Temperature Selection by Juvenile and Adult Yellow Perch (*Perca flavescens*) Acclimated to 24 C

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Samples of juvenile and adult yellow perch (*Perca flavescens*) were obtained from the same habitat and at the same time from two separate water sources to study the differences, if any, in their preferred temperatures.

The fish, acclimated to 24 C, were subjected to a vertical temperature gradient. Juveniles selected temperatures in the range 20.0–23.3 C and adults in the range 17.6–20.1 C. It is concluded that age plays an important role in temperature selection in this species.

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Nous avons capturé des échantillons de perchaudes (*Perca flavescens*) jeunes et adultes dans un même habitat et en même temps à deux endroits différents, dans le but d'étudier leurs préférences thermiques.

Les poissons acclimatés à 24 C furent placés dans un gradient vertical de températures. Les jeunes ont choisi des températures dans l'intervalle de 20.0 à 23.3 C, et les adultes dans celui de 17.6 à 20.1 C. Nous en concluons que l'âge joue un rôle important dans le choix de la température chez cette espèce.

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Preferred temperatures of many species of fish have been determined in the laboratory. Although previous thermal experience through acclimation exerts the most significant influence on temperature selection it has been shown for several species that seasonal effects exist (Sullivan and Fisher 1954; Zahn 1963; Barans and Tubb 1973). Little work has been done on the role of the geometry of the gradient (i.e. horizontal or vertical) but there is evidence, at least in some instances, that it may not be as important as previously thought (Fry 1971; McCauley and Pond 1971).

There are no reports comparing temperature selection in young and old individuals of a species collected from the same source. Comparison of the preferred temperatures recorded in the literature is questionable because of differences in experimental technique. Therefore, we collected juvenile and adult yellow perch on the same day from the same habitat and acclimated them in the laboratory under similar conditions. The yellow perch was chosen because preferred temperatures for young and old individuals were available as a reference from previous studies (McCracken and Starkman 1948; Ferguson 1958).

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Materials and methods — Two groups of fish collected from two geographically separated water courses were tested. The first group was seined from the Grand River (Waterloo County) below the Shand Dam in May of 1971 and consisted of yearlings and 2–3 year olds. The second sample consisted of young-of-the-year and adults collected by an outboard trawl from Lake St. Clair in June of 1971. The Lake St. Clair group was held for a week at the Fisheries Research Station at Wheatly before being transferred to the Waterloo Laboratory. Both groups were acclimated at 24 C under a 12-hr photoperiod for at least 1 month before any observations were made. The fish were trained within a week to feed on trout pellets.

The vertical temperature gradient tank (see McCauley and Pond 1971) was a modified facsimile of that originally used to make the previous determinations of selected temperature on yellow perch (McCracken and Starkman 1948; Ferguson 1958). The fish were transferred from the rearing tank to the temperature gradient tank where the temperature was also 24 C, and allowed to habituate for at least 2 days before experiments were begun. Temperature gradients from 14 to 30 C were established in a depth of about 1 m by adjusting the flows of hot water passing downward through a metal heat exchanger and cold water upwelling through a perforated tube resting on the bottom of the tank. Observations began about 2 hr after the temperature gradient was established. The position of each fish was noted at intervals of 30 sec over a 10-min period (designated a

"run"). The gradient was slightly altered after each 10-min run in preparation for the next run. After a series of experiments the fish were returned to the rearing tank. The data from the runs were combined and the frequency distributions at each temperature class interval were expressed as a percentage of total observations. Means were calculated and compared by the standard '*t*' test.

Results and discussion — After a habituation period of several days in the preferendum tank the fish responded to temperature gradients by distributing themselves around a temperature zone in the tank. Most of the fish could be moved upwards or downwards by altering the depth of this temperature zone. Table 1 summarizes the percentage distributions of fish from Grand River and Lake St. Clair, along with calculations of mean and modal distributions.

Temperatures selected by the juveniles were usually higher than those selected by the adults. While the difference between juveniles and adults tested in November was greatly reduced, it is still significant at the 5% level. The marked decrease in the selected temperature for the juveniles is difficult to explain but it is suggested that seasonal effects can be present and that these may affect young and old fish to different degrees. Our results are in general agreement with those of previous studies. McCracken and Starkman (1948) found a final preferendum of 20.5 C in late winter (February and March) for adults. Ferguson (1958) working with underyearlings in the summer found a final preferendum[1] some 3 C higher.

Barans and Tubb (1973) followed seasonal variations in temperature selection of juvenile and adult perch acclimatized to natural fluctuating lake temperatures. They found that young-of-the-year perch usually selected higher temperatures than adults at all seasons.

Ferguson (1958) reviewed the literature on selected temperatures of fish, comparing laboratory determinations with field observations, and concluded that the laboratory-determined thermal preferences, especially those for warmwater species,

[1]The final preferendum is defined as that temperature range in which fish will ultimately congregate in an infinite gradient (Fry 1947).

TABLE 1. The percentage frequency distribution in a temperature gradient of juvenile and adult yellow perch acclimated to 24 C.

	Lake St. Clair				Grand River	
Temp. (C)	YOY Oct. 3	Adults Oct. 6	YOY Nov. 17	Adults Nov. 1	Yearlings June 3	Adults June 8
30					.5	1.3
29				.5	2.0	1.7
28					1.5	–
27	.7				16.8	–
26	10.5		.3	.5	–	–
25	13.6		1.5	0	5.1	3.8
24	20.2		.2	2.6	19.4	5.7
23	27.8		11.8	8.6	18.4	4.7
22	10.9	.8	7.6	12.2	8.8	5.0
21	10.3	0	20.4	2.3	12.7	9.4
20	2.5	3.9	30.4	9.7	7.7	27.0
19	.8	15.4	7.6	17.4	3.1	13.4
18	2.7	38.4	12.0	13.3	2.0	11.4
17		23.2	3.3	27.0	1.0	9.6
16		11.7	–	5.5	.5	7.0
15		6.6	3.6	.4	.5	
14			.2			
Total Observations	1013	862	769	635	196	299
No. of fish	8	8	8	8	8	8
Preferenda						
Mode (C)	23	18	20	17	24	20
Mean (C)	23.3	17.6	20.0	19.2	23.3	20.1
SD (C)	1.8	1.3	2.2	2.3	2.5	2.0

were several degrees higher than those deduced from field observations. Since laboratory studies are usually carried out on young fish and field observations on adults, he suggested that the difference in selected temperatures could be attributed to age. Our own results which are in agreement with those of Barans and Tubb (1973) indicate that this is true for the yellow perch. This difference in selected temperatures may reflect different physiological needs at various stages of postembryonic life.

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Sexual Ripening of Pacific Halibut (*Hippoglossus stenolepis*) in Captivity

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TOMLINSON, N., AND E. G. BAKER. 1973. Sexual ripening of Pacific halibut (*Hippoglossus stenolepis*) in captivity. J. Fish. Res. Board Can. 30: 1255–1256.

Five female Pacific halibut, ranging between 89 and 105 cm long and between 10.4 and 17.9 kg, and three males, between 79 and 99 cm and 6.34 and 13.3 kg, became sexually ripe after being held in captivity for 21 months. This apparently is the first record of this development in the species in captivity.

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Cinq flétans du Pacifique femelles, mesurant 89–105 cm de longueur et pesant 10.4–17.9 kg, et trois mâles mesurant 79–99 cm de longueur et pesant 6.34–13.3 kg sont devenus sexuellement mûrs après avoir été gardés en captivité pendant 21 mois. C'est la première mention, semble-t-il, d'un tel développement chez cette espèce en captivité.

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