

Tomasz HEESE

**FOOD OF ANADROMOUS FORM OF *SALVELINUS ALPINUS* (L., 1758)  
IN LAKE SVARTVATNET AND IN THE MOUTH OF RIVER REVELVA  
(VEST SPITSBERGEN – HORNSUND AREA)**

**POKARM ANADROMICZNEJ FORMY *SALVELINUS ALPINUS* (L., 1758)  
W JEZIORZE SVARTVATNET I W STREFIE UJŚCIOWEJ RZĘKI REVELVY  
(SPITSBERGEN ZACHODNI – REJON HORNSUNDU)**

**Department of Environmental Biology and Chemistry  
Technical University, Koszalin**

Food of the Arctic charr was studied using frequency of various diet items and their contribution to total food weight. Food of the adult Arctic charr in Lake Svartvatnet consisted mostly of larval, pupal and imaginal dipterans.

The juvenile Arctic charr, measuring 9–13 cm, were an important food item as well and made up more than half of the entire food weight.

The fish in the mouth of River Revelva fed mostly and most frequently on amphipods. The second most important food item in the area were cottid fishes, mainly small (up to 2.5 cm long) individuals of the *Myoxocephalus* species.

## INTRODUCTION

Problems related to feeding of *Salvelinus alpinus* in different parts of its range are relatively poorly investigated. Detailed analyses can be found in few papers only (McCart and Craing, 1973; Sparholt, 1985). Most publications report food items only and disregard the quantitative aspects of food composition which would show the importance of individual food items. Hence the need to collect more detailed data on Arctic charr biology, as most papers dealing with the species concern mainly its intraspecific systematics.

The studies described below were aimed at determining food composition of the migratory Arctic charr in Spitsbergen waters.

## MATERIALS AND METHODS

Analyses were made on Arctic charr specimens caught in Lake Svartvatnet and in the mouth of River Revelva (Vest Spitsbergen) in July 1986. Stomach contents of a total of 58 individuals of *Salvelinus alpinus* were examined, 38 stomachs being obtained from fish dwelling in the lake, while those inhabiting the river mouth yielded 19 stomachs. The Arctic charr individuals caught measured 43–61 cm total length (l.t.).

Food composition was studied by analyzing frequency of each food item and its contribution to the total food weight. Food items were weighed to 0.001 g.

## RESULTS AND DISCUSSION

All the individuals studied were caught in July. Of the 38 stomachs yielded by individuals living in the lake, 7 (about 8%) were empty. The remaining stomachs were usually tightly filled with food. The fish caught in the river had, except for one individual, food in their stomachs.

The food composition differed considerably between the two areas (Table 1), which is the consequence of the differences between those two habitats. Lake Svartvatnet contains fresh water supplied by melting glaciers, while the River Revelva mouth is directly affected by the sea.

Larval, pupal and imaginal forms of dipterans are the major food items (Fig. 1) in Lake Svartvatnet, the spawning ground of the population. Some stomachs contained up to about 2000 larvae and pupae. The dipterans found in stomachs consist most probably of two species. The juvenile *S. alpinus* measuring 92–132 mm were found in 8 stomachs. In spite of its low frequency (25.8%), this food item should be considered as a very important one since its contribution to the total food weight was 52.1%. Cannibalism in the cold Arctic waters is most probably inevitable and is perhaps a regulatory mechanism.

The low degree of digestion of the four Arctic charr juveniles found in stomachs allowed to examine, in turn, composition of their food. The stomachs contained larval and pupal dipterans. It is evident then that dipteran larvae, pupae, and imagines are the main food resource in Lake Svartvatnet in July, cannibalism notwithstanding.

Table 1

Frequency and weight composition of food items of *Salvelinus alpinus* in mouth of River Revelva  
and in Lake Svartvatnet

Area	n	Analysis method	Food items				Total
			Gammaridae	Diptera		Pisces	
				larvae	pupae + imagines		
Revelva mouth	18	frequency (%)	88.2	47.1	—	35.3	176.6
		weight (%)	64.7	4.6	—	30.7	100.0
Lake Svartvatnet	31	frequency (%)	—	58.1	71.0	25.8	154.9
		weight (%)	—	13.0	34.9	52.1	100

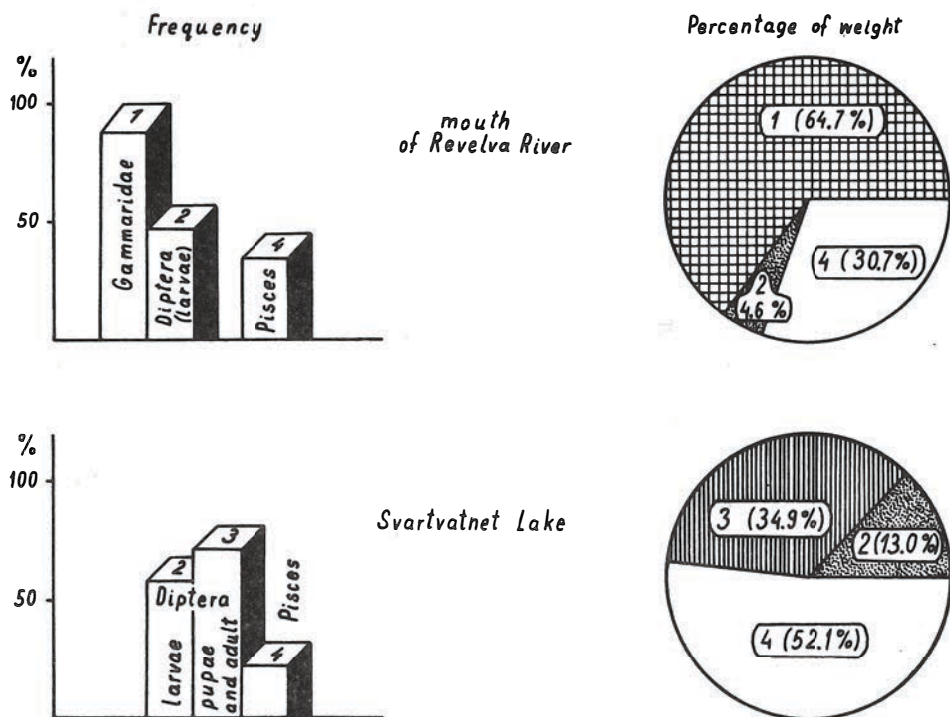


Fig. 1. Frequency of food items and their contribution to total food weight of *Salvelinus alpinus*: 1, Gammaridae; 2, dipteran larvae; 3, dipteran pupae and imagines; 4, fish

Gammarid amphipods are the major food item of the fish caught in the Revelva mouth (Fig. 1); the weight contribution (64.7%) and frequency (88.2%) of gammarids were highest among diet components. Cottid fishes (mainly *Myoxocephalus*) were important in the food as well; the fishes measured up to 25 mm. One stomach contained 2 capelin (*Mallotus villosus*) individuals measuring about 120 mm.

In spite of their high frequency, larval insects found in the riverine fish are of a minor importance only due to their low total weight percentages (4.6%). The stomachs contained usually both the insect larvae and typically marine organisms. The larvae were most probably carried to the sea by the river, or the feeding fish migrated between the river and the coastal zone.

The Arctic charr diet consists most often (Maitland, 1977; Rass, 1983; Sparholt, 1985) of insect larvae, planktonic crustaceans, molluscs, and fish, the latter being most important in the food of larger fish. Food of *S. alpinus* in different areas of its range is usually poorly diversified, which is a consequence of the species-poor habitats. For Lake Baikal areas, Kalašnikov (1978), quoting Pronin (1967) and Tomilov

(1954), lists juvenile coregonids, gammarids, trichopteran and dragonfly larvae as diet components. The Arctic charr living in Alaskan streams (McCart and Craing, 1973) feed mainly on larval, pupal, and imaginal *Plecoptera*, *Diptera*, *Ephemeroptera*, and *Trichoptera*. Terrestrial insects accidentally falling to the water (*Coleoptera*) are of importance as well. Apart from larval insects, *S. alpinus* living in Siberian lakes (Mina, 1962) fed on crustaceans (*Gammaridae*, *Mysidae*), molluscs (*Pisidium*), and fish. Stomach contents of predatory lacustrine forms (Rešetnikov, 1961) were dominated by fish.

In the area of study, the northernmost part of the Arctic charr range, the food of the species is poorly differentiated, which is a consequence of a low diversity of organisms in the Far North. Dipterans in Lake Svartvatnet are, for all practical purposes, the only food item available to Arctic charr, supplemented out of necessity by cannibalism. Once the fish move to the sea, their food composition changes dramatically, although the number of items is not very high, either. However, due to the abundance of food, the fish is able to feed voraciously, which is reflected in the body size. The migratory individuals, anadromous predators in particular, usually attain larger size than the stationary ones living in oligotrophic water bodies with poor food resources.

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STRESZCZENIE

Badania przeprowadzono na rybach złowionych w jeziorze Svartvatnet i w strefie ujściowej rzeki Revelvy. Łącznie do analizy użyto 58 żołądków *Salvelinus alpinus*, z czego 38 pochodziło z ryb złowionych w jeziorze, a 19 z ryb pozyskanych w ujściu rzeki. Analizę składu pokarmu przeprowadzono metodą częstości występowania i udziału wagowego.

W jeziorze Svartvatnet, miejscu tarła badanych ryb, głównym pokarmem są muchówki (*Diptera*) zarówno larwy jak i poczwarki i postacie dorosłe (Ryc. 1). W 8 żołądkach z tego rejonu stwierdzono młode osobniki *Salvelinus alpinus* o długości od 92 do 132 mm. Znalezione w żołądkach młode golce stanowiły ponad połowę całej masy pokarmowej badanych ryb.

Głównym składnikiem pokarmu golców złowionych w ujściu rzeki Revelvy (Ryc. 1) są kielże (*Gammaridae*), charakteryzujące się najwyższym udziałem wagowym (64,7%) i również najwyższą częstością występowania (88,2%). Następnie ryby, z których najważniejsze znaczenie mają gatunki z rodziny *Cottidae*, głównie z rodzaju *Myoxocephalus*.

Author's address:

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dr inż. Tomasz Heese  
Zakład Biologii i Chemii Sanitarnej  
Wyższa Szkoła Inżynierska w Koszalinie  
ul. Racławicka 15–17  
75–620 Koszalin