– 34	—	—	28– 32
Large hook	114	130–140	130–140 (95–100)	95–140	85–140	140– 160	125–150	96–105	90–110	—	135–153
Small hook	47	85– 90	85– 90 (70– 75)	70– 90	—	90– 110	91–114	58– 65	—	—	81–103
Testes	—	—	—	—	—	250– 350	350–450	—	—	430–550	—
Cirrus pouch L	—	—	—	250–350	—	375– 480	274–347	—	—	384–434	—
W	—	—	—	—	—	100– 140	101–114	—	—	78–105	—
Uterus	—	—	—	—	—	10– 14	12– 13	—	—	11– 12	—

Female genitalia: The two lobes of the ovary are of unequal size. The vagina is surrounded by a sphincter 27 to 34 μ in diameter and situated 69 to 91 μ from the vagina's opening in the genital atrium. The uterus has 11 to 13 lateral branches. The ova are 36 to 41 μ by 34 to 36 μ in diameter with an embryophore 3·4 to 4·5 μ thick. The oncosphere is 19 to 21 μ by 17 to 21 μ in diameter (Table 36).

Discussion

T. brauni described from a dog in Ethiopia, was redescribed and its life cycle determined by Fain (1952) in the Congo. The material investigated differs from Fain's description mainly in the smaller size of the large hook. As both this material and that of Fain resulted from experimental infestations and are from the same locality, these differences probably represent the normal variation in these characters.

An adult *T. glomeratus* resulting from the experimental infestation of a dog with a coenurus from a mouse, resembles *T. s. brauni* in the number and distribution of the testes, the size of the cirrus pouch, the number of uterine branches and in the presence of a vaginal sphincter. As the rostellar hooks of the specimen were abnormal neither their number nor their size could be determined. Railliet & Henry (1915) described this species from *Gerbillus pyramidium hirtipus* Lataste, 1882 (Synonym: *Gerbillus hirtipus*) in Tunis, as having 18 to 34 rostellar hooks, the large hook being 96 to 105 μ and the small one 58 to 65 μ in length. Although these lengths are considerably smaller than those recorded by Fain (1952) and in this paper, it is probable that these parasites are identical. The species of this genus show considerable variation in the length of the rostellar hooks and, as is to be expected in a polycephalic larva this variation is more marked because the scolices may differ greatly in age. The conclusion that these species are identical is further supported by the localities and the intermediate hosts from which they have been recorded.

As stated earlier, Clapham (1942b) considers *T. serialis* and *T. packi* as well as *Taenia clavifer* (Railliet & Moque, 1919), *Taenia lemuris* (Cobbold, 1862), *Taenia polytuberculosus* (Megnin, 1880), and *Taenia ramosus* (Railliet & Marullaz, 1919) synonyms of *T. multiceps*. With the exception of *T. serialis*, *T. glomeratus* and *T. packi* of which the adults are known, these species are known only as larvae and therefore cannot be assigned to any one species. It is possible that these as well as *Taenia otomys* (Clapham, 1942a), are synonyms of *T. s. brauni*.

The larval stage of *T. s. brauni* was first recorded by Von Linstow (1902) from *Gerbillus pyramidium* Geoffrey, 1825 in Egypt. It has since been recorded in the Congo by Fain (1956) from various rodents, man and *Cercopithecus mitis* and by Mahon (1954a) from *Praomys natalensis* (Smith, 1834) (Synonym: *Mastomys coucha*). Nelson & Pester (1966) record it in Kenya from *Otomys* sp., *Hystrix* sp. and man. The type material of *T. glomeratus* originated in Tunis from *G. hirtipus* and Turner & Leiper (1919) record it under this name from man in Nigeria. Clapham (1942a, b) established experimental infestations of "*T. glomeratus*" in *Gerbillus* sp., *Mus musculus* Linnaeus, 1758 and rabbits. It has recently been recorded in the Republic of South Africa from *P. natalensis*.

GROUP II

Taenia taeniaeformis (Batsch, 1786) Wolffügel, 1911

Synonym: *Taenia infantis* Bacigalupo, 1922
Definitive host: *Felis catus* Linnaeus, 1758 and other felines and viverrids
Intermediate host: Rodents and Lagomorphs
Distribution: Cosmopolitan

Material:

1. Larval stage from naturally infested *Rattus norvegicus* (Berkenhout, 1769); Republic of South Africa
2. Adults from experimentally infested domestic cat; Republic of South Africa

Redescription

Scolex, rostellum and suckers: In five adults these are 1,001 to 1,183 μ, 546 to 918 μ and 291 to 491 μ in diameter. There are 34 to 36 rostellar hooks arranged in two crowns. The large hooks are 370 to 402 μ (mean 384·4 $\pm$ 9·8 μ) and the small hooks 210 to 261 μ (mean 241·2 $\pm$ 4·5 μ) in length (Fig. 47).

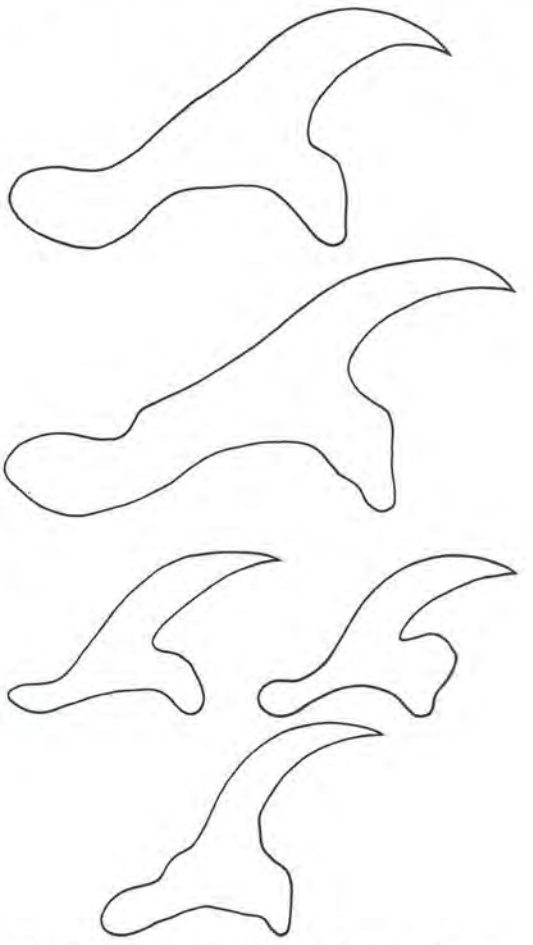


FIG. 47.—*T. taeniaeformis*. Rostellar hooks of adult

Male genitalia: There are 450 to 500 testes, 50 to 64 μ by 32 to 41 μ in diameter. They are in one to two layers which are dorsal only in the median part, but both dorsal and ventral in the lateral parts of the medulla. They extend to the vitellarium but are not confluent posterior to it. The cirrus pouch which extends into the medulla partly overlaps the vas deferens. In the sexually mature segment the cirrus pouch is 301 to 412 μ long and 64 to 82 μ wide; in the early gravid segment it is 269 to 411 μ by 64 to 73 μ, and in the gravid one 320 to 503 μ by 64 to 73 μ. The cirrus is not covered with hairlike bristles.

Female genitalia: The two lobes of the ovary are of equal size. There is no seminal receptacle, but in some early gravid segments the lumen of the vagina in this region dilates to 55 μ. The vagina runs close to the vas deferens and is markedly looped dorso-ventrally. After crossing into the cortex, it loops posteriorly and then loops anteriorly to open in the genital pore. At this loop (69 to 80 μ from the opening in the genital pore) it is surrounded by a well developed sphincter, 55 to 69 μ in diameter anterio-posteriorly; dorso-ventrally it is up to 91 μ in diameter (Fig. 48). The uterus has 5 to 9 lateral branches which redivide; as the branches fill with ova they may become sacculate. The ova are spherical, 31 to 36 μ in diameter, with an embryophore 3·4 to 4·5 μ thick (Table 37).

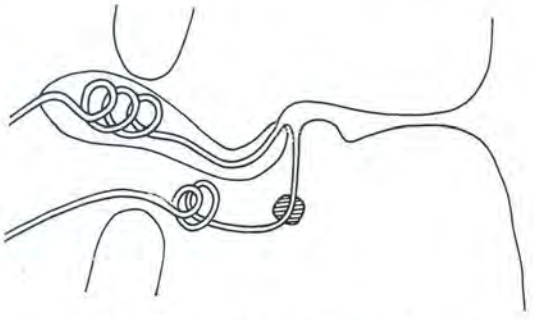


FIG. 48.—*T. taeniaeformis.* Genital atrium

Discussion

This cestode has been recorded from a wide range of felines as well as viverrids, mustelids and canines. The records from canines must, however, be treated with reserve. Joyeux & Baer (1935) record it from *Viverra zibetha* (Linnaeus, 1758); re-examination of this specimen has proved this to be correct. Abuladse (1964) also lists *Genetta genetta* (Linnaeus, 1758) but does not record the responsible authority; genets are often infested with *T. parva*, which is easily confused with this species. According to Abuladse (1964), Ryabov (1958) and Rybaltovski & Ovchinnikova (1960) record *T. taeniaeformis* from mustelids; the veracity of these records is difficult to assess without consulting the original publication. Abuladse (1964) also lists *Mellivora capensis* (Schreber, 1776) (Synonym: *Mellivora ratel*) as a host; this too must be treated with reserve. According to Abuladse (1964) it has been recorded from dogs (Bol, 1904; Dubinin, 1953); Kornienko & Pelevin, 1948; Zdanova & Polous, 1956; Delyanova, 1957); from the jackal, *Canis aureus* Linnaeus, 1758 (Petrov & Potekhina, 1953); from the fox, *Vulpes vulpes* (Linnaeus, 1758), (Khlodkovskii, 1912; Troitskaya, 1955; Dubinin, 1953). These records in canines could be misidentifications of *T. endothoracicus*, a parasite of canines, which has rostellar hooks of comparable size.

Mahon (1954b) records the larvae of *T. taeniaeformis* from the back muscles of *Lepus americanus* Erxleben, 1777 in Canada. It is possible that her specimen is the larval stage of *T. macrocystis* which is intramuscular in leporids but resembles *T. taeniaformis* which occurs in the liver of rodents. The larval stage of this cestode has been recorded from the liver of leporids (Joyeux, Senevet & Gros, 1936; in Mahon 1954b); re-examination of their specimen has verified its identification as *T. taeniaeformis.*

Taenia brachyacantha Baer & Fain, 1951

Definitive host: *Poecilogale albinucha* (Gray, 1864)
Intermediate host: Unknown
Distribution: Africa

Material:

1. Type specimen from the Congo (Democratic Republic) (Institute of Zoology, Neuchatel)
2. Incomplete strobila from *P. albinucha*, Republic of South Africa

Redescription

Scolex, rostellum and suckers: These are 480 μ, 126 μ and 176 μ in diameter; there are 54 rostellar hooks in two crowns (Baer & Fain, 1951). The hooks

TABLE 37.—*Comparison of* T. taeniaeformis *described by various authors*

Author	Leuckart (1856)	Hall (1919)	Joyeux & Baer (1937)	Riser (1956)	Müller (1965)	Esch & Self (1965)	This Paper
Scolex	1,400	1,700	1,700	—	—	—	1,001–1,183
Rostellum	—	—	1,000	—	—	—	546– 918
Suckers	460	—	400–500	—	—	333·0×277·9	291– 491
No. hooks	44–52	26– 52	26– 52	—	—	—	34– 36
Large hook	390	380–420	300–485	380–400	392–412	294–429 (2)	370– 402
Small hook	246 (1)	250–270	228–293	250–260	187–232	215–287 (2)	210– 261
Testes	—	Numerous	—	—	—	—	450– 500
Cirrus pouch L	—	300–475	430–475	—	—	429·8–432·9	269– 503
W	—	70– 85	70	—	—	76·0– 84·0	64– 82
Uterus	—	—	—	—	—	5 – 11	5– 9

(1) Length not given; calculated from illustration.
(2) According to the histogram the large hooks are 320 to 430 μ and the small 195 to 295 μ.

and the two crowns are not of two distinct sizes nor is there a consistent difference in their shape. The smallest hooks are 23·5 μ and the largest 28·0 μ long (Fig. 49).

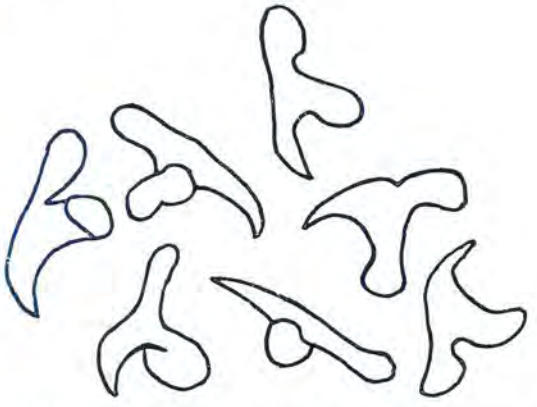


FIG. 49.—*T. brachyacantha.* Rostellar hooks (From Baer & Fain, 1951)

Male genitalia: There are 120 to 140 testes, 5 to 86 μ by 32 to 46 μ in diameter. They are in one to two dorsal layers, extend from the anterior margin of the segment posteriorly to the vitellarium. The genital pore is large and deep, extends almost to the ventral longitudinal vessel. The circular muscles surrounding the genital pore are very well developed. The cirrus pouch, which extends into the medulla, in the sexually mature segment is 227 to 272 μ long and 70 to 114 μ wide; in the gravid segment it is 193 to 227 μ by 125 to 129 μ. The cirrus, 32 to 40 μ in diameter, is covered with hairlike bristles.

Female genitalia: The two lobes of the ovary are slightly unequal in size. In the medulla the vagina is strongly coiled and has a thick, muscular wall; it straightens to pass into the cortex (Fig. 50). The early gravid uterus appears saccular (type specimen) but when fully gravid (S. African material) there are 14 to 17 branches which redivide. The ova are spherical, 24 to 27 μ in diameter, with an embryophore 3·4 to 4·5 μ thick (Table 38).

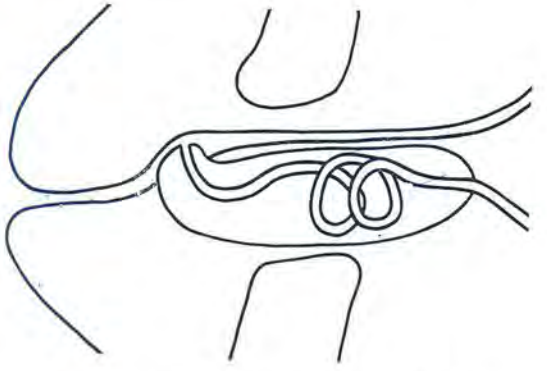


FIG. 50.—*T. brachyacantha.* Genital atrium

Discussion

According to Baer & Fain (1951) the large hooks are 28 μ and the small ones 26 μ long. There is, however, no clear difference in the size of the hooks in the two crowns as hooks of 23·5 μ, 24·6 μ, 25·8 μ and 28·0 μ in length are present. The sacculate structure of the uterus in the type specimen is probably a factor of its immaturity. On superficial examination the uterus of the South African specimen also appeared sacculate but on closer examination it was found to be branched as is usual in taeniids.

TABLE 38.—*Comparison of* T. brachyacantha *described by various authors*

Author	Baer & Fain (1951)	This Paper	
		Type	S. African material
Scolex	480	—	—
Rostellum	126	—	—
Suckers	176	—	—
No. Hooks	54	—	—
Large Hooks	28	23·5–28·0	—
Small Hooks	26	—	—
Testes	100–145	120–140	120
Cirrus Pouch L.	240–280	193–272	209–251
W.	120	70–129	128–151
Uterus	Saccular	Saccular	Branched (14–17)

On present information this species differs from *T. mustelae* only in having larger rostellar hooks, viz. 23·5 to 28 μ vs 12 to 22 μ. Examination of further specimens may show it to be a subspecies of, or even identical with, *T. mustelae*.

Taenia martis (Zeder, 1803)

Synonyms: *Taenia intermedia* Rudolphi, 1810
Taenia skrjabini Romanov, 1952
Taenia sibirica Dubnitzky, 1952

Freeman (1956) reviews the synonyms of this species and concludes that *Taenia martis* (Zeder, 1803) has priority over the other names including *T. intermedia* Rudolphi, 1810 and furthermore that *T. skrjabini* Romanov, 1952 and *T. sibirica* Dubnitzky, 1952 are synonyms of it. Freeman (1956) questions the identity of parasites assigned to this species by Joyeux & Baer (1934) as the rostellar hooks in their specimens are larger than those recorded by Thienemann (1906). Wahl (1967) concludes that the specimens described by Joyeux & Baer were correctly identified and that Thienemann's records are of the small and not of the large hook. Wahl (1967) erects two subspecies, *Taenia martis martis* from Europe with larger rostellar hooks than those of *T. martis americana* from America and Asia.

Taenia martis martis (Zeder, 1803) Wahl, 1967

Synonym: *Taenia intermedia* Rudolphi, 1810
Definitive host: *Martes* spp.; *Mustela* spp.
Intermediate host: Rodents
Distribution: Europe

Material:

Adults from *Martes foina* (Erxleben, 1777); Switzerland

Redescription

Scolex, rostellum and suckers: In two specimens these are 960 to 1,097 μ, 352 to 357 μ and 229 to 242 μ in diameter. There are 28 to 30 rostellar

hooks arranged in two crowns. The large hooks are 183 to 218 μ (mean $206 \cdot 3 \pm 8 \cdot 0$ μ) and the small ones 151 to 169 μ (mean $162 \cdot 7 \pm 5 \cdot 1$ μ) in length (Fig. 51). The two crowns of hooks are of the same shape, but those of the second crown are smaller.

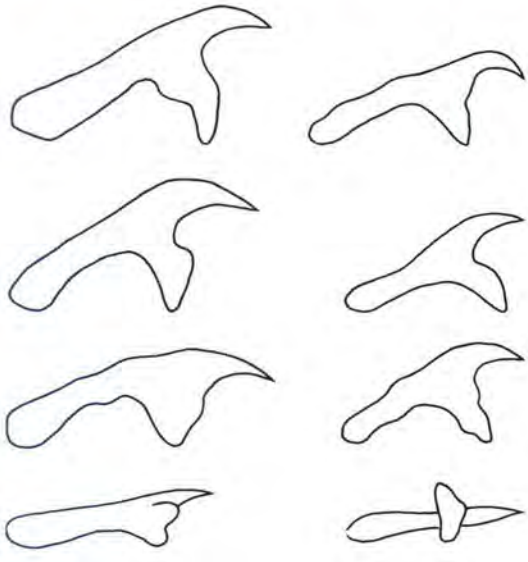


FIG. 51.—*T. martis martis*. Rostellar hooks of adult

Male genitalia: There are 106 to 168 testes, 69 to 91 μ by 41 to 59 μ in diameter. They are in two dorsal layers and extend to the posterior margin laterally but are not confluent posterior to the vitellarium; testes are also present between the ovary and the vitellarium. The cirrus pouch extends to the median wall of the longitudinal excretory vessel; in the sexually mature segment it is 107 to 161 μ long by 25 to 41 μ wide; in the gravid segment it is 148 to 182 μ by 30 to 50 μ. The cirrus is not covered with bristles.

Female genitalia: The two lobes of the ovary are of unequal size. The vagina is straight and thick-walled with a lumen 9 μ in diameter; it loops in the medulla and in the cortex its lumen dilates to 27 to 50 μ in diameter for a distance of 114 to 151 μ, then narrows again to 9 μ before opening in the genital atrium (Fig. 52). The uterus has 6 to 9 lateral branches which redivide. The ova are spherical, 28 to 33 μ in diameter, with an embryophore 2·2 to 3·4 μ thick.

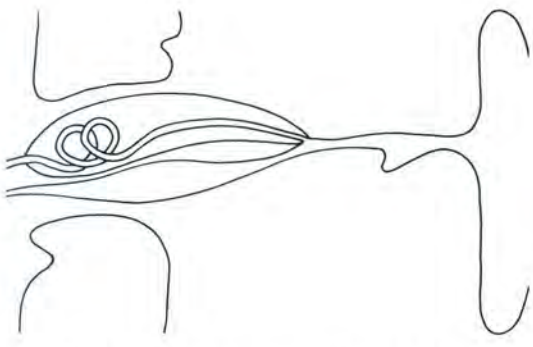


FIG. 52.—*T. martis martis*. Genital atrium

Taenia martis americana (Zeder, 1803) Wahl, 1967

Synonyms: *Taenia sibirica* Dubnizky, 1952
Taenia skrjabini Romanov, 1952
Definitive host: *Martes* spp.; *Mustela* spp.
Intermediate host: Rodents
Distribution: North America; U.S.S.R.

Material:

Larval stage from *Clethrionomys gapperi gapperi* Vigors, 1830

Redescription

Rostellar hooks: There are 24 to 26 rostellar hooks arranged in two crowns. The large hooks are 134 to 157 μ (mean $143 \cdot 4 \pm 7 \cdot 8$ μ) and the small ones 125 to 141 μ (mean $131 \cdot 5 \pm 5 \cdot 4$ μ) long (Tables 39 and 40).

Discussion

These two subspecies can be differentiated on the length of the large hook, that of the nominate subspecies being 175 to 220 μ and that of the Asiatic and American subspecies 134 to 157 μ. The lengths of the small hook, however, overlap being 130 to 171 μ and 125 to 141 μ respectively in the two subspecies and thus cannot be used for their separation.

Wahl (1967) considers it possible that *T. twitchelli* Schwartz, 1924 of *Gulo gulo* (Linnaeus, 1758) is identical with this species. This cannot be so as *T. twitchelli* has proliferating larvae in porcupines (*Erethizon epixanthum* Brandt, 1835) while Wahl (1967) describes the larva of *T. martis martis* as monocephalic in *Apodemus flavicollis* (Melchoir, 1834), *Apodemus silvaticus silvaticus* (Linnaeus, 1758), and *Clethrionomys glareolus* (Schreber, 1780). Moreover the length of the large hook of *T. twitchelli* is recorded as 195 μ by McIntosh (1938), 200 to 212 μ by Rausch (1959b) and 209 to 218 μ (this paper); these measurements correspond with those of *T. martis martis* in Europe and not with those of *T. m. americana*. It is improbable that a parasite will have hooks so markedly different in size in different hosts in the same locality.

Taenia melesi Petrow & Sadychow, 1956 (listed as a *species inquirendae* in this paper) described from a badger, *Meles meles* (Linnaeus, 1785) may be identical with *T. martis americana*.

Taenia mustelae Gmelin, 1790

Synonym: *Taenia tenuicollis* Rudolphi, 1819
Definitive host: *Martes* spp.; *Mustela* spp.
Intermediate host: *Talpa europaea*; various rodents
Distribution: Europe, U.S.S.R.; North America

Freeman (1956) reviews the synonyms of this species and concludes that *T. mustelae* has priority over other names including *T. tenuicollis*.

Material:

1. Cystic stage from naturally infested *Clethrionomys glareolus* (Schreber, 1780); Switzerland
2. Adults from *Mustela putorius* Linnaeus, 1758 and *Mustela erminea* Linnaeus, 1758, previously described by Joyeux & Baer (1934) and Wahl (1967)

TABLE 39.—*Comparison of* T. martis martis *described by various authors*

Author	Joyeux & Baer (1936)	Shakhmatova (1963; in Abuladse, 1964)	Muller (1965)	Wahl (1967)	This Paper
Scolex	1,500	940–960	—	680–880	960–1,097
Rostellum	420	300–330	—	340–410	352– 357
Sucker	280	210–243	—	200	229– 242
No. hooks	34– 40	28	—	28– 30	28– 30
Large hook	210–220	175–195	204–211	186–213	183– 218
Small hook	150–160	130–145	152–171	145–168	151– 169
Testes	—	160–180	—	120	106– 168
Cirrus pouch L.	210–230	—	—	160	107– 182
W.	70– 80	—	—	88	25– 50
Uterus	10– 13	12– 14	—	12– 14	6– 9

TABLE 40.—*Comparison of* T. martis americana *by various authors*

Synonym	*T. m. americana*	*T. sibirica*	*T. skrjabini*	*T. martis*	*T. m. americana*
Author	Wahl (1967)	Dubnitzky (1952b)	Romanov (1952; in Abuladse, 1964)	Freeman (1956)	This Paper
Scolex	—	600–700	634–840	720	—
Rostellum	—	350	352–420	350	—
Suckers	—	150–161	138–168	170–200	—
No. hooks	—	26– 30	26	26	24– 26
Large hook	142	152–153	153–155	146	134–157
Small hook	129–133	128–130	126–129	133	125–141
Testes	—	—	70– 80	—	—
Cirrus pouch L.	136–147	—	160–170	—	—
W.	34– 52	—	60– 68	—	—
Uterus	11	10– 14	14– 15	—	—

3. Adults from *Mustela ermina arctica* (Merriam, 1896) infested with larvae from *Microtus pennsylvanicus* Ord, 1815. North Dakota, U.S.A.

4. Adults from naturally infested *Mustela nivalis* Linnaeus, 1766 and *Mustela vison* Schreber, 1777; Alaska

Redescription

Scolex, rostellum and suckers: Wahl (1967) records these as 300 μ, 91 μ and 130–150 μ in diameter. The larval stage from *C. glareolus* has 38 rostellar hooks, 20·7 to 22·1 μ long; hooks on one adult (*M. putorius*) are 18·4 to 20·7 μ in length (Fig. 53).

Male genitalia: There are 83 to 127 testes, 36 to 52 μ by 32 to 39 μ in diameter. The testes are mainly anterior to the female genitalia but their distribution relative to these organs is variable; they extend from the anterior margin of the segment posteriorly to the middle of the ovary, and in some instances may extend as far as the posterior margin of the ovary. The genital atrium is deep with well developed circular muscles. The cirrus pouch in the sexually mature segment is 129 to 265 μ long by 80 to 137 μ wide, in the early gravid segment 220 to 230 μ by 100 to 110 μ and in the gravid one 104 to 306 μ by 75 to 120 μ. The cirrus, 23 to 24 μ in diameter, is not covered with bristles.

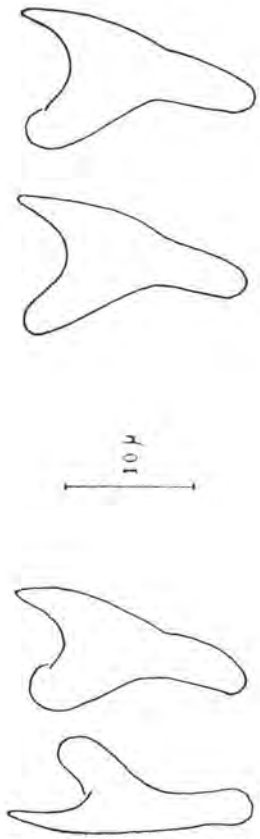


FIG. 53.—*T. mustelae.* Rostellar hooks (From Wahl, 1967)

TABLE 41.—*Comparison of* T. mustelae *described by various authors*

Synonym	Thienemann (1906)	Joyeux & Baer (1934)	Skinker (1935b)	Joyeux & Baer (1936)	Petrov (1941; in Abuladse 1964)	Locker (1955)	Freeman (1956)	Wahl (1967)	This paper	
									European material	Alaskan material
Scolex	333 –400	300	237–303	260–350	449–477	—	200–440	300	—	—
Rostellum	133	85– 90	61– 77	100–180	108	—	70– 97	91	—	—
Suckers	100 –133	120	77–110	60–100	167–186	—	92–132	130 –150	—	—
No. hooks	50– 52	52	42– 60	52	50	44 –48	47– 66	37 – 46	38	—
Large hook	16·38	20	15– 16	20	18– 21	15·5–18·0	14– 20	19·0–20·1	18·4–22·1	—
Small hook	13·86	—	—	—	12– 15	14·0–16·5	—	—	—	—
Testes	114	90–110	90–125	110	114	—	—	100 –110	83 –127	97–117
Cirrus pouch L	150 –250	160	193–220	175–250	352–369	—	—	229 –319	104 –306	138–250
W	105·0–112·5	70– 80	130–150	40– 90	158–176	—	—	91 –146	75 –137	90–120
Uterus	12 – 18	12– 15	10– 19	12– 14	14– 16	—	10– 23	28	10 – 23	13– 18

Female genitalia: The two lobes of the ovary are of equal size. The wall of the vagina is thick and muscular throughout its length. There is no vaginal sphincter nor does the lumen dilate markedly before opening in the genital atrium which has well developed circular muscles (Fig. 54). The uterus has 10 to 23 branches which redivide. The ova are spherical, 17 to 20 μ in diameter, with an embryophore 1·1 to 2·2 μ thick (Table 41).

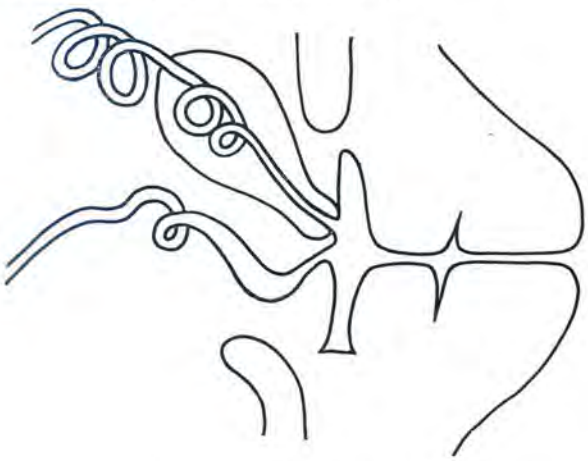


FIG. 54.—*T. mustelae*. Genital atrium

Discussion

Thienemann (1906), Locker (1955) and Petrov (1941; according to Abuladse, 1964) divide the rostellar hooks into two categories based on size. It is, however, not possible to place them in two categories as many of the hooks are intermediate between the greatest and smallest measurement.

Kirschenblatt (1939) described *Coenurus parviuncinatus* from *Citellus citellus* (Linnaeus, 1766) and *Spalax leucodon* Nordmann, 1840 which is probably the larval stage of *T. mustelae*. Wahl (1967) describes it as a monocephalic larva, but Freeman (1956) showed that it is both mono- and polycephalic in the same host.

Taenia parva Baer, 1926

Synonyms: "*Taenia laticollis*" of Joyeux and Baer (1937)
Multiceps macracantha Clapham, 1942
Hydatigena laticollis forme *parva* (Baer, 1926) of Dollfus, 1962

Definitive host: *Genetta* spp.; *Herpestes ichneumon* (Linnaeus, 1758); *Ictonyx striatus* (Perry, 1810); *Felis silvestris* Schreber, 1777

Intermediate host: *Mus musculus* Linnaeus, 1758; *Rattus chrysophilus* (De Winton, 1897); *Rattus namaquensis* (Smith, 1834); *Rattus paedulus* (Sundevall, 1846); *Rhabdomys pumilo* (Sparrman, 1784); *Praomys natalensis* (Smith, 1834); *Apodemus silvaticus* (Linnaeus, 1758)

Distribution: Africa, Europe

Material:

1. Type specimens from *Genetta tigrina* (Schreber, 1776) (Institute of Zoology, Neuchatel)
2. Adult from *Genetta* spp., Republic of South Africa, Rhodesia and Europe; from *I. striatus*, Republic of South Africa
3. Larval stage from *R. chrysophilus*, *P. natalensis*, Republic of South Africa; *A. silvaticus*, France

Redescription

Scolex, rostellum and suckers: In six adults these are 683 to 1,001 μ, 546 to 655 μ and 165 to 237 μ in diameter. There are 38 to 48 rostellar hooks arranged in two crowns (Table 42; Fig. 55).

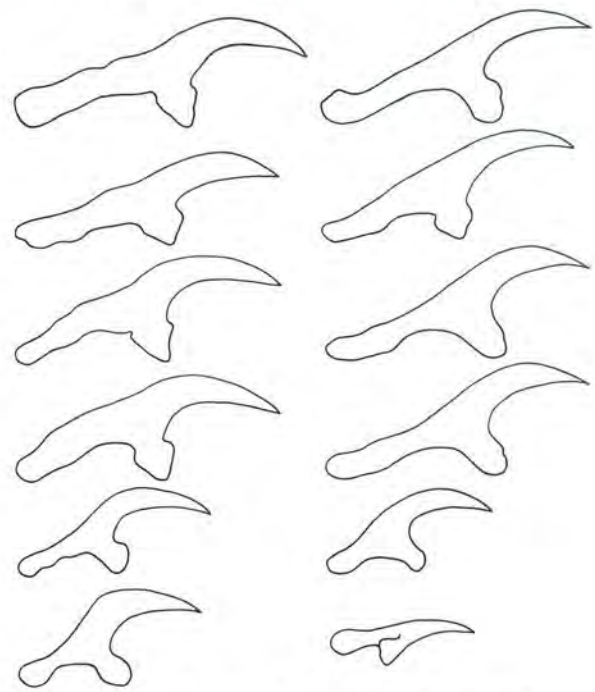


FIG. 55.—*T. parva*. Rostellar hooks of adult

Male genitalia: There are 500 to 650 testes, 69 to 91 μ by 37 to 69 μ in diameter. They are in one to two dorsal layers and extend to the posterior margin of the segment, confluent posterior to the vitellarium and are also present between the ovary and vitellarium. The cirrus pouch extends into the medulla; it is long and narrow and at its origin overlaps the vas deferens. In the sexually mature segment it is 352 to 470 μ long and 78 to 110 μ wide; in the early gravid segment it is 375 to 420 μ by 69 to 91 μ and in the gravid one 297 to 357 μ by 78 to 91 μ.

Female genitalia: The two lobes of the ovary are slightly unequal in size. The vagina is not surrounded by a sphincter nor does it dilate before opening in the genital atrium (Fig. 56). The uterus has 7 to 12 lateral branches which redivide. The ova are spherical, 25 to 29 μ in diameter with an embryophore 2·2 to 3·4 μ thick (Table 43).

TABLE 42.—*Size of rostellar hooks of* T. parva

	Large hooks			Small hooks		
	n	Range	Mean ± S.D.	n	Range	Mean ± S.D.
Larval stage:						
R. natalensis	25	351–366	361·9 ± 3·5	25	218–238	229·4 ± 5·1
A. chrysophilus	9	306–320	313·8	9	196–209	203·9
Adult	50	302–370	324·0 ± 15·4	50	192–233	210·1 ± 3·5
Total	84	302–370	335·3 ± 22·2	84	192–238	214·9 ± 12·2

TABLE 43.—*Comparison of* T. parva *described by various authors*

Synonym	*T. parva*				*T. laticollis*	*Hydatigena laticollis* forme *parva*
Author	Baer (1926)	Mahon (1954a)	Baer & Fain (1965)	This paper	Joyeux & Baer (1937)	Dollfus (1962)
Scolex	1,000	—	—	683–1,001	1,200	880–900
Rostellum	600	—	—	546– 655	700	—
Suckers	200	—	—	165– 237	260	220–227 × 230–246
No. hooks	44	42– 46	36	38– 48	30– 40	40– 46
Large hook	361	392–424	398–410	302– 370	315–340	320–358·8
Small hook	228	240–264	260–266	192– 238	205–235	215–245
Testes	500	—	—	500– 650	—	Numerous
Cirrus pouch L	440	—	—	297– 470	440–450	280–380
W	80	—	—	69– 110	80–100	40– 47
Uterus	7–12	—	—	7– 12	—	10– 12

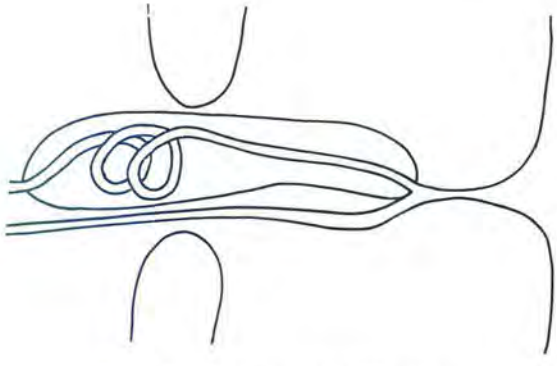


FIG. 56.—*T. parva*. Genital atrium

Discussion

This species shows great variation in the size of the rostellar hooks. Examination of the cotypes showed that the majority of the specimens had rostellar hooks which were smaller than those previously reported for this species. Comparison of specimens from a single genet (Rhodesia) showed that individuals with large hooks 361 to 384 μ long, occur together with specimens with hooks 306 to 311 μ long; in other respects these specimens are morphologically identical.

Although *T. parva* is common in the genet in Southern Africa, it has been recovered from this host once in Europe when it was recorded as *T. laticollis* (Joyeux & Baer, 1937). Re-examination of this material shows it to be *T. parva*. Dollfus (1962) described it as *Hydatigena laticollis* forme *parva* from *H. ichneumon* in Algeria. Baer & Fain (1965) recorded it from *F. silvestris* in the Congo; it has also beeu recovered from the same host in Botswana. In South Africa, however, it was not found in any of 65 wild cats examined.

Mahon (1954a) assigned a polycephalic larva from *M. musculus* to this species. Although this has not been substantiated by experimental infestation, there is little doubt that Mahon's identification is correct. This species may be distinguished from *T. endothoracicus* and *T. selousi*, which also have polycephalic larvae, on the number and size of the rostellar hooks. *T. parva* larvae have been recovered from *R. chrysophilus*, *R. namaquensis*, *R. pumilo* and *P. natalensis* in South Africa and from *R. paedulus* in Moçambique, as well as from *A. silvaticus* in France (Lussan).

Taenia selousi Mettrick, 1962

Definitive host: *Felis silvestris* Schreber 1776
Intermediate host: *Rhabdomys pumilo* (Sparrman, 1784)
Distribution: Southern Africa

Material:

1. Cotype from *F. silvestris*; Rhodesia (British Museum)
2. Adults from *F. silvestris*; Republic of South Africa

37826–4

3. Polycephalic larvae from *R. pumilo*; Republic of South Africa

Redescription

Scolex, rostellum and suckers: In three adults these are 801 to 828 μ, 456 to 519 μ and 200 to 246 μ in diameter. There are 50 to 58 rostellar hooks arranged in two crowns (Table 44; Fig. 57).

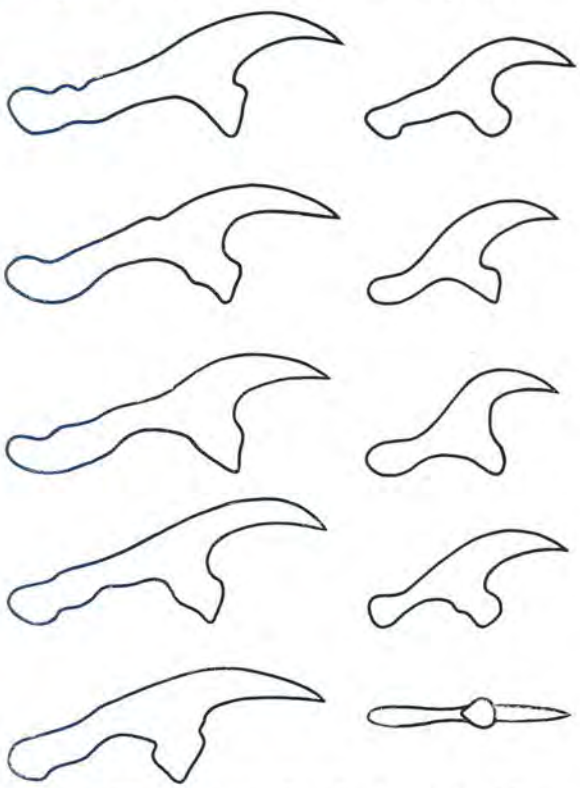


FIG. 57.—*T. selousi.* Rostellar hooks of adult

Male genitalia: There are 220 to 300 testes, 46 to 91 μ by 46 to 69 μ in diameter. They are in one or two layers and overlie the vas deferens and the vagina. Posteriorly they extend to the vitellarium but are not confluent posterior to it. The cirrus pouch extends into the medulla; in the sexually mature segment it is 251 to 366 μ long by 46 to 69 μ wide, in the early gravid segment 274 to 343 μ by by 46 to 87 μ and in the gravid one 274 to 357 μ by 59 to 87 μ.

Female genitalia: The poral lobe of the ovary is slightly smaller than the aporal one. The vagina is not surrounded by a sphincter and there is no dilatation of its lumen before its opening into the genital atrium (Fig. 58). The uterus has 4 to 8 lateral branches which redivide. The ova are oval, 30 to 36 μ by 27 to 33 μ in diameter, with an embryophore 2·2 to 3·4 μ thick (Table 45).

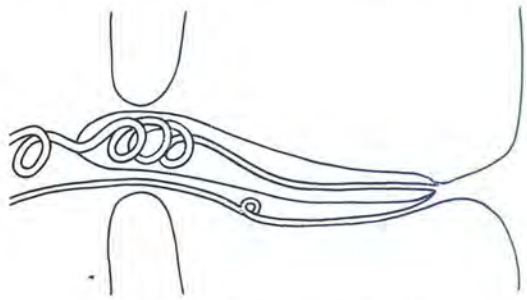


FIG. 58.—*T. selousi.* Genital atrium

TABLE 45.—*Comparison of* T. selousi *described by various authors*

	Mettrick (1962)	This Paper
Scolex	790–810	801–828
Rostellum	530–580	456–519
Suckers	160–200	200–246
No. Hooks	48	50– 58
Large Hook	265–274	256–290
Small Hook	171–176	160–187
Testes	220–240	220–300
Cirrus Pouch L.	510–570	251–366
W.	70– 80	46– 87
Uterus	6– 11	4– 8

Discussion

The material described above differs from Mettrick's (1962) description in the distribution of the testes and in the size of the cirrus pouch. Mettrick states that the testes do not extend posteriorly beyond the ovary, but in the specimens described above they extend to the level of the vitellarium. This difference could be ascribed to differences in the state of contraction of the specimens. In the specimens described above the ova are somewhat larger, 30 to 36 μ by 27 to 33 μ, than those recorded by Mettrick, 24 to 26 μ by 28 to 31 μ.

T. selousi resembles *T. parva* both macro- and microscopically: both are short, stocky cestodes usually occurring in large numbers. *T. selousi*, however, has more rostellar hooks which are smaller,

TABLE 44.—*Size of rostellar hooks of* T. selousi

	Large hook			Small hook		
	n	Range	Mean ± S.D.	n	Range	Mean ± S.D.
Larval stage	25	256–274	264·5 ± 4·9	23	169–183	175·6 ± 5·1
Adult	50	256–290	270·3 ± 7·0	50	160–187	173·2 ± 5·8
Total	75	256–290	268·4 ± 6·9	73	160–187	173·9 ± 5·7

and fewer testes than *T. parva*. *T. selousi* resembles *T. endothoracicus* in the number of rostellar hooks but they are considerably smaller than in the latter species.

Taenia taxidiensis Skinker, 1935

Synonym: *Fossor angertrudae* Honess, 1937
Monordotaenia taxidiensis (Skinker, 1935a) Little, 1967
Definitive host: *Taxidea taxus* Schreber, 1778
Intermediate host: Unknown
Distribution: North America

Skinker (1935) when describing this cestode was under the impression that some of the rostellar hooks had been lost as there was only one crown present. Rausch (1947) found only one crown of rostellar hooks in this species. Honess (1937), describing a cestode from the same host, used the single crown of rostellar hooks as a criterion for placing it in a new genus, *Fossor angertrudae*. Little (1967) concludes that *T. taxidiensis* and *F. angertrudae* are identical, but since the genus *Fossor* is a junior homonym of *Fossor* Lichtenstein, 1844 he erects a new genus, *Monordotaenia*, for this species.

Material:

1. Type specimen from *T. taxus*; U.S.A. (U.S.D.A.)
2. Immature strobila and another incomplete strobila from the type host; U.S.A.

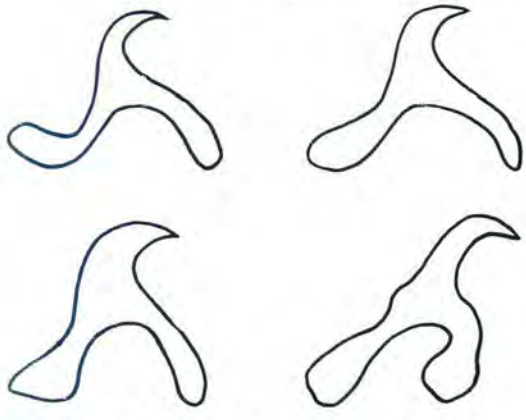


FIG. 59.—*T. taxidiensis*. Rostellar hook of adult

Redescription

Scolex, rostellum and suckers: These are 900 μ, 251 μ and 215 μ in diameter. There is a single crown of 22 rostellar hooks, 100 to 104μ long (Fig. 59).

Male genitalia: As the strobila is macerated and not fully mature, the number of the testes cannot be determined accurately, but there are at least 150, 41 to 46 μ by 37 to 41 μ in diameter. They are in a single layer extending from the anterior to the posterior margin where they are confluent. The cirrus pouch does not quite reach the longitudinal vessels; in the early gravid segment it is 229 to 279 μ long and 91 to 101 μ wide. The cirrus is 37 to 50 μ in diameter.

Female genitalia: It was not possible to study these in detail. The vagina dilates slightly before opening in the genital atrium; there is no vaginal sphincter (Fig. 60). The early gravid uterus has 12 to 15 branches (Table 46).

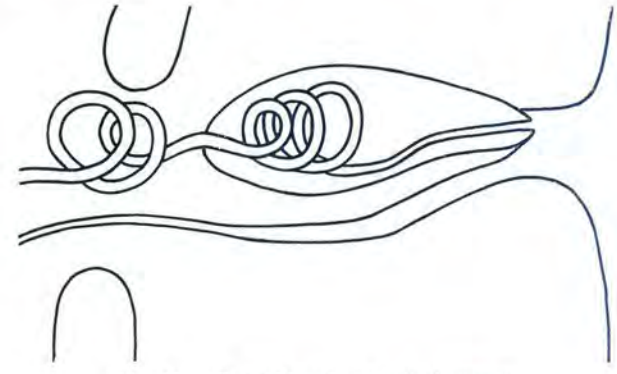


FIG. 60.—*T. taxidiensis*. Genital atrium

Discussion

Adams (1966) and Little (1967) examined the type specimens of *T. taxidiensis* and *F. angertrudae* and conclude that they are identical.

Honess (1937), Keppner (1967) and Little (1967) object to the inclusion of this species in the genus *Taenia* as it has a single and not a double crown of rostellar hooks. As stated in the introduction, however, the procedure of erecting a new genus based on a single character is completely unwarranted.

TABLE 46.—*Comparison of* T. taxidiensis *described by various authors*

Synonym	*T. taxidiensis*			*F. angertrudae*	
Author	Skinker (1935b)	Rausch (1947)	This paper	Honess (1937)	Little (1967)
Scolex	450	497–596	900	666–818	780
Rostellum	170	—	251	262–308	—
Sucker	140	156	215	192–239	200
No. hooks	—	20– 27	22	22– 25	20
Hook length	90– 93	79– 99	100–104	83– 99	89
Testes	150–250	200–300	150	Numerous	200–300
Cirrus pouch L	—	240–330	229–279	281	270
W	—	100	91–101	137	110
Uterus	11– 19	10	12– 15	11– 23	—

Taenia twitchelli Schwartz, 1927

Synonym: *Multiceps twitchelli* (Schwartz, 1927) Clapham, 1942
Definitive host: *Gulo gulo* (Linnaeus, 1758)
Intermediate host: *Erithizon epixanthum* Brandt, 1835;
Erithizon dorsatum (Linnaeus, 1758) and various rodents
Distribution: North America

Material:

1. Type specimen from *E. epixanthum*; Alaska. (U.S.D.A.)
2. Adults from *G. gulo*, Alaska

Redescription

Scolex, rostellum and suckers: These structures are 960 μ, 457 μ and 247 μ in diameter. The type specimen has 36 rostellar hooks arranged in two crowns, the large hooks are 184 to 193 μ and the small ones 143 to 147 μ long. The adult has 28 hooks, the large hook 209 to 218 μ and the small one 165 to 178 μ in length (Fig. 61).

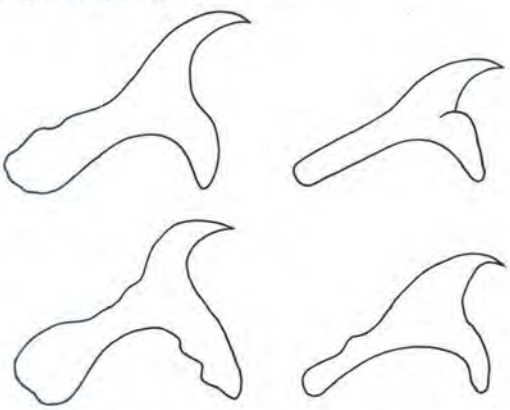


FIG. 61.—*T. twitchelli.* Rostellar hooks of adult

Male genitalia: There are 204 to 214 testes, 50 to 82 μ by 46 μ in diameter. They are in two dorsal layers which are confluent posterior to the vitellarium. The cirrus pouch extends to the longitudinal excretory vessels but not into the cortex; in the sexually mature segment it is 209 to 229 μ long by 55 to 78 μ wide; in the gravid segment it is 218 to 283 μ by 55 to 69 μ. The cirrus is covered with hairlike bristles.

Female genitalia: The poral lobe of the ovary is slightly smaller than the aporal one. In the cortex the lumen of the vagina dilates from 14 μ to 23 μ and then narrows gradually before opening in the genital atrium (Fig. 62). The uterus has 8 to 11 lateral branches which redivide. The ova are spherical, 28 to 31 μ in diameter, with an embryophore 2·2 to 3·4 μ thick (Table 47).

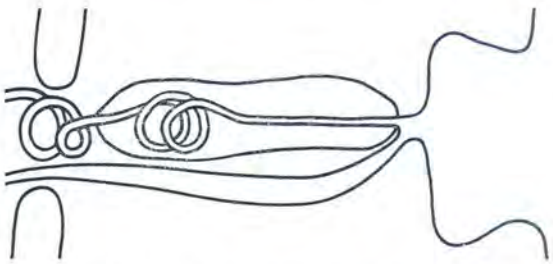


FIG. 62.—*T. twitchelli.* Genital atrium

Discussion

Wahl (1967) believes that this species is possibly identical to *T. martis*. This, however, is improbable as it has a polycephalic proliferating larva while that of *T. martis* is monocephalic (Wahl, 1967). Furthermore, *T. twitchelli* which is a North American species has rostellar hooks corresponding in size with those of *T. m. martis* (a European subspecies) and not with those of *T. m. americana*.

SPECIES INQUIRENDAE

Taenia brachysoma Setti, 1899

Definitive host: *Canis familiaris* Linnaeus, 1758
Intermediate host: Unknown
Distribution: Eritrea

Material:

No specimens available.

Discussion

Baer (1926) considers this species a synonym of *T. brauni*. It is also listed as such by Yamaguti (1959) and Abuladse (1964).

TABLE 47.—*Comparison of* T. twitchelli *described by various authors*

	Schwartz (1924)	McIntosh (1938)	Clapham (1942b)	Rausch (1959b)	This paper	
					Type specimen	Adult
Scolex	—	620	—	1,200	—	960
Rostellum	—	—	—	—	—	457
Suckers	—	215	—	265	—	247
No. hooks	36	30– 36	—	32– 36	36	28
Large hook	189–198	195	189–198	200–216	184–193	209–218
Small hook	155–163	155	155–163	156–168	143–147	165–178
Testes	—	—	—	200	—	204–214
Cirrus pouch L	—	70	—	220	—	209–283
W	—	50	—	80	—	55– 78
Uterus	—	7– 9	—	10– 12	—	8– 11

Taenia erythraea Setti, 1897

Definitive host: *Canis mesomelas* Schreber, 1775
Intermediate host: Unknown
Distribution: Eritrea

Material:

No specimens available

Discussion

Unfortunately it was not possible to consult the original description; references to it in the literature are contradictory. Baer (1926) remarks on the small size of the single crown of rostellar hooks and in the table lists the large hook as 85 μ and the small as 95 μ in length. Wardle & McLeod (1952) record them as 185 μ and 95 μ in length.

Taenia krepkogorski (Schulz & Landa, 1934) n. comb.

Synonym: *Hydatigera krepkogorski* Schulz & Landa, 1934
Definitive host: *Felis* spp.; *Vulpes vulpes* (Linnaeus, 1758)
Intermediate host: Rodents, Lagomorphs
Distribution: U.S.S.R.

Material:

No specimens available

Discussion

Schulz & Landa (1934) describe the strobilocercus of this cestode from *Rhombomys opimus* (Lichtenstein, 1823) and *Meriones meridianus* (Pallas, 1773). According to Abuladse (1964) Petrov & Potekhina (1953) described the sexual stage from *Felis catus* Linnaeus, 1758 (Synonym: *Felis ocreata*). The latter description, however, appears to be identical to *T. macrocystis*. According to Abuladse (1964) Agapova & Sapozenkov (1961) assign cestodes from *V. vulpes* to this species. The latter specimens are possibly *T. endothoracicus*.

Taenia melesi Petrov & Sadychow, 1956

Definitive host: *Meles meles* (Linnaeus, 1758)
Intermediate host: Unknown
Distribution: U.S.S.R.

Material:

No specimens available

Discussion

This species appears to be identical to *T. martis americana* (synonym: *T. sibirica* Dubnizky, 1952).

Taenia monostephanos von Linstow, 1905

Synonym: *Fossor monostephanos* (von Linstow, 1905) Abuladse, 1964
Definitive host: *Lynx lynx* (Linnaeus, 1758)
Intermediate host: Unknown
Distribution: Russia

Material:

No specimens available

Discussion

Baer (1926) considers this species an anomaly. Adams (1966) pointed out that *T. laticollis* frequently loses all the large rostellar hooks and that such specimens agree well with the description of Von Linstow (1905) of *T. monostephanos*. The author agrees with Adams.

Taenia ovata Molin, 1858

Definitive host: *Vulpes vulpes* (Linnaeus, 1758); *Alopex lagopus* (Linnaeus, 1758)
Intermediate host: Unknown
Distribution: Norway

Material:

No specimens available

Discussion

Abuladse (1964) considers this a *species inquirendae*. The description is incomplete, but from the number and size of the rostellar hooks as well as the host and locality, it is probable that this species is identical with *T. polyacantha*.

Taenia polycalcaria Von Linstow, 1903

Definitive host: *Panthera pardus* (Linnaeus, 1758)
Intermediate host: Unknown
Distribution: Ceylon

Material:

No specimens available

Discussion

The description of this species is incomplete. Baer (1926) considers it a synonym of *T. pisiformis*.

Taenia pungutchi Ortlepp, 1938

Definitive host: *Canis mesomelas* Schreber, 1775
Intermediate host: Unknown
Distribution: Republic of South Africa

Material:

Type specimen from *C. mesomelas*, Republic of South Africa (Veterinary Research Institute, Onderstepoort)

Redescription

Male genitalia: There are 200 to 250 testes, 91 to 114 μ by 69 to 91 μ in diameter. They are in two and sometimes three layers, present between the ovary and the vitellarium and extend to the posterior margin of the vitellarium but are not confluent. The cirrus pouch does not extend to the longitudinal vessels; in the sexually mature segment it is 238 to 352 μ long and 59 to 69 μ wide. The cirrus is covered with hairlike bristles.

Female genitalia: The poral lobe of the ovary is smaller than the aporal one. After entering the cortex the lumen of the vagina dilates to 32 μ and then narrows to pass through the sphincter before opening in the genital atrium. The sphincter is weakly developed, 27 to 32 μ in diameter, situated 69 to 91 μ from the opening in the atrium. The part of the sphincter situated between the vagina and the cirrus pouch is only 7 μ thick while posterior to the vagina it is 14 to 16 μ thick. In one segment only the sphincter is the same thickness throughout. The uterus has 8 lateral branches.

Discussion

The above data agree with those of Ortlepp (1938) but he records the size of the cirrus pouch as 320 to 380 μ by 70 to 80 μ and found 8 to 10 uterine branches. Ortlepp states that the cirrus is unarmed. The bristles occurring in this species and in many other *Taenia* spp. are hairlike and resemble the lining of the vagina.

Ortlepp is correct in concluding that this material is unlike any other known species in that it has very few testes and few uterine branches. It differs from *T. ovis* in having two layers of testes which do not exceed 250 per segment, while the latter species has 600 in one layer. *T. serialis* has 350 to 500 testes in one to three layers but has 11 to 18 uterine branches. *T. hydatigena* also has few uterine branches, but has at least 600 testes in a single layer, and does not have a vaginal sphincter. *T. multiceps* has 280 to 350 testes in two layers, but has 14 to 20 uterine branches and a "pad" between the vagina and the cirrus pouch. As the scolex, rostellum and suckers of this species are unknown, it must be considered *species inquirendae*.

Taenia retracta von Linstow, 1903

Definitive host: *Vulpes ferrilata* Hodgson, 1842
Intermediate host: Unknown
Distribution: Tibet(?)

Material:

No specimens available

Discussion

This species has the same number of rostellar hooks as *T. crassiceps*; they are similar in shape to those of the latter species but are larger.

Taenia secunda Olsson, 1893

Definitive host: *Meles meles* (Linnaeus, 1758)
Intermediate host: Unknown
Distribution: Europe

Material:

No specimens available

Discussion

The description of this species is too incomplete for consideration.

Taenia smythi (Johri, 1957) n. comb.

Definitive host: *Canis familiaris* Linnaeus, 1758
Intermediate host: Unknown
Distribution: Ireland

Material:

No specimens available

Discussion

As stated earlier this species is probably identical with *T. pisiformis*.

Invalid Species

Taenia balaniceps Hall, 1910

Definitive host: *Canis familiaris* Linnaeus, 1758; *Lynx* spp.
Intermediate host: Unknown
Distribution: U.S.A.

Material:

Type specimen. (U.S.D.A.)

Discussion

The description of this species is a composite, being based on incomplete specimens from a dog and a lynx; those from the dog consist of an immature strobila which has lost its large rostellar hooks and a strobila without a scolex; those from the lynx retained some large rostellar hooks, but they are immature and unsegmented. Hall (1910) considered these specimens identical because the small rostellar hooks are similar; this is, however, not a reliable criterion for specific identification. This species was differentiated from others mainly on the uterine structure; Hall describes this as "practically a lobed pouch." It is probable that the fragment of strobila concerned is that of another species showing abnormal uterine development. The supposition that these are aberrant specimens is supported by the fact that this species has not been recorded since the original description. It is also most unlikely that such diverse hosts as the dog and lynx are parasitized by the same cestode.

Examination of the type specimen does not assist with a possible identification. As stated above, the scolex has only small hooks remaining. It is not possible to determine the number of testes nor their distribution. The vagina appears to be surrounded by a sphincter.

Taenia triserrata Meggitt, 1928

Definitive host: *Felis* sp.
Intermediate host: Unknown
Distribution: Paraguay

Material:

Type specimen (British Museum)

Discussion

Meggitt (1928) assigned these cestodes to the genus *Taenia* mainly on the structure of the eggs. The rostellar hooks which are in three crowns, are described as similar in shape to those of *T. monostephanos*.

The rostellar hooks of *T. triserrata* are 183 μ, 160 μ and 135 μ in length. These hooks are, however, incomplete consisting of a blade only; there is therefore little evidence, if any, that it belongs to this genus.

Summary

The genus *Taenia* Linnaeus, 1758 *sensu strictu* is revised. Besides the type species, *Taenia solium* Linnaeus, 1758, there are 29 valid species: *T. acinonyxi*, *T. brachyacantha*, *T. crassiceps*, *T. crocutae*, *T. endothoracicus*, *T. gonyamai*, *T. hyaenae*, *T. hydatigena*, *T. ingwei*, *T. laticollis*, *T. macrocystis*, *T. martis*,

T. multiceps, *T. mustelae*, *T. omissa*, *T. ovis*, *T. parenchymatosa*, *T. parva*, *T. pisiformis*, *T. polyacantha*, *T. rileyi*, *T. regis*, *T. saginata*, *T. selousi*, *T. serialis*, *T. taeniaeformis*, *T. taxidiensis*, *T. twitchelli*. "*T. laticollis*" of Skinker (1935) and Joyeux (1945) is renamed, *T. pseudolaticollis*. *T. brauni* is considered a subspecies of *T. serialis* and *T. krabbei* a subspecies of *T. ovis*. Invalid species and *species inquirendae* are also listed.

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Addendum

Since the above was written Dinnik & Sachs (1969, *Z. ParasitKde*, 31, 326–339) have described a new species, *Taenia olngojinei*, from the spotted hyaena in Tanzania. This species is to be included in the valid species Group I.

Taenia olngojinei Dinnik & Sachs, 1969

Definitive host: *Crocuta crocuta* (Erxleben, 1777).
Intermediate host: *Gazella granti* Brooke, 1872; *Damaliscus korrigum* (Ogilby, 1836); *Alcelaphus buselaphus* (Pallas, 1766); *Connochaetus taurinus* (Burchell, 1823).
Distribution: Tanzania.

Material:

No specimens available.

Description

According to Dinnik & Sachs (1969).

Scolex, rostellum and suckers: These structures are 980 to 1,150 μ, 480 to 660 μ and 400 to 500 μ in diameter. There are 42 to 48 rostellar hooks arranged in two crowns: the large hooks are 274 to 314 μ and the small ones 167 to 222 μ long.

Male Genitalia: There are about 400 oval testes in a single layer; they are in two lateral groups extending from the anterior margin to the posterior border of the ovary. The cirrus pouch extends to the longitudinal vessels, and is 400 to 500 μ long by 120 to 140 μ wide.

Female Genitalia: The two lobes of the ovary are of unequal size. The uterus has 10 to 15 lateral branches which redivide. The ova are oval, 36 to 43 μ by 30 to 33 μ in diameter.

Discussion

T. olngojinei differs from the other species in that the testes are divided into two groups. Two other species, *T. corcutae* and *T. hyaenae*, have also been recorded from the same definitive host, but they have fewer rostellar hooks which are smaller than those of *T. olngojinei.*

The rostellar hooks of this species resemble those of *T. regis* in number and shape but are somewhat larger (274 to 314 μ vs 223 to 290 μ); the distribution of the testes and the number of uterine branches are also different.