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The Summer Food of Coregonus clupeaformis from Yellow Bay, Flathead Lake, Montana

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Yellow Bay, situated about midway on the east shore of Flathead Lake, is connected to the lake proper by a mouth nearly as wide as the bay is long. A deep channel, which points northward into the bay, is an extension of the profundal area of the lake. This channel is bordered on the west side of the bay by precipitous sides and shallows gradually on the east. Strong currents occur either in a clockwise or counterclockwise direction, depending upon the direction of the winds which initiate them. All of these factors, together with the entrance of three small streams, make the bay an ideal habitat for the Great Lakes Whitefish, Coregonus clupeaformis (Mitchill).

Seventy-one fish were taken by means of gill nets from July 9 to August 22, 1948, inclusive, and June 20 to July 5, 1949, inclusive. Specimens were taken from depths ranging from 30 to 100 feet, with the majority coming from the 50 to 80 foot depth level. Although many sets were made in depths of 100 to 200 feet, no individuals were caught from these settings. Most specimens were taken in a gill net which had 2½" square mesh, but supplementary sets were made with nets which were graded from 3/4" to 3" square.

Of the total number of stomachs studied, 26 were empty and 10 contained only gravel or detritus. The amount of food in the remaining 35 varied from only a trace in some to approximately 4 cc. in another. As might be expected in bottom-feeders, gravel or detritus was found in 29 of the 35 stomachs which contained food organisms; and, as also might be expected, these materials made up the larger part of the contents of many stomachs.

The smallest fish found and studied was 18.0 cm. long (total length) and weighed 37 g. The other 34 ranged from 37.0 to 51.5 cm. in total length, with an average of 44.1. The weight of these 34 varied from 333 to 900 g. with an average of 681. Although this comparatively small range of size might indicate an intended selection, efforts to catch fish of smaller sizes were unsuccessful.

Because of such obvious difficulties as the time element in recovering specimens from gill nets, no concentrated effort was made to determine accurately the volume of the food items. Small organisms, such as Cladocera, were measured by displacement in a graduate and estimated to the nearest tenth of a cc. Quantity of larger organisms was based on actual counts. The food organisms, the frequency of occurence of each in the 35 stomachs, and numbers or volume of each are given in Table 1.

Evidence from Table 1 indicates that chironomid larvae make up the most important food item, both by frequency of occurence and amount of food material. In spite of the fact that 7 of the 16 stomachs had 6 or fewer larvae, the average for all 16 was 111 per stomach. Molluscs probably rank next as an important food item, some form of these being found in 15 of the stomachs. Water mites were eaten by many of the fish, but, with 2

Table 1. Food of thirty-five whitefish from Yellow Bay

Food Organism	No. of stomachs found in	Per cent of fish with organism	Greatest number in any fish	Average number	Greatest Vol. in any fish
Chironomidae	16	45.7	650	111	--
Hydrachnida	14	40.0	453	56	--
Pisidium	12	34.3	10	4.25	--
Copepoda	10	28.5	27	11.2	--
Leptodora	10	28.5	--	--	0.8 cc.
Algae	9	25.7	--	--	--
Other insects and parts	9	25.7	--	--	--
Cladocera	7	20.0	--	--	2.8 cc.
Nematoda[a]	6	17.1	10	3	--
Valvata humeralis	5	14.3	18	6	--
Fish scales	4	11.4	4	1.8	--
Fish - young[b]	3	8.5	2	1.7	--
Bryozoa	3	8.5	--	--	3.0 cc.
Trichoptera	3	8.5	11	4.3	--
Gyraulus	2	5.7	6	3.5	--
Other molluscs	2	5.7	--	--	--
Ephemerida	1	2.8	1	1	--
Ostracoda	1	2.8	--	--	0.05 cc.
Valvata tricarinata	1	2.8	1	1	--

[a] Whether food or parasite not yet determined.
[b] Too young to identify.

noticeable exceptions, the total volume in any one stomach was negligible. Of the various types of algae found, Chaetophora sp. was the most prevalent. It was not determined whether the nematodes which were found were parasites or food items.

Food preference, or continuity of feeding patterns, may be indicated by an analysis of the data from several stomachs. Five of the stomachs had Chironomids almost to the exclusion of all other forms. The same was true of 3 stomachs which contained water mites. Four stomachs had an almost "pure culture" of Leptodora, 2 with other Cladocera, 1 with Ostracods, and 2 with Copepods, although the last mentioned had only 26 and 27 specimens, respectively. It is interesting to note that Ostracods were found only in the stomach of the one small fish caught. Bryozoan tubes, either of the genus Fredericella or Plumatella, made up 95% to 99% of the contents of one stomach. Further investigations of the food of the Whitefish may very likely shed light on migrations, movements and life history stages of the fish.

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