

Informational Leaflet **16**

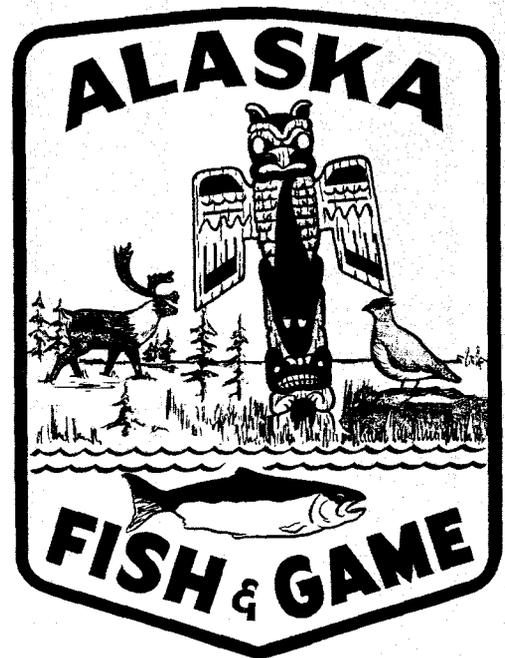
PRELIMINARY OBSERVATIONS ON PHILONEMIASIS AND CREPIDOSTOMIASIS IN ALASKAN FRESHWATER FISH

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STATE OF ALASKA
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**DEPARTMENT OF
FISH AND GAME**
WALTER KIRKNESS - COMMISSIONER
SUPPORT BUILDING, JUNEAU



ALASKA DEPARTMENT OF FISH AND GAME

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Preliminary Observations on
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ABSTRACT

Infections of *Philonema* sp. (?) (body cavity roundworm) are reported for the first time from Alaskan fish. The species is endemic in the rainbow trout of the Tebay Lake system, Wrangell Mountains. These trout are also relatively heavily infected with *Crepidostomum* sp. (?) (intestinal fluke) and six other parasite species. The genus *Philonema* is reviewed and potential pathogenicity reported elsewhere is noted. The intestinal inflammation observed in many of the Tebay rainbows probably result from the infections of *Crepidostomum*. It does not appear at the present time that the helminthiases observed are substantially detrimental to the trout population of the Tebay Lake system. No potential human parasites were noted in the edible portions of the fish.

INTRODUCTION

The presence of large roundworms lying free in the body cavities of rainbow trout from the Tebay Lakes, Wrangell Mountains, has apparently been known to local sportsmen for some time. Only recently, however, have these worm-infestations been subjected to more than the casual perusal of the layman. During June, 1961, Mr. George Van Whye, Fishery Biologist, Division of Sport Fish, Glennallen office, sent in for examination 21 trout taken from the spawning beds. These were found to be infected with 8 species of the following kinds of parasites (number of species indicated in parentheses): flukes (2), tapeworms (2), roundworms (2), thorny-headed worms (1), and fish lice (1). Of these, the most spectacular from the sportsman's point of view and of great potential significance to the biologist are specimens of *Philonema* sp. (?) commonly found in the larger (14-18 inch) fish. The females of this roundworm species are about 10 cm long and are readily seen lying free among the viscera, sometimes in relatively large numbers (see Figure 1). Because they are so readily evident to the casual observer, and since at least one species of this genus, *Philonema agubernaculum*, is known to interfere with normal spawning in Brook Trout and Atlantic Salmon (Meyers, 1958), infections by this kind of worm (*philonemiasis*) are of particular concern. Accordingly six days were spent at Lower Tebay Lake during the spawning period in June, 1962. At that time it was possible to study fresh material and to obtain a larger sample of fish. The results are given below in Table 1. A brief review of all the relatively few published reports on the genus *Philonema* is included in the discussion section.

Another of the parasitic worms present in the Tebay trout warrants further consideration. One of the two species of flukes observed belongs to the genus *Crepidostomum*, a widely distributed parasite of trout in Alaska, North America, Europe, and Asia. This parasite normally occurs in the intestine and when present in large numbers may cause severe inflammation and eventual death of the host. Data on the occurrence of this species in Alaskan trout is included in Table 2 in the following section.

RESULTS

A. *Philonemiasis*

The data in Table 1 illustrates the variation in *Philonemiasis* with sex and maturity in 86 Tebay Lake rainbows. It is readily evident that larger (mature), females are most commonly infected with the greatest number of worms. The frequent, heavy infections observed in so-called juvenile female fish in 1961 were restricted to individuals in the 12-1/2 to 13-3/4" size class, and accordingly are not a serious objection to the foregoing generality. The lack of occurrence of *Philonema* sp. elsewhere in Alaskan salmonids is shown in Table 2.

The genus *Philonema* was proposed by Kuitunen-Ekbaum (1933) for the reception of *P. oncorhynchi* which she found to heavily infect 95% of 600 adult sockeye salmon taken from English Bay, British Columbia. According to K.-Ekbaum (loc. cit.), "a careful examination of fish muscles showed that no larvae or mature stages of the worm had migrated into the muscles, therefore the parasite may be

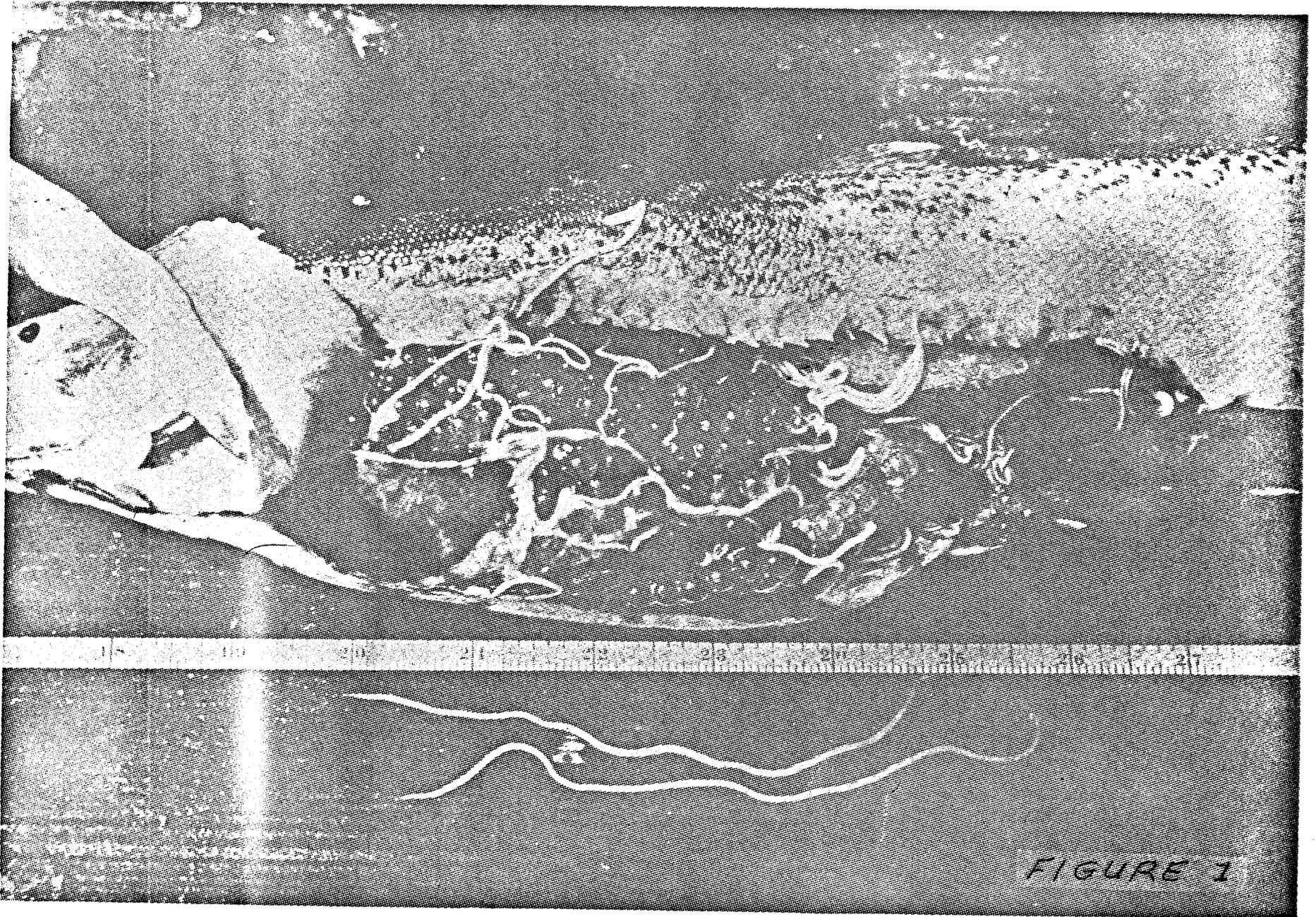


FIGURE 1

Table 1. Variation of the incidence of *Philonema* sp. in Tebay Lake rainbows with sex and maturity*.

	Year	Sex	Sample size	% infected	**Average intensity of infection
Mature (14" or larger)	1961	M	1	100%	10
		F	7	70%	48.0
	1962	M	22	59%	7.3
		F	18	72%	26.0
Juvenile (less than 14")	1961	M	2	none	----
		F	9	89%	49.8
	1962	M	17	35%	7.0
		F	10	30%	8.0
All males)	Both Years		42	48%	7.3
All females)			44	66%	34.4

** Non-infected fish not included in calculation.

* In the Tebay Lake system the rainbow is considered mature when it was reached a fork length of about 14 inches.

Table 2. The occurrence of *Philonema* sp. and *Crepidostomum* sp. in some Alaskan salmonids.

Host species	Locality	Date	Incidence	
			<i>Philonema</i>	<i>Crepidostomum</i>
<i>Salmo gairdnerii</i>	Tebay Lakes Wrangell Mtns.	6/'61 & '62	50/82	39/42
<i>Salvelinus malma</i>	Lake Eva, Baranof Island	5/62	0/100	0/100
" "	Gut Bay Baranof Island	5/61	0/10	0/10
" "	Tebenkov Bay Kuiu Island	5/61	0/12	0/12
" "	Lower Jennifer Lake, Kitoi Bay Afognak Island	10/60	0/10	3/10
<i>Oncorhynchus nerka</i> (smolts)	Upper Jennifer Lake, Kitoi Bay Afognak Island	9/61	0/21	6/21
<i>O. kisutch</i> (adult)	Kitoi Bay, Afognak Island	9/61	0/4	0/4
<i>O. tshawytscha</i> (adult)	Taku River	5/60	0/3	0/3
<i>Salmo gairdnerii</i>	Kvichak River, Bristol Bay	5/60	0/43	----

considered practically harmless and the commercial value of sockeye salmon not diminished by this infection." This author apparently did not observe or consider the possibility of *Philonema* affecting reproduction (spawning). Simon and Simon (1936) described a new species, *P. agubernaculum*, from *Prosopium williamsoni*, *Salvelinus fontinalis*, *Salmo shasta*, *S. trutta fario*, and *Cristvomer n. namaycush* in waters of the Wyoming National Forest. They noted that pathological changes occurred in the gonads of infected fish. Fujita (1939, 1940) described the larval stages of four new species of *Philonema* from *Oncorhynchus kawamurae* (Japan), *O. keta* (Kamchatka), and *Salvelinus kundscha* (Rausu). Fujita apparently did not look for pathology. Baylis (1948) reported *Philonema oncorhynchi* Kuitunen-Ekbaum, 1933, from *Salvelinus alpinus* from East Greenland and suggested that *P. agubernaculum* Simon and Simon, 1936, be considered a synonym of the former. Dombroski (1955) studied the relationship between size and degree of parasitism in the 1952 and 1953 sockeye smolt migrations from Babine Lakes, British Columbia. He found that smolts of both years infected with *Eubothrium salvelini* (tapeworm) and either with or without *Philonema oncorhynchi* were significantly smaller than uninfected fish or those infected with *P. oncorhynchi* only. In 1952 (but not 1953) smolts infected with *P. oncorhynchi* were larger than those free of parasites. Presumably the foregoing data indicates a correlation between favorable nutrition and opportunity for infection by *P. oncorhynchi* which apparently is not pathogenic in juvenile red salmon. Meyer (1958) reported *P. agubernaculum* from *Salvelinus fontinalis* and *Salmo salar* in Maine. They summarized their observations on the pathogenicity of these host-parasite combinations as follows: "multiple mesenteric and serosal adhesions evoked by the presence of the worms, may be so severe, especially in older fish, that neither normal spawning nor stripping is possible."

Preliminary observations on Tebay Lake rainbows infected with *Philonema* sp. (?) indicate that there is no marked inhibition of spawning or gonad activity. These conclusions, however, are only tentative and may have to be revised when additional, quantitative data is available. Since philonemiasis is most common (70%) in the heaviest spawning segment of the population (see Table 1), it could easily depress reproduction without being highly pathogenic. The writer is unaware of an explanation for the more common (66% vs: 48%) and heavier (34.4 vs: 7.3) infections observed in females. The life cycle of members of the genus *Philonema* is not known.

B. *Crepidostomiasis*

The occurrence of one (or more?) species of *Crepidostomum* in Alaskan trout is shown in Table 2. The heaviest infections of this parasite observed to date in Alaska have been in Tebay Lake rainbows. Infections of 50-100 of these flukes are common and most of the intestinal tracts examined were highly inflamed. The infections observed elsewhere (see Table 2) were less intense (5-10 specimens) and inflammation of the intestinal tract was not noted. According to Wales (1958) two cases of mass mortality in Lower Gumboot and Castle Lakes, Siskiyou County, California, of rainbow and brook trout were due "entirely or in part to an intestinal fluke, *Crepidostomum*". He noted serious intestinal inflammation in heavily parasitized (up to 446 specimens) fish. Crawford (1943) reported the life cycle of *Crepidostomum farionis* to involve a small clam (*Pisidium* sp.) and mayfly nymphs (*Ephemera* sp.) as first and second intermediate hosts respectively. Since mayfly nymphs are an important food-species for fresh-water salmonids, it is readily evident how they may become heavily infected.

The specific identity of the species of *Crepidostomum* reported above from various Alaskan salmonids has not yet been determined with certainty. It appears likely that it can be validly designated *C. farionis* (Mueller), but Morton (1942) has reported *C. transmarinum* (Nicoll) from *Salvelinus alpinus* and *S. malma* from Karluk Lake. In any case, in lieu of evidence to the contrary, one can assume that the various species of *Crepidostomum* probably have similar pathogenic properties under similar conditions. Wales (loc. cit.) stated that the worms involved in the California mortality were "definitely identified as belonging to the genus *Crepidostomum*, and probably to the species *farionis*."

CONCLUSIONS

Although the rainbow trout population of the Tebay Lakes, Wrangell Mountains, is relatively heavily infected with eight species of parasites, of which at least two species are probably significant pathogens, the evidence at hand does not indicate that the situation is critical. Some depression of reproductive rate (Philonemiasis) and of growth rate (Crepidostomiasis and other helminthiasis) may be taking place. The main contributing factor at this time may be the apparently high population density of fish resulting in less than optimum nutrition and increased transmission of parasites. In spite of the relatively intense parasitism, the culinary and sports value of the trout is unimpaired. None of the parasites observed were found in the edible portions of the fish. Accordingly the relative lack of severity of the situation at the present time does not justify or require the expense of extensive remedial efforts. More extensive harvest, particularly of the heavily infected spawning fish might prove to be an inexpensive solution, particularly if the situation ever became critical.

ACKNOWLEDGMENTS

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