Andrzej WITKOWSKI

Ichthyology

MORPHOLOGICAL VARIABILITY IN LAKE AND RIVER POPULATIONS
OF *COTTUS POECILOPUS* HECKEL, 1836 (PISCES: COTTIDAE)

ZMIENNOŚĆ MORFOLOGICZNA JEZIOROWYCH I RZECZNYCH POPULACJI
GŁOWACZA PRĘGOPIŁETWEGO *COTTUS POECILOPUS* HECKEL,
1836 (PISCES: COTTIDAE)

Wrocław University

Morphological variability in both population types of *Cottus poecilopus* Heckel was shown on the basis of study on 316 specimens from 11 lakes and 6 mountain rivers. Rheophilous populations have better developed features related to locomotion; in limnophilous populations cephalic and truncal canals of lateral line are partly reduced. The differences between river and lake populations of *Cottus poecilopus* involve adaptations to their respective habitats.

INTRODUCTION

Cottus poecilopus Heckel is a species of very wide geographical distribution. Its range includes northern and central Europe, northern Asia as far as Kamchatka. In northern Europe (Scandinavia) and Asia it inhabits both mountain rivers and lakes. In central Europe *C. poecilopus* is limited only to the Sudety and the Carpathians Mts. Where it inhabits parts of rivers and streams near their sources. Moreover, on the lowlands of central Europe there were found four geographically isolated localities in the lakes Plön, Schwerin (Duncker, 1925), Onega (Berg, 1949) and Hańcza (Witkowski, 1975).

Studies, by the present author (Witkowski 1979), on variability of freshwater sculpins

in Poland show that the *C.poecilopus* population from the Lake Hańcza differs from those inhabiting mountain rivers and streams to such an extent that it should be considered a new subspecies. Yet in order to find out whether the morphological differences noticed were caused by genetic factors (geographical isolation) or by ecological ones only (different habitats), in this paper the author wants to check also lake population of this species.

MATERIAL AND METHODS

Material comprised 316 specimens of *C.poecilopus* and was collected from 11 lakes and 6 mountain rivers and streams in Poland and Sweden. Specimens studied for this project are deposited in ichthyological collections of the Museum of Natural History, University of Wrocław (MNHUW), Zoological Museum, University of Uppsala (ZMUU), Museum of Natural History, University of Göteborg (MNHUG), and Natural History Museum of Stockholm (NHMS).

MATERIALS

a. Lakes

Torne trask. — 4 specimens, coll. Blomquist, 1942, MNHUG; Stora Le. — 3, coll. O. Nybelin, 3IX 1958, MNHUG; Hornaran jackvik. — 4, coll. P. Enequist, 26 VIII 1946, MNHUG; Lule älv, — 1, coll. E. Mattason, 11 IX 1958, MNHUG; Storajön — 2, coll. Lilljeborg, ZMUU; Nömmen — 4, coll. O. Porat, 1863, ZMUU; Hemsjö sjön — 4, coll. D. Mellin, MNHUG; Vättern — 1, coll. S. Ekman, 14 VII 1910, ZMUU; Langas — 3, coll. N.G. Gejvall, 8 VI 1936, MNHS; Norräsjön — 3, coll. J. Johansson, V. 1897, MNHS; Hańcza — 73, coll. A. Witkowski, 22 V 1974, MNHUW;

b. Mountain rivers and streams

Lipnica — 20, coll. A. Witkowski, 8 VI 1976, MNHUW; Jałowiec — 38, coll. A. Witkowski, 10 VI 1976, MNHUW; Wisła — 49, coll. Z. Kozikowska, 15 X 1969, MNHUW, Biała Łądecka — 28, coll. A. Witkowski, 30 VI 1976, MNHUW; Morawka — 36, coll. A. Witkowski, 30 VI 1976, MNHUW; Bystrzyca Dusznicka — 45, coll. A. Witkowski, 27 IX 1971, MNHUW.

Plastic features were measured and meristic features calculated according to the scheme used in previous papers (Witkowski 1972, 1979). Lateral line canals were dyed by the method developed by Jakubowski (1967), used also by other authors in studies on *Cottidae* (Neelov, 1979, Sideleva, 1979, Starmach, 1968, 1972).

RESULTS AND DISCUSSION

Analysis of plastic features (Table I) of lake populations and of these from mountain rivers and streams reveals that their body structure and shape different. Sculpins in lakes have longer head and longer predorsal distance; almost all their fins are higher (D_1 , D_2 , P, and V). They have larger orbital diameter than those in running water. Mountain river and stream populations reveal higher values in such features as: length of both dorsal fins, length of caudal peduncle, least body height, pre- and postorbital distance, mandible length and body height. The observed differences between lake and river populations of *C. poecilopus* are adaptations to their habitats. This is especially evident in populations from rapid running water where features related to locomotion are more strongly developed. These populations have also a much wider snout, which seems important for catching food rapidly drifting with water. Differences of this sort in plastic features between limnophilous and rheophilous populations are observed in many fish species of various systematic groups (Bănărescu, 1954; Belyj, 1964; Cihăţ, 1975; Gąsowska, 1974; Rolik, 1965).

In meristic features such as: number of rays, number of vertebrae and gill rakers no statistically significant differences have been found between lake and river populations of *C. poecilopus*.

The number of lateral line pores in the limnophilous and rheophilous populations of *C. poecilopus* studied is significantly different (Tab. II-IV, Fig. 1-3).

Lake populations of *C. poecilopus* have lateral line partly reduced ending at the fourth or fifth ray of second dorsal fin. In populations from running water this line is longer, reaching as far as the last ray of the second dorsal fin. Shortening of the lateral line is followed by reduction in pore and neuromast numbers. In limnophilous populations there are 10-20 pores, 15,08 on the average, while in rheophilous ones this number is almost twice as high-17 to 38, 26,80 on the average. The differences between the two populations are statistically significant ($M_{diff} = 52,67$).

The case is similar with respect to suborbital canals. Lake populations have 16,18 pores on the average, the most frequent pattern being 8-8 (in 40,19% of fishes). In river populations, this number is somewhat higher ($\bar{x} = 17,24$), the most frequent pattern being 9-9 (in 46,72% of fishes). According to Jakubowski (1970), Neelov (1979), and Reno (1966) in many fish species a reduction in pore number is seen most often in these canals, involving even a partial reduction of the canals.

The situation is different with regard to supratemporal and supraorbital canals. All limnophilous populations have somewhat more pores, by 1 on the average in those embranchments of the lateral line (Tab. III and IV).

In operculo-mandibular and temporal canals the number of pores is similar in both populations (Tab. V), although there are some more pores in sculpins of lakes ($\bar{x} = 20,27$) than in those of mountain rivers and streams ($\bar{x} = 19,96$). According to Ceresnev (1976), McAllister and Lindsey (1961), and Neelov (1979), the structure of those canals and pore numbers in the *Cottidae* species and other groups are very stable.

Table 1

Plastic features of lake and river populations of *Cottus poecilopus* Heck

Features	Lake populations		River populations					
	Scandinavian lakes n = 29	Haiczka lake n = 73	Biała Łądecka n = 27	Morawka n = 36	Bystrzyca Dusznicka n = 44	Jałowiec n = 38	Lipnica n = 20	Wisła (Vistula) n = 49
	$\bar{x} \pm m$	$\bar{x} \pm m$	$\bar{x} \pm m$	$\bar{x} \pm m$	$\bar{x} \pm m$	$\bar{x} \pm m$	$\bar{x} \pm m$	$\bar{x} \pm m$
In % longitudo corporis								
Longitudo capitis	29.5 0.29	30.3 0.17	26.6 0.31	26.2 0.13	25.8 0.16	27.6 0.19	27.8 0.25	28.2 0.15
Distantia praedorsalis	33.7 0.27	34.0 0.19	31.2 0.27	30.2 0.15	29.5 0.15	30.7 0.17	31.8 0.25	30.9 0.13
Longitudo D ₁	19.0 0.42	21.3 0.21	21.7 0.34	20.5 0.22	20.4 0.22	22.8 0.23	22.5 0.28	20.5 0.22
Longitudo D ₂	37.0 0.37	37.0 0.23	37.9 0.57	36.7 0.36	38.0 0.20	38.8 0.27	37.6 0.49	39.1 0.44
Distantia postdorsalis	48.4 0.35	47.4 0.22	48.4 0.43	48.2 0.22	48.3 0.28	49.7 0.21	48.1 0.39	47.1 0.24
Distantia praenalis	53.9 0.46	53.4 0.21	53.6 0.42	53.7 0.25	52.6 0.30	51.0 0.22	51.9 0.35	53.8 0.22
Longitudo A	29.8 0.29	30.3 0.21	29.8 0.37	28.1 0.22	29.7 0.21	31.1 0.21	30.0 0.33	29.5 0.20
Longitudo pedunculi caudae	16.8 0.32	15.1 0.17	16.3 0.30	17.3 0.20	17.1 0.21	17.2 0.19	17.0 0.35	14.6 0.21
Summa altitudo corporis	17.8 0.30	19.3 0.26	18.9 0.32	16.8 0.19	18.6 0.22	19.4 0.16	17.5 0.37	17.2 0.21
Minima altitudo corporis	5.9 0.10	6.0 0.08	8.5 0.12	7.0 0.07	7.8 0.12	9.1 0.08	7.2 0.13	7.3 0.11
Altitudo D ₁	8.3 0.19	7.3 0.10	7.1 0.18	7.4 0.11	7.3 0.12	7.4 0.18	7.7 0.12	7.8 0.14
Altitudo D ₂	12.2 0.29	12.5 0.16	11.5 0.21	11.7 0.11	11.6 0.16	11.9 0.13	12.7 0.15	12.3 0.13
Altitudo A	10.3 0.16	13.5 0.17	11.7 0.23	11.7 0.13	11.1 0.14	12.3 0.13	12.9 0.12	12.1 0.19
Altitudo P	27.0 0.31	26.1 0.18	24.1 0.21	24.1 0.21	23.6 0.19	23.5 0.18	24.7 0.24	24.2 0.16
Altitudo V	22.1 0.56	21.1 0.29	19.1 0.20	19.1 0.20	19.6 0.27	21.6 0.39	20.1 0.42	21.2 0.21
In % longitudo capitis								
Distantia praeorbitalis	29.8 0.53	30.0 0.35	33.8 0.59	33.9 0.41	34.7 0.41	34.7 0.38	32.3 0.23	30.4 0.52
Diameter oculi	25.0 0.59	20.7 0.22	19.6 0.48	20.5 0.32	20.8 0.34	20.9 0.32	20.5 0.42	19.7 0.33
Distantia postorbitalis	48.8 0.74	49.9 0.30	50.5 0.49	48.2 0.45	48.6 0.43	51.2 0.36	52.1 0.64	51.1 0.41
Longitudo maxillae	34.5 0.74	38.5 0.58	41.5 0.60	37.7 0.42	37.7 0.56	41.5 0.62	41.5 1.06	39.9 0.70
Altitudo capitis	53.4 1.10	62.4 0.54	62.4 0.78	59.4 0.82	65.7 0.92	61.3 0.68	55.5 0.98	56.0 0.77
Distantia inter oculos	14.3 0.53	18.1 0.29	17.4 0.45	16.8 0.34	17.0 0.34	15.8 0.30	15.9 0.47	14.9 0.31

Table 2

Number of pores in supraorbital canals in lake and river populations of *Cottus poecilopus* Heck.

Lake populations	n	7 – 7	7 – 8	8 – 8	8 – 9	9 – 9	Other comb.
Torne trask	4	–	1	1	–	–	2
Stora Le	3	–	1	1	1	–	–
Hornaran jackvik	4	–	2	1	–	–	–
Lule älv	1	–	–	–	1	–	–
Storsjön	2	–	–	–	2	–	–
Nömmen	4	2	–	1	1	–	–
Hemsjö sjön	4	2	2	–	–	–	–
Vättern	1	–	–	1	–	–	–
Langas	3	1	1	–	–	–	1
Narrasjön	3	–	–	2	1	–	–
Hańcza	73	1	8	34	15	12	3
Total	102	6	15	41	20	12	7
% of fish	100.00	5.88	14.70	40.19	19.60	11.76	6.86
River populations							
Biała Łądecka	27	–	–	7	5	10	4
Morawka	36	1	4	12	7	8	4
Bystrzyca Dusznicka	44	–	1	3	6	28	6
Jałowiec	38	–	–	4	12	18	4
Lipnica	20	1	–	4	3	12	–
Wisła (Vistula)	49	–	–	6	11	24	8
Total	214	2	6	36	44	100	26
% of fish	100.00	0.93	2.80	16.84	20.56	46.72	12.14

Fig. 1. Variation of pores number in truncal canals of lateral line in lake and river populations of *Cottus poecilopus* Heck. a – Torne trask, b – Stora Le, c – Homaran jackvik, d – Lule älv, e – Storsjön, f – Nömmen, g – Hemsjö sjön, h – Vättern, i – Langas, j – Norrasjön, k – Hańcza, l – Biała Łądecka, m – Morawka, n – Bystrzyca Dusznicka, o – Jałowiec, p – Lipnica, r – Wisła

Fig. 2. Scheme of patterning of truncal and cephalic canals in lake (A) and river (B) populations of *Cottus poecilopus* Heck.

Fig. 3. Cephalic canals of lateral line in lake (A) and river (B) populations of *Cottus poecilopus* Heck. CIO – suborbital canal, CSO – supraorbital canal, CPM – operculo-mandibular canal, CST – supra-temporal canal, CT – temporal canal

Table 3

Number of pores in supratemporal canal in lake and river populations of *Cottus poecilopus* Heck.

Lake populations	n	2	3	4	5
Torne trask	4	—	1	3	—
Stora Le	3	—	—	3	—
Hornaran jackvik	4	—	2	2	—
Lule älv	1	—	1	—	—
Storsjön	2	—	1	1	—
Nömmen	4	—	2	2	—
Hemsjö sjön	4	1	3	—	—
Vättern	1	—	1	—	—
Langas	3	—	2	1	—
Narrasjön	3	—	1	1	1
Hańcza	73	—	40	33	—
Total	102	1	54	46	1
% of fish	100.00	0.98	52.94	45.09	0.98
River populations					
Biała Łądecka	27	—	23	4	—
Morawka	36	—	36	—	—
Bystrzyca Dusznicka	44	—	40	4	—
Jałowiec	38	—	37	1	—
Lipnica	20	—	19	1	—
Wisła (Vistula)	49	1	46	2	—
Total	214	1	201	12	—
% of fish	100.00	0.46	93.92	5.60	—

Table 4

Number of pores in supraorbital canals in lake and river populations of *Cottus poecilopus* Heck.

Lake populations	n	2 – 2	2 – 3	3 – 3	3 – 4	4 – 4
Torne trask	4	–	1	1	1	1
Stora Le	3	–	–	2	1	–
Homaran jackvik	4	–	–	2	2	–
Lule älv	1	–	–	–	–	1
Storsjön	2	–	–	2	–	–
Nömmen	4	–	–	–	4	–
Hemsjö sjön	4	1	–	3	–	–
Vättern	1	–	–	–	1	–
Langas	3	–	–	2	–	1
Narrasjön	3	–	–	2	1	–
Hańcza	73	–	4	27	27	15
Total	102	1	5	41	37	18
% of fish	100.00	0.98	4.90	40.19	36.27	17.64
River populations						
Biała Łądecka	27	–	–	23	4	–
Morawka	36	–	1	30	4	1
Bystrzyca Dusznicka	44	–	–	39	3	2
Jałowiec	38	–	2	28	8	–
Lipnica	20	–	3	17	–	–
Wisła (Vistula)	49	–	–	29	12	8
Total	214	–	6	166	31	11
% of fish	100.00	–	2.80	77.57	14.48	5.14

Table 5

Number of pores in operculo-mandibular canals in lake and river populations of *Cottus poecilopus* Heck.

Lake populations	n	8 – 9	9 – 9	9 – 10	10 – 10	10 – 11	11 – 11	Other comb
Torne trask	4	1	1	1	–	1	–	–
Stora Le	3	–	–	–	3	–	–	–
Hornaran jackvik	4	–	1	1	2	–	–	–
Lule älv	1	–	–	–	–	–	1	–
Storsjön	2	–	–	–	1	1	–	–
Nömmen	4	–	–	–	4	–	–	–
Hemsjö sjön	4	–	–	–	4	–	–	–
Vättern	1	–	–	–	1	–	–	–
Langas	3	–	2	–	1	–	–	–
Narrasjön	3	–	–	–	1	1	1	–
Hańcza	73	–	1	3	41	15	12	1
Total	102	1	5	5	58	18	14	1
% of fish	100.00	0.98	4.90	4.90	56.86	17.64	13.72	0.98
River populations								
Biała Łądecka	27	–	1	2	23	1	–	–
Morawka	36	–	–	4	31	–	–	1
Bystrzyca Dusznicka	44	–	–	3	38	2	–	1
Jałowiec	38	–	–	1	36	1	–	–
Lipnica	20	–	–	1	18	1	–	–
Wiśła (Vistula)	49	–	1	1	45	1	1	–
Total	214	–	2	12	191	6	1	2
% of fish	100.00	–	0.93	5.60	89.25	2.80	0.46	0.93

The average number of pores in all embranchments of the lateral line canals (truncal and cephalic) in reophilous populations of *C. poecilopus* is 100.04, to the results of Starmach (1968), Witkowski (1979). In limnophilous populations on the other hand, it is far lower amounting only to 82.71.

Based on the results presented, it could be inferred that a partial reduction in lateral line canals and in pore number in all lake populations of *C. poecilopus* is also adaptive. Ilenko and Movčan (1977) studying closely related species — *Phoxinus phoxinus* (L.) inhabiting running water, and *Ph. percnurus* (Pall.) (= *Moroco percnurus* sensu Gašowska 1979) in peat top reservoirs, found in the latter a partial reduction in lateral line canals too. According to Taranec (1941) the length of lateral line in various species of the *Cottidae* family depends on their activity. Nybelin (1958) and Starmach (1972) think that the length of lateral line, and also the number of neuromasts, is related to the speed of water current. According to them more mobile species of sculpins, and those in running water, have the longer lateral line, this finding is supported by studies of Neelov (1979) and Sidelova (1979) on other representatives of the *Cottidae* (*Cottinae*, *Myoxocephalinae*, *Artediellinae*), and of Dijkgraaf (1962), Disler (1960), Hensel (1978) and Page (1977), who studied closely related fish species inhabiting water habitats of various kinds.

CONCLUSIONS

1. Morphological variability of lake and river populations of *Cottus poecilopus* Heck. is adaptive to their habitat.
2. Rheophilous (river) populations of *C. poecilopus* have better developed features related to locomotion, and better developed system of sense canals of the lateral line.
3. In limnophilous (lake) populations of *C. poecilopus* there is a partial reduction of cephalic and truncal canals of the lateral line.

Acknowledgements

I would like, on this occasion, to express my sincere thanks to Professor O. Nybelin, Dr. S. Mathiasson (Göteborg), Dr. L. Wallin (Uppsala), and Dr. G. Åström, (Stockholm) for their kindly allowing me to borrow the Swedish lacustrine specimens from their collections.

REFERENCES

- Bănărescu P., 1954: Biometrische und systematische Studien an *Gobio gobio* aus Rumänien.-Vest. Česk. Spol. Zool., 18' 6–40.

- Belyj N.D., 1964: Izmenenije morfoložičeskich i biologičeskich osobennostej tarani, zavezenoj iz Dnepra v Krymskije vodočhranilišča.-Zool. Žurn. 43: 713–719.
- Berg L.S., 1949: Ryby presnych vod SSSR i sopredelnyh stran. Izd. Akad. Nauk SSSR, Moskva-Leningrad. (in Russian)
- Čerešnev I.A., 1976: O sistematičeskom položennii byčka-podkamenščika roda *Cottus* (Cottidae, Pisces) Čukotskogo poľuostrova. In: „Presnovodnaja fauna Čukotskogo poľuostrova”, Vladyostok: 123–128. (in Russian)
- Čihaj J., 1975: Geographical and ecologic variability of Perch (*Perca fluviatilis* (Linnaeus)) and history of its distribution from Eurasia to North America.- Sbor. Narod. Mus. v Praze, 31: 57–89.
- Dijkgraaf S., 1962: The functioning and significance of the lateral-line organs.-Biol. Rev., 38: 51–105.
- Disler N.N., 1960: Organy čustv bokovoj linii i ich značenie v povedenii ryb. Izd. Akad. Nauk SSSR, Moskva. (in Russian)
- Duncker G., 1925: Ichthyologische Notizen. II. Die Verbreitung von *Cottus gobio* L. und *C. poecilopus* Heck. in Nord und Mittel-Europa.-Pallasia, 2: 201–205.
- Gąsowska M., 1974: Biometric and ecological studies on the bleak, *Alburnus alburnus* (Linnaeus) (Pisces, Cyprinidae) from different bodies of water in Poland, in connexion with the geographic variability of this species.- Ann. Zool., 31: 373–405.
- Gąsowska M., 1979: Osteological revision of the genus *Phoxinus* Raf., sensu Bănărescu 1964 with description of a new genus *Parchrosomus* gen. n. (Pisces, Cyprinidae).-Ann. Zool., 34: 371–413.
- Hensel K., 1978: Morphology of lateral-line canals system of the genera *Abramis*, *Blicca* and *Vimba* with regard to their ecology and systematic position.- Acta Univ. Carol., Biologica, 12: 105–149.
- Ilenko N.N., Movčan Y.V., 1977: K morfologii i topografii organov bokovoj linii goljana obyknovennogo – *Phoxinus phoxinus* (L.) i goljana oziernogo – *Ph. percunus* (Pall.) (Pisces, Cyprinidae).- Vest. Zool., 6: 67–72. (in Russian)
- Jakubowski M., 1967: A method for manifestation of the lateral line canals and their neuromasts in fishes.-Copeia, 1: 234–235.
- Jakubowski M., 1970: Osobennosti morfologii sistemy organov bokovoj linii u predstavitelej antarktičeskogo roda *Trematomus* Boul. (Nototheniidae, Pisces).- Vopr. Ichtiol., 10: 585–590.
- McAllister D.E., 1968: Mandibular pore pattern in the sculpin family Cottidae.-Bull. Nat. Mus. Canada, 223: 58–69.
- McAllister D.E., Lindsey C.C., 1961: Systematics of the freshwater sculpins (*Cottus*) of British Columbia.-Bull. Nat. Mus. Canada, 172: 66–89.
- Neelov A.V., 1979: Sejsmosensornaja sistema i klasyfikacija kerčakovych ryb (Cottidae: Myoxocephalinae, Artediiellinae). Izd. „Nauka“, Leningrad: 1–208. (in Russian)
- Nybelin O., 1958: Ett bidrag vara sötvtattensimpor taxonomi.-Zool. Rev., 1: 3–11.
- Page L.M., 1977: The lateralis system of Darters (*Etheostomatini*).- Copeia, 3: 472–475.
- Reno H.W., 1966: The infraorbital canal, its lateral line ossicles and neuromasts, in the minnows *Notropis volucellus* and *N. buechanani*.-Copeia, 3: 403–413.
- Rolik H., 1965: Materiały dotyczące zmienności geograficznej i ekologicznej *Gobio gobio* (L.) w Polsce [Contribution to the knowledge of the geographical and ecological variability of *Gobio gobio* (L.) in Poland]. – Fragm. Faun., 12: 15–29.
- Sideleva V.G., 1979: Morfoložičeskije osobennosti organov bokovoj linii u euroazjatskich byčkov-podkamenščikov Cottinae (Cottidae). – Vopr. Ichtiol., 19: 343–446. (in Russian).
- Starmach J., 1968: Lateral line sense organs of *Cottus poecilopus* Heckel and *Cottus gobio* L. – Acta Biol. Cracov., Zool., 11: 243–253.
- Starmach J., 1972: Charakterystyka głowaczy. *Cottus poecilopus* Heckel i *Cottus gobio* L. [Characteristic of *Cottus poecilopus* Heckel and *Cottus gobio* L.]- Acta Hydrobiol., 14: 67–102.

- Taranec A.Y., 1941: K klasyfikacji i proischożdeniju byčkov semejstva Cottidae.-Izv. Akad. Nauk SSSR, 3: 427–447. (in Russian)
- Witkowski A., 1972: Characteristic of *Cottus gobio* L. from the streams Dzika Orlica and Kamienny Potok in Lower Silesia.-Pol. Arch. Hydrobiol., 19: 403–419.
- Witkowski A., 1975: Głowacz przęgopłetwy, *Cottus poecilopus* Heckel, 1836 w jeziorze Hańcza [*Cottus poecilopus* Heckel, 1836 in Hańcza lake (NE Poland)].- Przegl. Zool., 19: 224–227.
- Witkowski A. 1979: A taxonomic study on freshwater sculpins genus *Cottus* Linnaeus, 1758 (*Cottus gobio* L. and *Cottus poecilopus* Heck.) in Poland.-Acta Univ. Wratisl., 458, Prace Zool., 10: 1–95.

Andrzej Witkowski

ZMIENNOŚĆ MORFOLOGICZNA JEZIOROWYCH I RZECZNYCH POPULACJI *COTTUS POECILOPUS* HECKEL, 1836 (PISCES *COTTIDAE*)

STRESZCZENIE

Celem pracy było prześledzenie kształtowania się cech plastycznych i merystycznych oraz budowy kanałów czuciowych linii nabocznej u jeziorowych i rzecznych populacji *Cottus poecilopus* Heckel.

Badania oparto na 316 okazach pochodzących z 11 jezior oraz 6 rzek i potoków górskich z terenu Polski i Szwecji.

Analiza materiałów wykazała, że zróżnicowanie morfologiczne między oboma typami populacji ma charakter adaptacyjny do środowiska ich bytowania. Reofilne populacje *C. poecilopus* charakteryzują się silniejszym wykształceniem cech związanych z lokomocją oraz lepiej rozbudowanym systemem kanałów czuciowych linii nabocznej. Populacje limnofilne, słabo narażone na działanie prądu wody posiadają mniej hydrodynamiczny kształt ciała, a ponadto obserwuje się u nich częściową redukcję kanałów głowowych i tułowiowych linii nabocznej.

Витковский А.

МОРФОЛОГИЧЕСКАЯ ИЗМЕНЧИВОСТЬ ОЗЁРНЫХ И РЕЧНЫХ СОВОКУПНОСТЕЙ *COTTUS POECILOPUS* HECKEL, 1836 (PISCES: *COTTIDAE*)

Р е з ю м е

Исследования вели с целью, проследить формирование пластических и меристических признаков, а также строения чувствительных каналов боковой линии у озёрных и речных совокупностей *Cottus poecilopus* Heckel.

Материалом для исследований служили 316 экземпляров происходящих из 11 озёр, а также 6 рек и горных потоков, расположенных на территории Польши и Швеции.

На основании анализа полученных материалов установлено, что морфологическая дифференциация обоих видов совокупностей отличается адаптационным ха-

рактором по отношению к среде их обитания. Реофильные совокупности *C. poecilopus* отличаются лучшим формированием признаков, связанных с подвижностью, а также лучше построенной системой чувствительных каналов боковой линии.

Лимнофильные популяции, подвергавшиеся небольшому действию водотоков, отличаются гидродинамической формой тела не в такой степени назначенной как прежние, а также наблюдается у них частичное сокращение каналов боковой линии головы и туловища.

Author's address:

Dr. Andrzej Witkowski

Wrocław University

Museum of Natural History

Sienkiewicza 21

WROCLAW 50-335

Polska (Poland)

Received: 2 May, 1984