Parasites of pine marten, Martes americana in northeastern Alaska
by Christopher Rowe Scranton

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Veterinary Science
Montana State University

Abstract:
No systematic survey has ever been done on internal parasites of pine marten, Martes americana, in Alaska. The purpose of this study was to determine the prevalence and intensity of internal parasites, including Trichinella spiralis, in marten inhabiting the boreal forest ecosystem in northeastern Alaska.

One hundred and forty-one marten carcasses were collected in the Yukon Flats and Fairbanks areas. The carcasses, which had been frozen from one to twenty-nine months, were thawed at room temperature and examined using standard necropsy techniques. Muscle tissue was examined for encysted forms using a standard peptic digest method. All parasites were collected, counted, examined, and identified to species when possible. Live Trichinella spiralis larvae were fed to laboratory mice to determine post freezing infectivity. Marten stomach contents were also examined to obtain information on feeding habits in relation to parasite fauna.

12.7% of the marten examined were infected with Trichinella spiralis, with intensities of infection ranging from .04 to 1,856 larvae per gram of muscle tissue. This is a new locality record for Trichinella infection in marten. Viable Trichinella spiralis larvae were obtained from carcasses that had been frozen up to 16 months. The presence of a cold resistant strain of Trichinella spiralis in Alaskdn pine marten would have adaptive advantages for maintenance of this strain in an arctic ecosystem. Four other internal parasites were identified in this study: Soboliphyme baturini, Molineus patens (a new host record), Alaria mustelae and Taenia martis (a new locality record). Three other parasites were found but not identified to species because of inadequate material. These include a Taenia sp., unidentified tissue nematodes, and an ascaroid nematode.

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APPROVAL

of a thesis submitted by

Christopher Rowe Scranton

This thesis has been read by each member of the thesis committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies.

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ABSTRACT

No systematic survey has ever been done on internal parasites of pine marten, Martes americana, in Alaska. The purpose of this study was to determine the prevalence and intensity of internal parasites, including Trichinella spiralis, in marten inhabiting the boreal forest ecosystem in northeastern Alaska.

One hundred and forty-one marten carcasses were collected in the Yukon Flats and Fairbanks areas. The carcasses, which had been frozen from one to twenty-nine months, were thawed at room temperature and examined using standard necropsy techniques. Muscle tissue was examined for encysted forms using a standard peptic digest method. All parasites were collected, counted, examined, and identified to species when possible. Live Trichinella spiralis larvae were fed to laboratory mice to determine post freezing infectivity. Marten stomach contents were also examined to obtain information on feeding habits in relation to parasite fauna.

12.7% of the marten examined were infected with Trichinella spiralis, with intensities of infection ranging from .04 to 1,856 larvae per gram of muscle tissue. This is a new locality record for Trichinella infection in marten. Viable Trichinella spiralis larvae were obtained from carcasses that had been frozen up to 16 months. The presence of a cold resistant strain of Trichinella spiralis in Alaskan pine marten would have adaptive advantages for maintenance of this strain in an arctic ecosystem. Four other internal parasites were identified in this study: Soboliphyme baturini, Molineus patens (a new host record), Alaria mustelae and Taenia martis (a new locality record). Three other parasites were found but not identified to species because of inadequate material. These include a Taenia sp., unidentified tissue nematodes, and an ascaroid nematode.

INTRODUCTION

The purpose of this study was to determine the prevalence and intensity of internal parasites of marten in northeastern Alaska. Determination of the presence and frequency of tissue infections with Trichinella spiralis was of special interest due to possible human health implications. Marten are sometimes eaten by people in the study area. Freezing resistance, post-freezing viability, and the infectivity range of larvae of the Trichinella strain in marten from Alaska was also of major interest in this study. Food items from marten stomach contents also were noted when possible. Although this was not a major emphasis of the study, information on diet was considered relevant to an understanding of parasite transmission cycles in a predatory species such as the marten.

Few systematic surveys have been done on internal parasites of pine marten, Martes americana. Holmes (1963) examined twenty-four marten carcasses from the District of Mackenzie and reported Alaria taxideae Swanson and Erickson, 1946 in six, Taenia martis (Zeder, 1803) Freeman, 1956 in seven and Taenia mustelae Gmelin, 1790 in three animals. Poole et al. (1983) recovered five species of helminths from one hundred thirty-nine marten from Manitoba: Alaria taxideae in seventy-five; Taenia sp. (cf. martis martis) in

sixteen; Taenia mustelae in nine; Baylisascaris devosi Sprent, 1952 in one; and Trichinella sp. Railliet, 1895 in one. Trichinella spiralis was reported in two of twenty-four marten from Montana (Worley et al., 1974) and in twenty-two of thirty-six marten from British Columbia (Schmitt et al., 1976).

Some studies have touched on several aspects of parasitism in conjunction with broader based biological research. Morgan (1943) reported Soboliphyme baturini Petrow, 1930 in one marten from North America. S. baturini was first reported from Alaska by Swartz (1968), who collected two specimens from the stomach of a marten trapped near Fairbanks. Eighteen of sixty-two marten from Colorado examined by Olsen (1952) were infected with the lungworm Crenosoma coloradoensis Olsen, 1952. Taenia martis was first reported in marten from Ontario by Freeman (1956). In this report, he compiled descriptions of taenioid cestodes from Mustelidae. Alaria taxideae was first reported in marten from Ontario by Pearson (1956). Johnson (1979) outlined the morphology and life history of Alaria mustelae. Based upon his research, he considered A. taxideae and A. canadensis to be synonyms of A. mustelae.

As a result of the correlation between prey items and parasitism, the food habits of marten were of interest in the present study. The feeding habits of marten are well documented in many parts of North America, including Alaska.

Cowan and MacKay (1950) examined one hundred and ninety-seven marten scats from British Columbia and Alberta. They reported that sixty-six percent of the food items consisted of mice and voles. Red-backed voles, Clethrionomys gapperi, were the preferred food item. Red-backed voles were reported in forty percent of two hundred fifty marten from British Columbia (Quick,1955). Douglass et al. (1983) reported that seventy-five percent of the marten scats from the Northwest Territories contained Microtus species. Red-backed voles made up thirteen percent of the diet.

Studies from Wyoming (Murie, 1961), Idaho (Marshall, 1951) and Montana (Weckwerth and Hawley, 1962) reported similar food habit data. Microtines occurred most frequently in the marten diet in those states.

Zielinski et al. (1983) and Hargis and McCullough (1984) reported similar data on food habits of marten from California. Microtus species occurred most frequently as food items in their study. Douglas squirrels, Tamiasciurus douglasii, were also important prey of California marten.

Two studies of food habits of Alaskan marten have been reported. Microtine rodents occurred in fifty-eight percent of four hundred sixty-six scats collected in interior Alaska (Lensink et al., 1955). Red squirrels, Tamiasciurus hudsonicus, snowshoe hare, Lepus americanus and spruce grouse, Canachites canadensis made up the remainder of the animal food items. Buskirk and MacDonald (1984) reported

microtines in seventy percent of four hundred sixty-seven scats collected in south-central Alaska. Red-backed voles were the most common food taken by marten in their study.

MATERIALS AND METHODS

The survey area in the northeastern part of Alaska included the Yukon Flats and Fairbanks vicinities (Figure I). The study area consisted of boreal spruce/aspen forest with some willow species and cottonwoods common along streams and low lying areas. Other species of willow and birch were found throughout the study area.

One hundred and forty-one frozen marten carcasses were collected during the period October 1984-March 1985. Thirty-five were obtained from the Alaska Department of Fish and Game. They were supplied by trappers located on the road system in the vicinity of Fairbanks. The other one hundred and six were obtained from trappers in Venetie (76), and Chalkytsik (30). These two Indian villages are located in the Yukon Flats, about thirty miles north of the Arctic Circle and about two hundred miles north of Fairbanks.

Carcasses which were frozen from one to twenty-nine months were thawed at room temperature. A saturated NaCl fecal flotation was performed to determine the presence of cestode and nematode eggs or larvae and coccidian oocysts. Skinned weight was recorded for each carcass, and the sex of each specimen was noted. Nasal cavities were dissected and examined macroscopically for the presence of nasal nematodes.

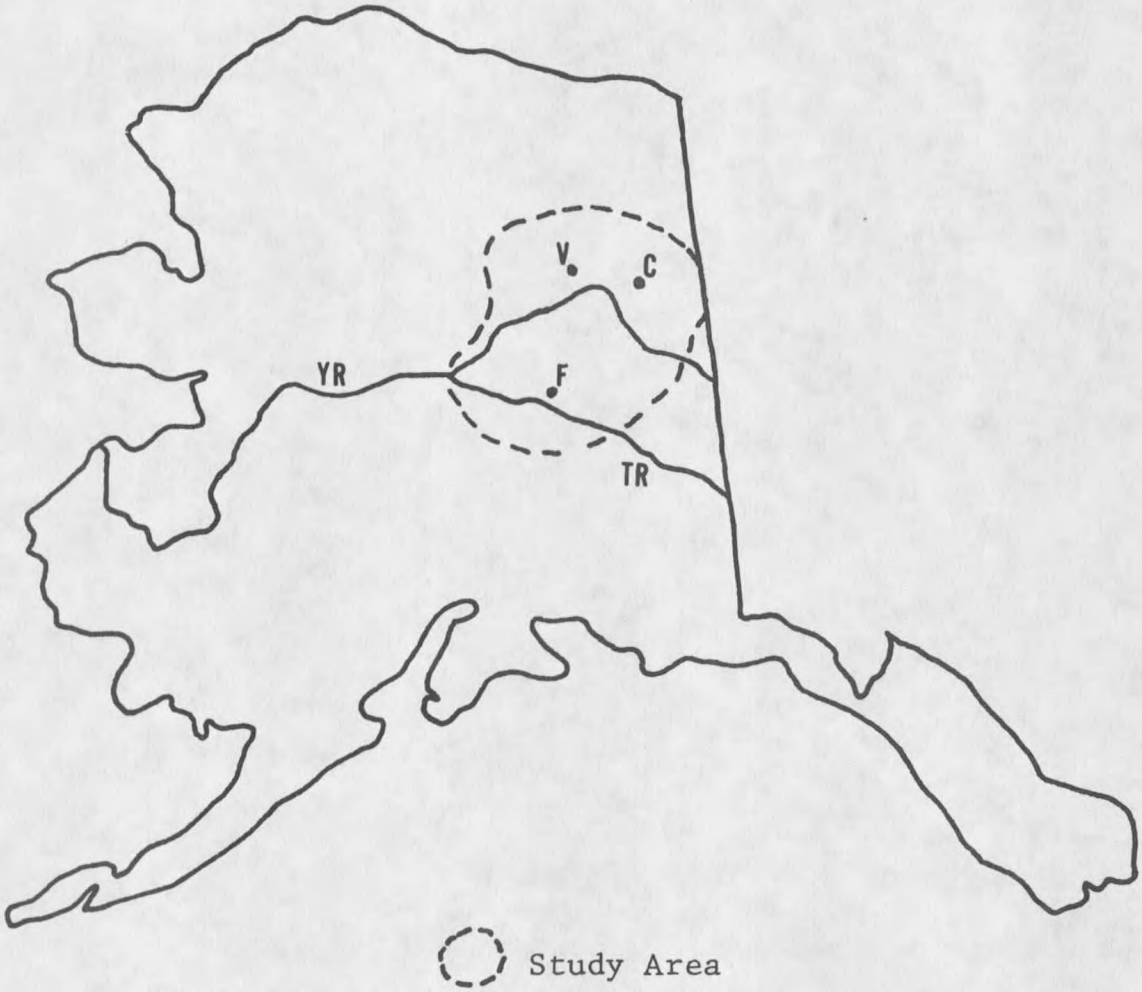

Figure I. Study area in northeastern Alaska where marten parasites were collected. October 1984-March 1985. V, Venetie; C, Chalkyitsik; F, Fairbanks; YR, Yukon River; TR, Tanana River.

The gastrointestinal tract, heart and lungs were removed intact for examination. The tract was divided into three major sections: the esophagus-stomach, small intestine and large intestine. An enterotome was used to open each section. The contents were scraped and washed through a sixty-mesh screen. Material collected on the screen was backwashed into an illuminated glass observation tray and searched for parasites under low power magnification.

Intestinal parasites were isolated from the collecting tray with eye droppers and dissecting needles. Specimens were then stored in glycerin alcohol (nematodes and trematodes), or 10% phosphate buffered formalin (cestodes).

Spleen, urinary bladder, heart and kidneys were dissected and examined using a dissecting microscope. The respiratory tree was opened, the liver was sliced and both organs were placed in jars with 0.86% physiological saline solution and agitated for twenty minutes (Barber and Lockard, 1973). The contents were poured onto a 100-mesh screen, rinsed and backwashed into an illuminated tray for observation.

Standard procedures were used to prepare whole mounts of representative helminths. Cestodes and trematodes were stained in Delafield's hematoxylin or Semichon's aceto-carmine, destained in acid alcohol, cleared with xylene or cedarwood oil, and mounted whole for microscopic examination and identification. Nematodes were cleared in glycerin or

lactophenol and examined. A few nematode specimens were permanently mounted in glycerin jelly.

Twenty-five grams of muscle tissue were removed from the biceps femoris and semitendinosus region of the thawed carcass. This was refrozen for five to ten months and then rethawed, chopped into small pieces and homogenized in an Omnimixer with a 0.7% HCl and 0.8% pepsin solution. This suspension was then incubated on a shaker at 37 degrees C for five hours. The solution was then washed through a 60-mesh screen and collected on a 100-mesh screen. The retained material was backwashed into a counting dish and examined for Trichinella larvae with a dissecting microscope. Results were recorded as larvae per gram of host tissue (l.p.g.).

Viable Trichinella larvae were administered orally to Swiss Webster mice, Cox strain. Each animal received fifty-five to one hundred larvae. The mice were killed and examined sixty to ninety days later to determine if infection had occurred from the larvae obtained from marten carcasses.

RESULTS

The major results of this study are summarized in Table 1. Parasitic helminths were recovered from 88 of 141 marten examined. Soboliphyme baturini was found in the stomach of one marten. All specimens of Molineus patens, Alaria mustelae, Taenia sp., and the unidentified ascarid species were located in the small intestine of the host. Trichinella spiralis and the unidentified tissue nematode were found in digested biceps femoris and semitendinosus muscle tissue.

The Trichinella spiralis strain recovered from marten in the study area demonstrated resistance to freezing at -15 degrees C. Live larvae were recovered from one carcass that had been frozen for 16 months. Live larvae also were recovered from one carcass that had been frozen for 7 months, two carcasses frozen for 6 months, and two carcasses frozen for 3 months. Of the 18 Trichinella positive carcasses examined, six had live larvae present. Larvae from two of these samples which were fed to white mice induced Trichinella infections in five of twelve mice (Table 2).

An unidentified tissue nematode larva was found in 34 of 141 marten muscle digests. These were present in low numbers ranging from 1 to 12 larvae per 25 grams of muscle

Table 1. Prevalence and intensity of internal parasites 141 marten from northeastern Alaska (1984-85)

Parasite	Prevalence of Infection %	Mean Intensity (Range)
Trichinella spiralis Railliet, 1895	12.7%	147.2 LPG* (0.4-1,856)
Soboliphyme baturini Petrow, 1930	.7%	8
Molineus patens (Dujardin, 1845)	7.8%	5.6 (1-30)
Alaria mustelae Bosma, 1931	11.1%	29 (1-225)
Taenia martis (Zeder, 1803)	3.6%	2.8 (2-5)
Taenia sp. (probably *T. martis*)	38.2%	2.9 (1-17)
Unidentified muscle tissue nematode	24.1%	.09 LPG (.04-.48)
Unidentified ascaroid nematode	.7%	1

*Expressed as larvae per gram of skeletal muscle

Table 2. Infectivity of *Trichinella* larvae from Alaskan marten in Swiss Webster white mice.

Source	Results	
	No. positive for *Trichinella* / No. Inoculated	LPG
Marten	0 / 1	------
Marten	2 / 4	3.1,6.9
Marten	0 / 2	------
Marten	0 / 1	------
Marten	3 / 4	2.9,9.6,16.9

LPG = larvae per gram

tissue. The larvae were roughly twice the length of Trichinella spiralis larvae and were noticeably thicker and not so tightly coiled. They showed considerable resistance to freezing. Live larvae of the unidentified nematode were found in 9 of 34 positive carcasses. Viable specimens were obtained from one carcass that had been frozen for 29 months. These larvae were still alive and motile after being placed in physiological saline solution for 28 days at 3 degrees C (Figure II).

One specimen of an ascaroid nematode measuring 9 mm in length was found in the small intestine of one marten. The specimen was in poor condition which prevented positive identification. All marten in this study were examined for the nasal nematode Skrjabingylus sp. No nasal nematodes were found.

No parasites were found in heart, lungs, liver, kidneys, nasal passages, urinary bladder or any other locations other than those mentioned above. All NaCl fecal flotation tests were negative for helminth eggs and larvae. Blood was not examined for parasites because of the inability to obtain fresh material.

Identifiable animal food items were found in 36 of 141 marten examined. Table 3 outlines these findings. Of the 141 marten examined, 78 were male and 63 were female. Weights for the 61 males ranged from 443 to 1,400 grams, with an average weight of 877.5 grams. Weights for the 45

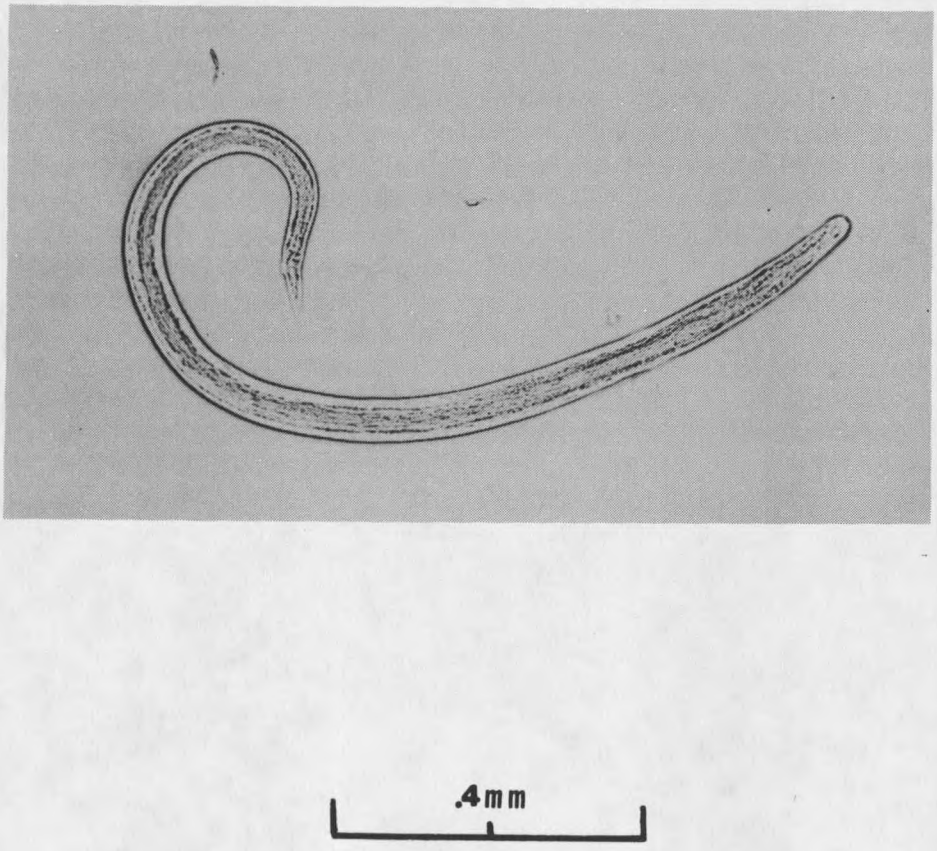

Figure II. Unidentified intramuscular nematode from Alaskan marten. Magnification 100 X.

Table 3. Food items collected from 36 marten stomachs.

Food Item	Number of marten containing the food item
Bird Parts (mostly gray jay- *Periosoreus canadensis*)	11
Red-backed Vole *Clethrionomys rutilus*	26
Red Squirrel *Tamiasciurus hudsonicus*	2
Snowshoe Hare *Lepus americanus*	1

females ranged from 402 to 760 grams, with an average weight of 614 grams. These weights are for carcasses after skinning. It was not possible to obtain whole unskinned carcasses in this study.

DISCUSSION

This research is the first systematic survey on internal parasites of marten in Alaska. The finding of Molineus patens (Dujardin, 1845) is a new host record for this species. Molineus patens was reported in mink from Mississippi (Skinker, 1933), weasels and stoats from England (Balisingam, 1963) and in fisher from Manitoba (Dick and Leonard, 1979). It has also been reported in least weasels (Morgan, 1943). Balasingam (1963) and Schmidt (1965) reported M. patens from a wide variety of mustelids including wolverine, otter, badger, and several species of skunks. None of these authors list pine marten as a host for M. patens, and an extensive literature search revealed no records of this nematode in marten.

The average length of M. patens females was approximately 7 mm. Males averaged 6 mm in length. The spicules ranged in length from 149 mm to 172 mm. All characteristics matched the description in Schmidt's key to the species of Molineus (Schmidt, 1965) for M. patens (Figures III and IV).

Trichinella spiralis has been reported in marten from Montana, Idaho, and Wyoming (Worley et al., 1974), British Columbia (Schmitt et al., 1976) and Manitoba (Chadee and Dick, 1982). It has also been reported from a pine marten

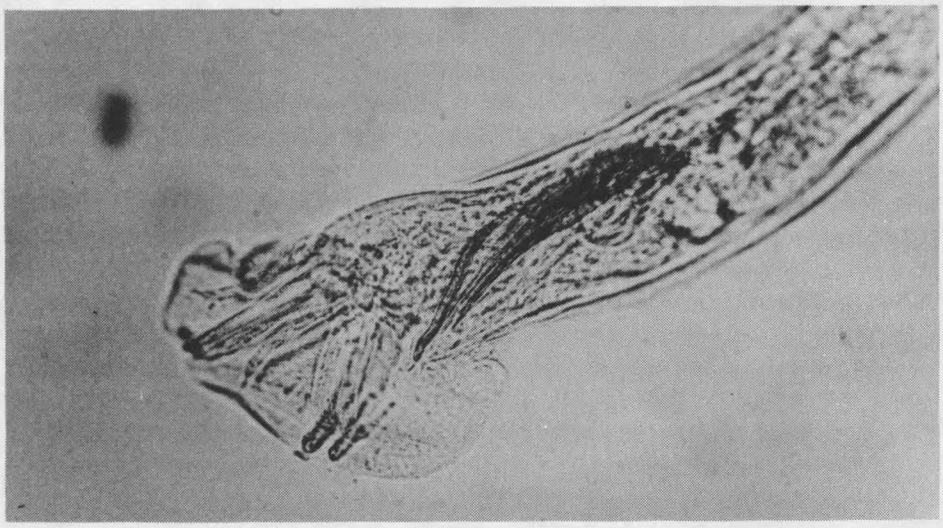

Figure III. Copulatory bursa and spicules of Molineus patens from the small intestine of Alaskan marten. Magnification 250 X.

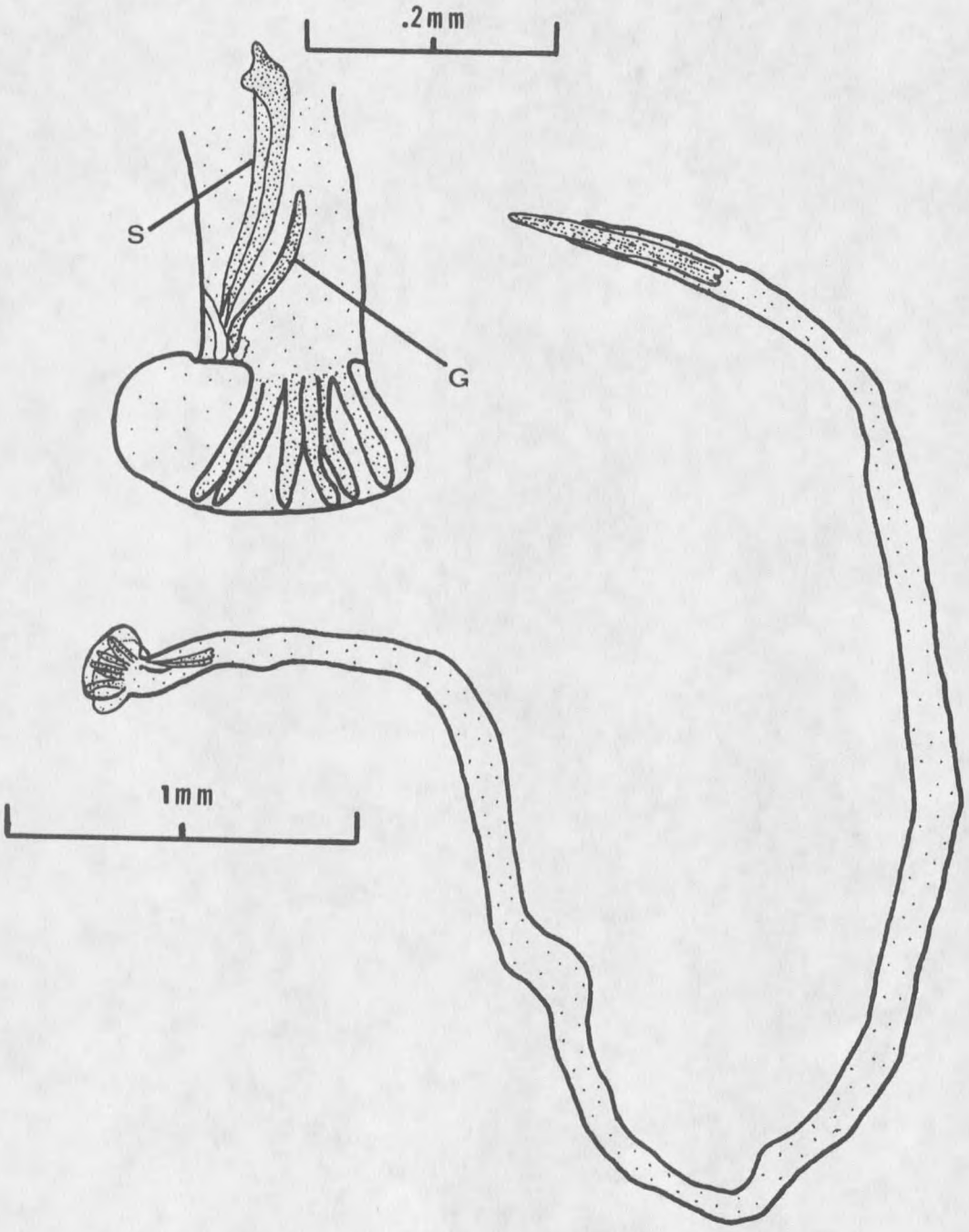

Figure IV. Molineus patens showing enlargement of copulatory bursa. Each spicule has three spikes. G, gubernaculum; S, spicules.

in Denmark (Clausen and Henriksen, 1976). The finding of Trichinella spiralis in marten is a new locality record for Alaska. Rausch et al. (1955) reported an extensive Trichinella spiralis survey of many mammal species in Alaska. They examined 18 pine marten and reported no evidence of infection with T. spiralis. This study found many other species of Alaskan mammals positive for T. spiralis including grizzly, black and polar bears, domestic dogs, coyotes, wolves, red fox, arctic fox, least weasel, short-tailed weasel, wolverine, lynx, snowshoe hare, many rodent species, and several marine mammals.

Trichinella spiralis has also been reported in fisher from Manitoba (Dick and Leonard, 1979), in wolves from Alberta (Dies, 1980), in black bears from Lake Superior (Rogers, 1975) and in black and grizzly bears from the western and north central United States (Zimmermann, 1977). Worley et al. (1974) reported Trichinella spiralis from grizzly and black bears, mountain lions, bobcats, martens, fishers, wolverines, striped skunks, red foxes, and coyotes in Montana.

The findings of the present study which show that Trichinella spiralis from marten is resistant to freezing for long periods of time are of considerable interest. It would be an adaptive advantage for Trichinella spiralis in arctic regions to withstand freezing prior to ingestion by a predator or scavenger. Winter temperatures in the study

area often reach -45 degrees C. and remain below freezing for long periods. Resistance to freezing would help insure natural transmission in an arctic ecosystem where infected carcasses may not be eaten immediately. Carcasses are often covered by snow and are not exposed until spring. The tendency of marten to feed on carcasses of other carnivores presumably accounts for the presence of Trichinella spiralis in Martes americana (Strickland et al., 1982).

There have been several studies which examined the time of survival by Trichinella spiralis in frozen muscle. Dies (1980) found viable larvae in wolf muscle which had been frozen at -10 degrees C for 18 months. These larvae produced Trichinella infections in white laboratory mice. Chadee and Dick (1982) found viable larvae in arctic fox muscle frozen for 14 months, in polar bear muscle frozen for 12 months, and in marten muscle frozen for 5 months. In the present study, the recovery of viable larvae in marten tissue which had been frozen for 16 months is the longest survival time reported for Trichinella spiralis in this host (Figure V). The ability of sylvatic strains of T. spiralis to survive freezing contrasts with the lethal effects of low temperature exposure in domestic isolates of the parasite (Chadee and Dick, 1982).

Soboliphyme baturini Petrow, 1930 has been reported twice in marten from Alaska (Bezdek, 1942; Swartz, 1968). It was first reported in marten from the lower 48 states by

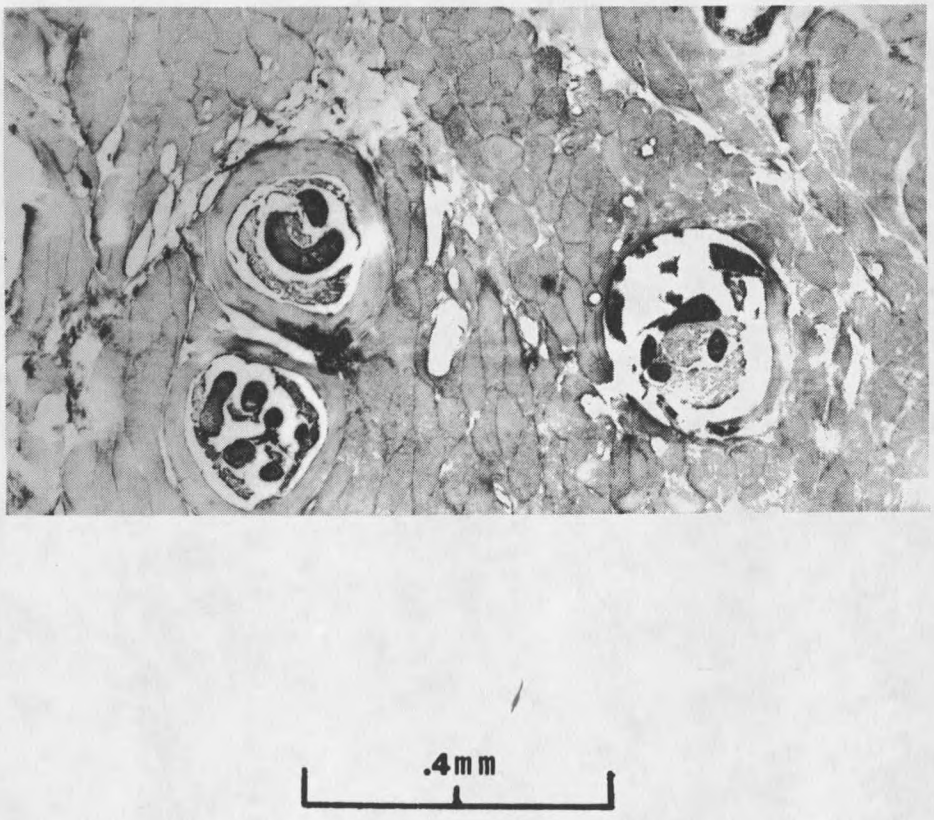

Figure V. Cross section of Trichinella spiralis-infected muscle from Alaskan marten. Magnification 100 X.

Morgan (1943) and again in marten from Minnesota by Erickson (1946). S. baturini has also been reported in wolverines from Montana (Price, 1930), in mink from Alaska (Swartz, 1968), in least weasel, wolverine and fisher in Minnesota (Erickson, 1946) and in fisher from Maine (Meyer and Chitwood, 1951). The S. baturini specimens from marten are illustrated in Figure VI.

Alaria mustelae Bosma, 1934 was described in mink, Mustela vison from South Dakota (Bosma, 1934). He outlined the life cycle of this strigeid trematode in a northern prairie ecosystem. According to Bosma, A. mustelae requires four hosts: a planorbid snail is infected by free swimming miracidia, which hatch from eggs in the water via animal feces. Cercariae develop within the snail and then emerge to infect tadpoles. Mesocercariae develop in the tadpoles. A rodent or other mammal becomes infected by ingestion of tadpoles or frogs containing the mesocercariae. A metacercarial stage develops within the third host. The cycle is completed when a mammal consumes infected third stage hosts containing the metacercariae. The adult then develops in the small intestine of the definitive host. Eggs are released into the intestine and passed through the feces. Johnson (1979) reported adult A. mustelae in two cats and a raccoon infected with mesocercariae from leopard frogs. He showed that four stages are not obligatory for development in the definitive host.

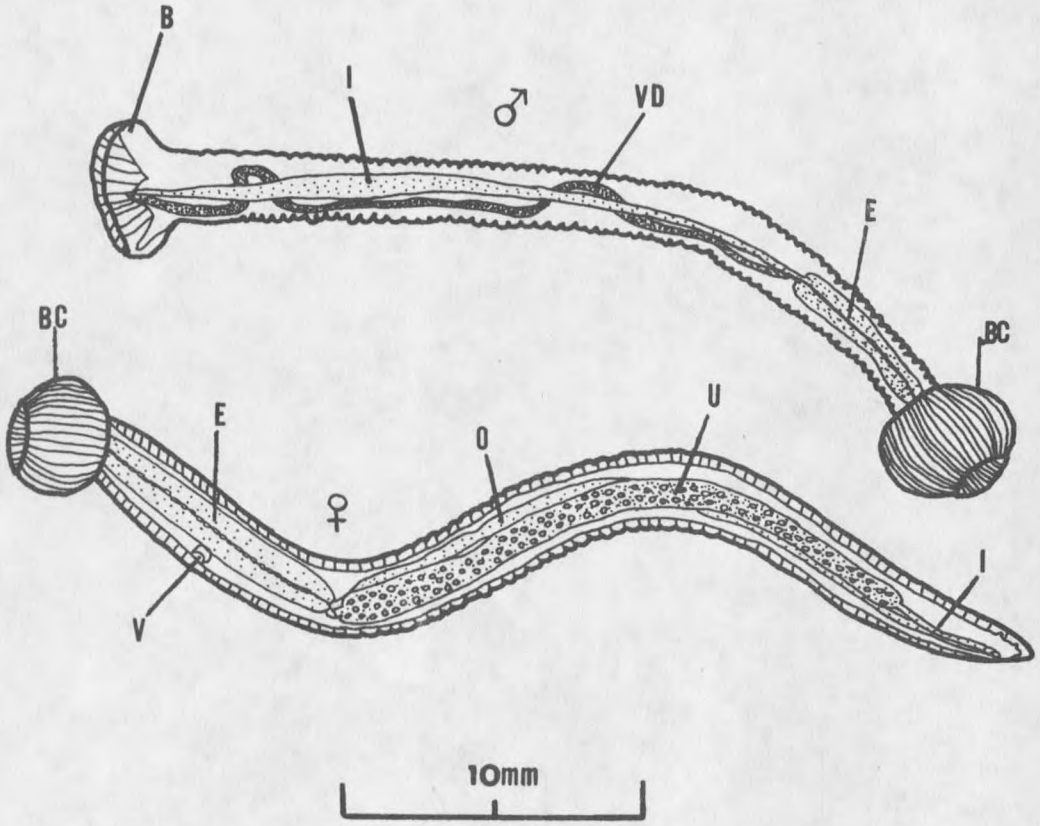

Figure VI. Soboliphyme baturini collected from the stomach of an Alaskan marten. BC, buccal capsule; E, esophagus; I, intestine; VD, vas deferens; B, bursa; V, vulva; U, uterus; O, ovary.

In the present study area planorbid snails were common in most of the numerous ponds and lakes. The wood frog, Rana sylvatica, was also common there. Several species of voles and lemmings were also present. The marten infected with adult A. mustelae in this study presumably became infected by direct ingestion of infected frogs, or via predation on paratenic hosts such as voles and/or lemmings. This is the second report of A. mustelae in Alaska. Sekerak (1969) first reported Alaria taxidae from marten in central Alaska. A. taxideae and A.canadensis are synonyms for A. mustelae (Johnson, 1979).

Alaria taxideae was reported in pine marten from the District of MacKenzie (Holmes, 1963) and from Manitoba (Poole and Dick, 1983). It was also reported from various mustelids in Minnesota, including badger, short-tailed weasel, and spotted and striped skunk (Swanson and Erickson, 1946). A. canadensis was reported in striped skunk from Quebec (Webster and Wolfgang, 1956). Alaria sp. was reported in wolverine from the Northwest Territories (Addison and Boles, 1978). Figures VII and VIII illustrate specimens from the present study.

The finding of Taenia martis (Zeder, 1803), in this study was expected. T. martis has been found in pine marten from Manitoba (Poole and Dick, 1983). Dick and Leonard (1979) found Taenia sibirica in fisher from Manitoba. According to Verster (1969), T. sibirica and T. intermedia

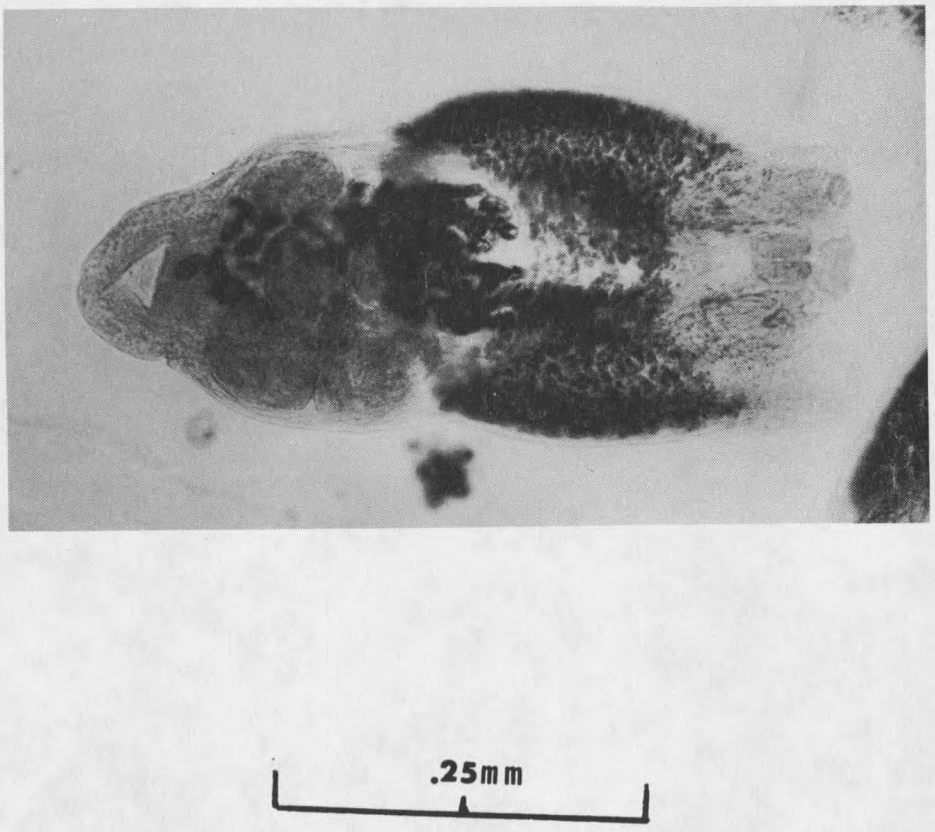

Figure VII. Whole mount of Alaria mustelae from the small intestine of Alaskan marten. Magnification 50 X.

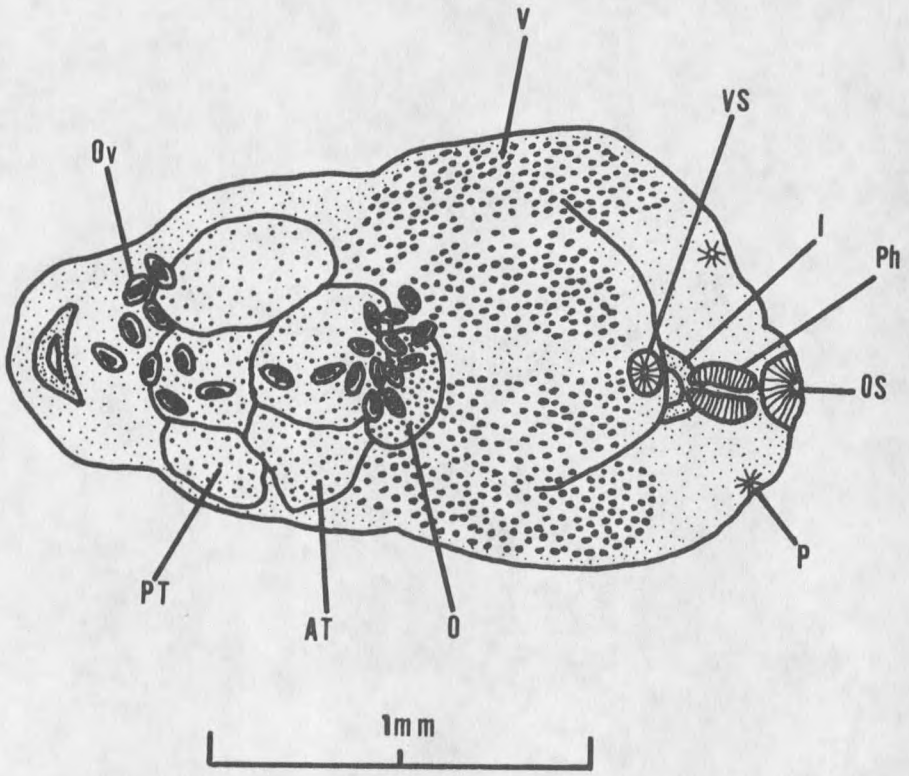

Figure VIII. Alaria mustelae from the small intestine of Alaskan marten. PT, posterior testes; AT, anterior testes; O, ovary; P, pseudo sucker; Ph, pharynx; OS, oral sucker; V, vitellaria; Ov, ovum.

were reported in stoats and weasels from England (Leiper, 1936). T. martis was also reported in pine marten from the District of MacKenzie (Holmes, 1963), in wolverine from the Northwest Territories (Addison and Boles, 1978), and in pine marten from Czechoslovakia (Prokopic, 1970). Taenia martis appears to be a holarctic species.

Taeniid tapeworms are often difficult to identify even with fresh specimens. Freezing of these cestodes creates a major problem due to loss of hooks since the hooks are often the major criterion for identification of Taenia species. Fortunately, in this study, enough hooks were recovered to assure identification of some of the specimens to T. martis (Figure IX). Most of the unidentified specimens fit the criteria for T. martis as described by Verster (1969) (Figure X and Figure XI). This is the first report of this cestode in pine marten from Alaska.

The apparent absence of Taenia mustelae Gmelin (1790) in marten from this study is of interest. It is possible that some of the unidentified specimens in this study are T. mustelae, but no hooks were recovered that matched those described for the species. T. mustelae has been reported from Ontario (Freeman, 1956) and from Manitoba (Poole and Dick, 1983). It has also been reported in mink (Barber and Lockard, 1973) and in short-tailed weasels (Locker, 1955) from Montana. Taeniid tapeworms were the most commonly found helminth in marten in the present study.

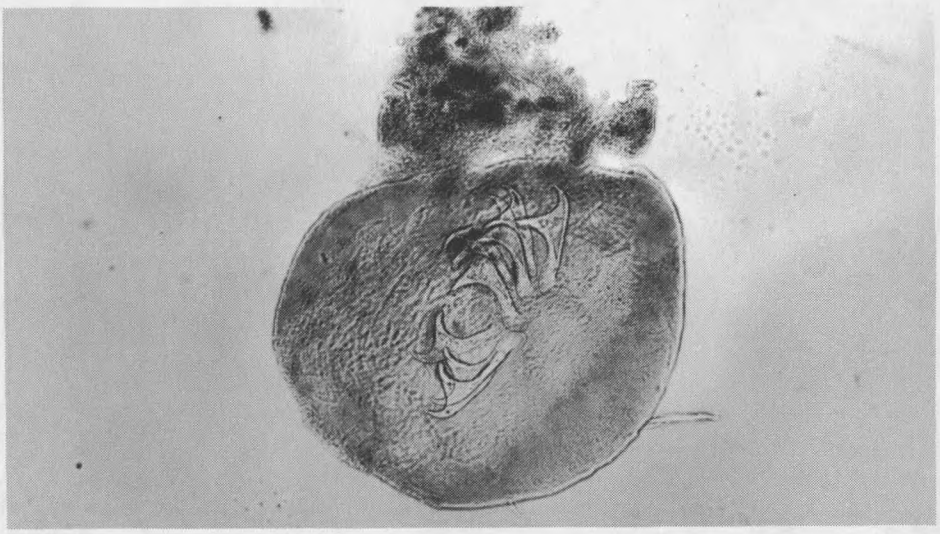

Figure IX. Hooks of Taenia martis from Alaskan marten. Magnification 100 X.

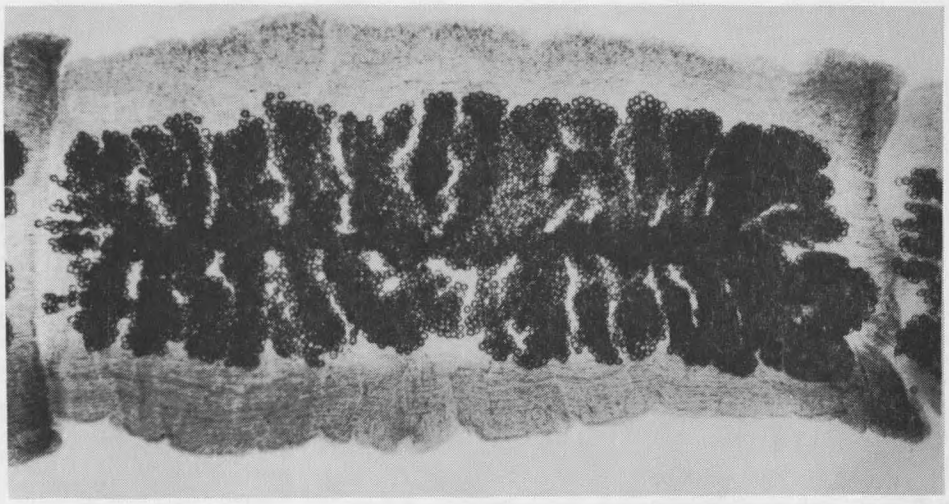

Figure X. Mature proglottid of Taenia martis from Alaskan marten. Magnification 100 X.

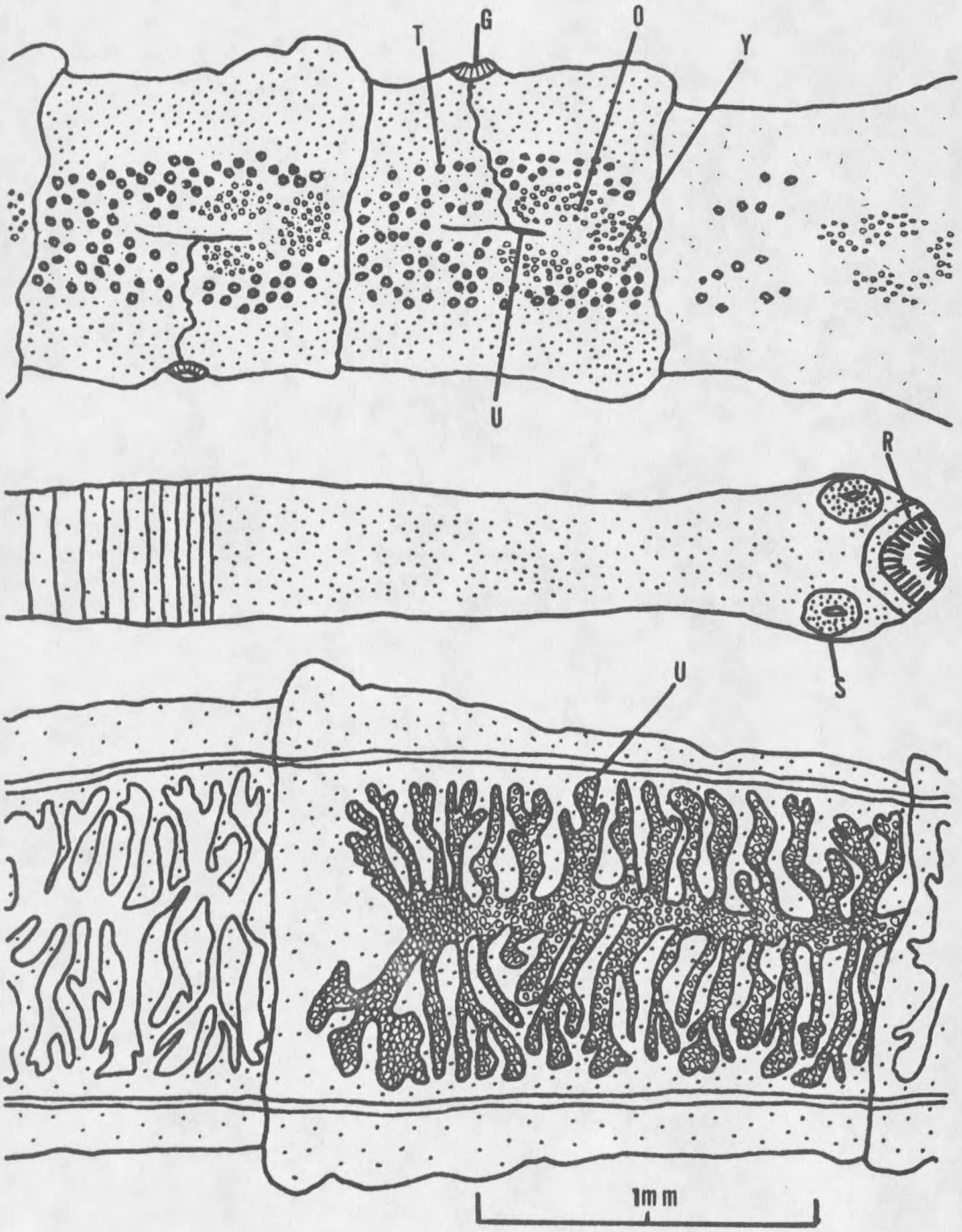

Figure XI. Taenia martis from Alaskan marten. T, testes; G, genital atrium; O, ovary; V, vitellarium; U, uterus; R, rostellum; S, suckers; Y, yolk gland.

The single ascarid specimen recovered from the small intestine of one marten in this study may be Baylisascaris devosi Sprent 1952. The specimen was in poor condition when collected. B. devosi has been reported in marten (Poole and Dick, 1983) and in fisher (Dick and Leonard, 1979) from Manitoba and in wolverine from the Northwest Territories (Addison and Boles, 1978).

The unidentified intramuscular nematodes which were found in 24.1% of the marten examined in this study may be third stage larvae of Baylisascaris devosi. Sprent's experiments with white mice and his descriptions of third stage larvae closely fit the observations of the unidentified tissue nematodes found in the present study. Sprent (1953) reported experiments with third stage larvae stored at -20 degrees C for several weeks. He noted active motility after thawing. Several larvae recovered in the present study were vigorously motile after being stored at minus 15 degrees C for 29 months. No positive identification was made because of the immaturity of these nematodes (Figure II).

The absence of lungworms in this study is of interest. Perostrongylus pridhami was reported in mink from Montana (Barber and Lockard, 1973) and Crenosoma coloradoensis was reported in marten from Colorado (Craig and Anderson, 1972; Olsen, 1952). It is possible that one or more intermediate hosts for these nematodes are not present in the study area.

The nasal nematodes Skrjabingylus chitwoodorum Hill, 1939 and S. nasicola Leuckart, 1842 have been found in many mustelids from North America (Lankester, 1983). It is not known why these nematodes appear to be absent in the study area. There was no indication of parasitism by any nasal parasites.

Dracunculus sp., the guinea worm, which is a common parasite of raccoon, mink, and otter in Ontario (Crichton and Beverly-Burton, 1974), was not found in marten during this study. Surveys of local ponds in the study area revealed an abundance of a potential intermediate host; the crustacean Cyclops sp. It is possible that lack of a paratenic host may explain the absence of this nematode in northern regions.

The intensity of infections for all parasite species in this study are similar to the frequency distibution of many other helminth infections in both free ranging and domestic animal populations. Most positive animals had low intensity infections, with only a few animals having high parasite counts. This approximates a negative binomial equation as described by Froyd and Clarke (1962) (Figure XII).

The food habit data in this report are limited. Many trappers check their traplines once a week or less frequently. Many of the marten gastrointestinal tracts in this study were empty upon examination. Marten digest their food after being caught and are unable to feed again. Gray

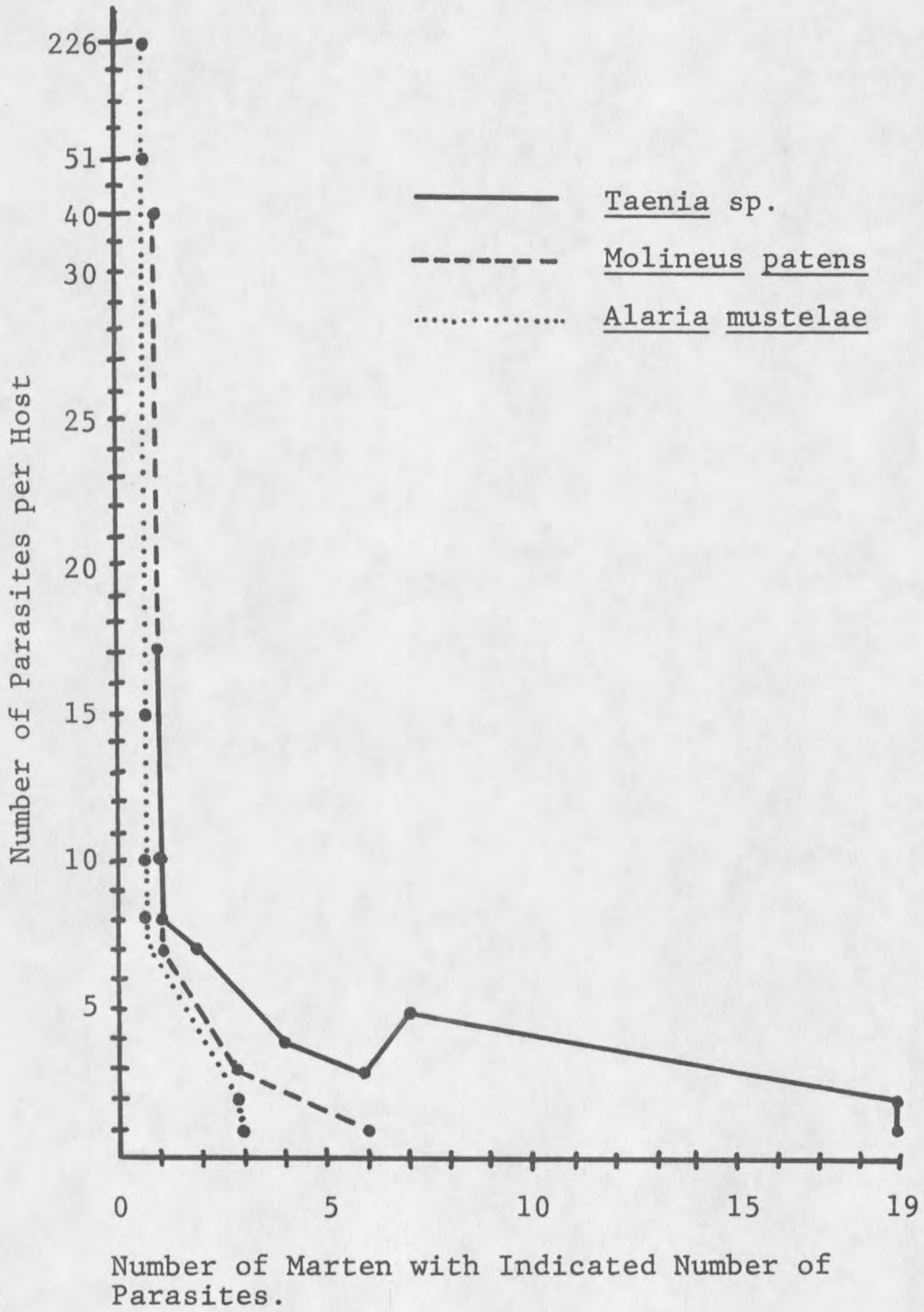

Figure XII. Frequency distribution of helminths from 141 Alaskan marten.

jays, or "camp robbers", Periosoreus canadensis, often get caught in marten traps and are left for bait when the traps are reset. This is probably why gray jays were found in 11 of the 36 marten that contained identifiable animal material in their stomachs. The food habit data from this report suggest that Clethrionomys rutilus is the preferred item in the marten's diet. Red squirrels and snowshoe hare were also abundant in the study area, but seem to be taken less frequently. The high frequency of red-backed voles, Clethrionomys rutilus as a food item of marten is of interest as a probable explanation for the high prevalence of Taenia sp. found in marten during this study. Rausch (1952) found many Taenia cysticerci in red-backed voles from Alaska. Prokopic (1970) recovered nine Taenia martis cysticerci in 1205 voles examined from Czechoslovakia. Adult cestodes developed when these cysticerci were fed to short-tailed weasels, Mustela erminea.

SUMMARY

One hundred and forty one marten, Martes americana were collected in the Yukon Flats and Fairbanks areas of Alaska. This research was the first systematic survey on internal parasites of marten from Alaska. Carcasses were examined for the presence of helminth fauna in the gastrointestinal tract, other internal organs, and skeletal muscle.

The stomach nematode Soboliphyme baturini Petrov, 1930 was found in one marten. Molineus patens (Dujardin, 1845) was identified in the small intestine of 7.8% of the specimens. This is the first report of this nematode in marten. The following helminths were also recovered from the small intestine: Alaria mustelae Bosma, 1931, (11.1%); Taenia martis (Zeder, 1803), (3.6%); Taenia sp., (38.2%); unidentified ascaroid nematode, (0.7%).

Muscle digest revealed Trichinella spiralis Railliet, 1895 in 12.7% of the marten. An unidentified intramuscular nematode was also present in 24.1% of the digests. Live Trichinella larvae were observed from six carcasses frozen at -15 degrees C for 3 to 16 months. Five of twelve Swiss Webster mice became infected after oral inoculation with the recovered T. spiralis larvae.

Marten pelts are an important source of income for many people in the survey area. Carcasses are sometimes consumed

as a dietary supplement. This practice increases the possibility of infection with T. spiralis since 12.7% of the marten surveyed were positive for this nematode. Education of local people could prevent possible future outbrakes of Trichenellosis.

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