

Matylda GĄSOWSKA, Jan Maciej REMBISZEWSKI

The revision of the subspecies of the swamp-minnow *Phoxinus phoxinus* (PALLAS) in Poland

Rewizja podgatunków strzebli błotnej *Phoxinus phoxinus* (PALLAS) w Polsce

Ревизия подвидов озерного голяна *Phoxinus phoxinus* (PALLAS) в Польше

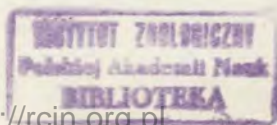
(With 2 plates, 1 map and 8 tables in the text)

INTRODUCTION

The swamp-minnow, *Phoxinus phoxinus* (PALLAS), is broadly distributed in the Palearctic. It usually inhabits small and shallow pools, generally strongly vegetated. The swamp-minnow is distributed over the drainages of all rivers discharging into the Arctic Ocean from Kolyma in East Siberia to the North Dvina in Northern Europe. In the Pacific basin it is present in the Uda and Tugur drainage-areas and is very common in the Amur River drainage. It is also known in Sahalin. In the European part of the USSR the swamp-minnow has been found in the Kama, Vjatka and Dnepr drainage-areas as well as in the drainages of the middle Volga and Oka. The Vistula nad Odra systems are the westernmost areas of the swamp-minnow's appearance.

In all this large territory besides the nominate subspecies *Phoxinus phoxinus phoxinus* (PALLAS) another six subspecies have been recognized. Three of them were stated in the territory of the USSR, namely: *Ph. phoxinus mantschuricus* BERG as living in the lower Amur River system (drainages of the Sungari, Ussuri, Zeja and Amgun), in the system of some rivers discharging into the Zaliv Petra Velikogo as well as in Manchuria and Korea and North-West Sahalin; *Ph. phoxinus sachalinensis* BERG. inhabits North Sahalin

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(Arakul River drainage) and *Ph. percnurus stagnalis* WARPACHOWSKI known from the system of the middle Volga.

In the territory of Poland — many times smaller than the area of the USSR — three subspecies of swamp-minnow have been found as well. They are: *Ph. percnurus gdaniensis* BERG (vicinity of Gdańsk); *Ph. percnurus occidentalis* KAJ (vicinity of Poznań); and *Ph. percnurus dybowski* LOR. et WOL. (vicinity of Warszawa).

The conclusion may be drawn that the study made on the swamp-minnow in Poland was so precise that it permitted to state its exact subspecific differences. This does not reflect the actual state, however. After a close examination of the more numerous material of the swamp-minnow from Poland, the authors have serious doubts as to the existence of the three subspecies as mentioned above.

The first information about the swamp-minnow in Poland comes from BENECKE (1881). This author noted it in the vicinity of Gdańsk under the name *Ph. laevis* AG. var. *punctatus* ZADD. SELIGO (1916: 245) also described the swamp-minnow from the vicinity of Gdańsk and defined it as follows: “. . . Danach gehört die Sumpfelritze zu *Ph. percnurus*, und zwar, nach den drei gemessenen Stücken, da die geringste Körperhöhe grösser ist als 50 % der Länge des Schwanzstiels, zu der Abart *sachalinensis* . . .”. So far many other papers dealing with this species from the territory of Poland have been established: LOREC and WOLSKI, 1910; SCHULZ, 1912, 1913; DYBOWSKI, 1914; KULMATYCKI, 1920a, b; URBAŃSKI, 1946; KAJ, 1953; KULAMOWICZ and JAŻDŻEWSKI, 1960; KULAMOWICZ and KLIMKIEWICZ, 1962; KULAMOWICZ, 1960, 1961, 1962a, b, 1963; OLIVA, 1963. Some of the mentioned papers seem questionable because of significant controversy among the authors. It chiefly concerns the opinion expressed by KULAMOWICZ (1963) and OLIVA (1963). The first of these recognized *Ph. percnurus gdaniensis* BERG as *nomen nudum* (sic!) and designated the swamp-minnow from the neighbourhood of Gdańsk as a nominate subspecies. The second author, on the contrary, gives proof of the reality of this different geographic race, choosing and describing a neotype and “paratopotypes” (sic!) from the material personally collected in the actual pool stated by SELIGO (1916).

It seems that the description of new subspecies has been due to two things. Firstly the previous investigators had mostly to do with material from only one or two localities and secondly that they used to compare their own material with the data sometimes concerning only the restricted material cited in the literature.

The concentration of the three subspecific forms of the swamp-minnow in an area so small as the territory of Poland gives rise to some doubts. In order to revise this problem we decided to collect the material from the as great as possible number of localities taking into account chiefly the territory

from which the mentioned subspecies originated. As a result of this we collected the swamp-minnow from 20 localities. This fact shows that the fish is not at all so rare in Poland as we thought.

Our aim was to carry out a morphologic analysis of the newly collected material and to compare it with the data published by other investigators, as well as with the material we received from other sources. We have also taken into consideration the 9 specimens of swamp-minnow labelled "typus descriptivus" forming part of the old collection of LOREC and WOLSKI. These specimens are deposited in the collection of the Institute of Zoology of the Polish Academy of Sciences in Warszawa.

In this revision of the Polish swamp-minnow we cannot omit the peculiar case of the species *Phoxinus czekanowskii czekanowskii* DYB. sensu KULMATYCKI (1920). This species was designated on the basis of only one specimen taken from the pool of Kiekrz (neighbourhood of Poznań). This species was later designated by BERG (1932) as *Phoxinus czekanowskii posnaniensis* BERG. KAJ (1953: 74) is doubtful as to the definition of BERG and expressed his opinion as follows: "It would be better to consider this form as one of the geographical races of the species *Phoxinus percunurus* PALL. and exclude *Phoxinus czekanowskii* DYB. from the list of fishes inhabiting Poland ..."¹. KAJ, despite a most careful penetration of the pools at Kiekrz has not found any specimens of this fish. Our own efforts to obtain specimens from those places have given no results. There is, however, some oral information indicating the former presence of the swamp-minnow in some of those pools.

In the light of comparative data on certain features of the swamp-minnow specimen of Kiekrz as: caudal peduncle length, maximum and minimum body depth, head length, length of the pectoral fin in the distance between the insertion of the pectoral and ventral fins, diameter of the eye in the interorbital width — we identify it, in accord with KULAMOWICZ (1963) as *Phoxinus percunurus percunurus* (PALLAS) and we support the suggestion of KAJ (1953) to recognize the name *Ph. czekanowskii posnaniensis* BERG as a synonym of the name mentioned above.

In general this paper will represent an analysis of our own material from 20 new localities and a critical comparison of the data available from earlier publications. On the basis of these considerations it brings forward our own point of view on the taxonomic position of the swamp-minnow of Poland.

The rules of the transliteration of the Russian alphabet are based on ISO indications.

We sincerely thank Doc. Dr. A. KULAMOWICZ for the material of the swamp-minnow from Ryszewo and Siberia (Jana River system, Bjugujah Lake, 10 km from Verhojansk). We are also very grateful to Doc. Dr. M. SOBOCIŃSKI for the material from Serock Pomorski.

¹ All the citations taken from KAJ's, BERG's and KARANTONIS', KIRILLOV's, MUHOMEDIJAROV's papers translated by authors.

MATERIAL AND METHOD

The investigated material concerning the territory of Poland comes from 16 unpublished localities. Four have not been included in the plastic and meristic measurements because of insufficient material. Besides these, 11 specimens from the Jana River system have been studied as well as 20 from Ryszewo, 7 from Serock Pomorski (borrowed material), 5 specimens from Złotkowo, 9 ("typus descriptivus") from Choszczówka collected by LOREC and WOLSKI and 71 specimens from this same Choszczówka collected by us in 1965. In all, 525 specimens have been investigated. We began the work of collecting the material in 1964–1965 by searching for localities known in our literature. It came to light that the locality at Siedliska near Piaseczno had ceased to exist. The search in the vicinity of Kiekrz near Poznań offered no better results. The locality near Serock Pomorski (KAJ, 1953) has also ceased to exist. We, however, discovered a small pool several hundred meters distant from the one mentioned by KAJ. This new locality lies in the village of Małe Łąki (Świecie district), on the farm of Mr. R. NITKA. The swamp-minnow is plentiful here.

We have also stated the presence of the swamp-minnow in 6 small bodies of water in the vicinity of Gdańsk. Below we are giving a full list of the localities:

Gdańsk voivodeship

1. Hel near Jastarnia, district Puck, KAJ, 1953 (not existent)
2. Żukowo, distr. Kartuzy, auth., 1964, 1965
3. Migowo Górne, distr. Gdańsk, auth., 1965
4. Migowo Dolne, distr. Gdańsk, auth., 1965
5. Jasień, distr. Gdańsk, OLIVA, 1963 (not existent)
6. Jasień, distr. Gdańsk, SELIGO, 1916 (not existent)
7. Gdańsk-Sianki, SELIGO, 1916 (not existent)
8. Jasień, distr. Gdańsk, auth., 1965
9. Kiełpino, distr. Gdańsk, auth., 1965
10. Karczemki Kiełpińskie, distr. Gdańsk, OLIVA, 1963
11. Wyczehowo, distr. Kartuzy, KULAMOWICZ and KLIMKIEWICZ, 1962
12. Kartuzy, auth., 1964, 1965

Bydgoszcz voivodeship

13. Buszkowo, distr. Bydgoszcz, URBANOWA leg. 1931 (not published)
14. Małe Łąki, distr. Świecie, auth., 1965
15. Bukowiec, distr. Świecie, auth., 1964
16. Serock Pomorski, distr. Świecie, KAJ, 1953
17. Rynarzewo, distr. Szubin, auth., 1964
18. Suszewo, distr. Lipno, auth., 1965
19. Łochocin, distr. Lipno, auth., 1965

Poznań voivodeship

20. Złotkowo, distr. Poznań, (SCHULZ, 1912), KAJ, 1953
21. Kiekrz, distr. Poznań, KULMATYCKI, 1920
22. Ryszewo, distr. Gniezno, KULAMOWICZ and JAŻDŻEWSKI, 1960

Warszawa voivodeship

23. Legionowo, distr. Nowy Dwór Mazowiecki, auth., 1965
24. Kiełpin near the road Michałów — Nieporęt, distr. Nowy Dwór Mazowiecki, auth., 1965
25. Pustelnik, distr. Wołomin, auth., 1965

26. Radzymin, distr. Wołomin, auth. 1964, 1965
27. Struga (Czarna Struga), distr. Wołomin, S. FELIKSIĄK leg. 1929 (not published)
28. Warszawa-Choszczówka, LOREC and WOLSKI, 1910, auth., 1965
29. Zielonka, distr. Wołomin, auth., 1965
30. Siedliska, distr. Piaseczno, LOREC and WOLSKI, 1910 (not existent)

Lublin voivodeship

31. Wola Tulnicka, distr. Radzyń Podlaski, KAJ, 1953
32. Parczew, auth., 1965
33. Jedlanka, distr. Parczew, KULAMOWICZ, 1962
34. Sosnowica, distr., Parczew, URBAŃSKI, 1946
35. Krasne, distr. Parczew, KULAMOWICZ, 1962
36. Kocia Góra, distr. Lubartów, URBAŃSKI, 1946
37. Nadrybie, distr. Chełm, URBAŃSKI, 1946
38. Zezulin, distr. Lubartów, URBAŃSKI, 1946
39. Zawieprzycze, distr. Lubartów, URBAŃSKI, 1946
40. Chlewiska, distr. Lubartów, URBAŃSKI, 1946
41. Krzcień, distr. Lubartów, KULAMOWICZ, 1962
42. Ryczka, distr. Parczew, KULAMOWICZ, 1962
43. Rejowiec, distr. Chełm, auth., 1965

The distribution of these localities shows Map 1.

In collecting the material we have limited ourselves from necessity to a rather modest number of specimens from one locality (usually 25), as the conditions under which they appeared were not always propitious to fishing on a large scale. Also, in the case of possessing a large number of specimens, in principle, only 25 were used for plastic measurements so that their comparison should give decisive information.

The material was killed in 2% formalin. This way of preserving makes it easy to count the rays in the fins being straightened to the maximum point. Part of the material was transported alive for breeding purposes. The fish bred in aquarium have not been included in this study.

The examined material is kept in the collection of the Institute of Zoology of the Polish Academy of Sciences in Warszawa.

Plastic and meristic measurements were taken of the fixed material. All the traits characteristic for the family *Cyprinidae* (PRAVDIN, 1939) have been taken into consideration. In order to obtain the greatest point of exactitude in the measurements and avoid mistakes resulting from different ways of taking them all the plastic measurements were made by a single author with the help of a dial-calipers and read with an exactitude of ± 0.1 mm. As to the meristic features the rays in the fins dorsal, anal, pectoral and ventral were counted as well as the scales in the lateral line, the gill rakers and vertebrae. The latter were counted either from radiographs or else on the prepared skeleton and stained with alizarin and made clear by glicerine.

In order to facilitate counting the rays certain dorsal and anal fins were stained as well, especially those where there seemed to be 8 soft rays. The result of measurements and counts are presented in tables.

GENERAL CHARACTERISTIC, SEXUAL DIMORPHISM

The swamp-minnow from Poland is a fish of small dimensions. KULAMOWICZ (1963) attributes the largest size — 135 mm — to the swamp-minnow

Table I. Sexual dimorphism of the swamp-minnow *Phoxinus*
All material except the last sample taken by au-

	N	Maximum body depth		Minimum body depth		Lateral head length		Caudal peduncle length	
		♂♂	♀♀	♂♂	♀♀	♂♂	♀♀	♂♂	♀♀
Jasień	13	21.7	22.7	9.2	9.8	25.4	26.2	21.2	20.7
Migowo	8	23.1	24.7	11.2	10.4	25.8	26.8	20.6	20.4
Kartuzy	8	22.5	25.5	10.2	10.3	25.4	25.6	22.6	22.6
Rynarzewo	6	23.8	24.4	11.6	11.3	25.0	25.8	22.3	22.6
Łochocin	7	24.4	24.9	10.4	10.1	25.4	24.9	22.3	22.6
Choszczówka	10	22.6	25.1	11.2	10.6	25.5	25.8	23.2	23.1
Legionowo	8	23.8	24.2	11.5	10.1	25.5	25.8	22.1	22.1
Kielpin	12	21.7	22.7	9.7	10.1	25.7	26.3	22.5	21.2
Radzymin	10	22.7	23.0	11.3	11.1	25.6	26.1	22.6	22.3
Ryszewo, KULAMOWICZ and JAŻDŹEWSKI, 1960	50	23.2	23.0	11.5	10.7	25.9	26.5	22.9	21.7

from Krasne. Among the specimens we collected only a single one, from Żukowo Zachodnie, measured 114 mm (total length). On the whole swamp-minnows are small fishes less than 100 mm in length. They are characteristic by their terminal mouth opening, the jaws being slightly oblique. In young specimens the lower jaw slightly protrudes over the upper one. The top point of the mouth occurs at the level of the lower edge of the eye. The dorsal outline of the head rises in a slight arch to the front edge of the eye, later runs straight backwards and upwards. Directly after the supraoccipital bone the trunk begins with a clearly defined hump. There exist, however, individuals with a hump only slightly outlined. In such cases the dorsal line of the head passes flowingly into the dorsal line of the trunk. In larger specimens the latter runs in a slight arch to the dorsal fin, whereas in small specimens it usually runs in a straight line. There are intermediary outline between the two extreme ones more or less in accord with the various length of the fishes. The outline of the back of the swamp-minnow from the vicinity of Gdańsk (Jasień, Migowo Górne, Kielpino) is usually straight (Pl. I and II).

The pigmentation of the back and sides of the body is very pronounced. Specimens coming from swamp bodies of water are very dark with almost black backs and sides whereas those from field bodies of water with a gravel or clay on the bottom are much lighter. The paired fins are brightly yellowish, the unpaired ones are of a grayish-yellow colour. The lateral line is interrupted and the longest part coming after the head. The spawning livery in the form of nuptial tubercles is sometimes very marked, which has already been mentioned by OLIVA (1963). The numerical relationship of males and females

percnurus percnurus (PALLAS) expressed in some plastic features.
thors. Average taken from percentages calculation

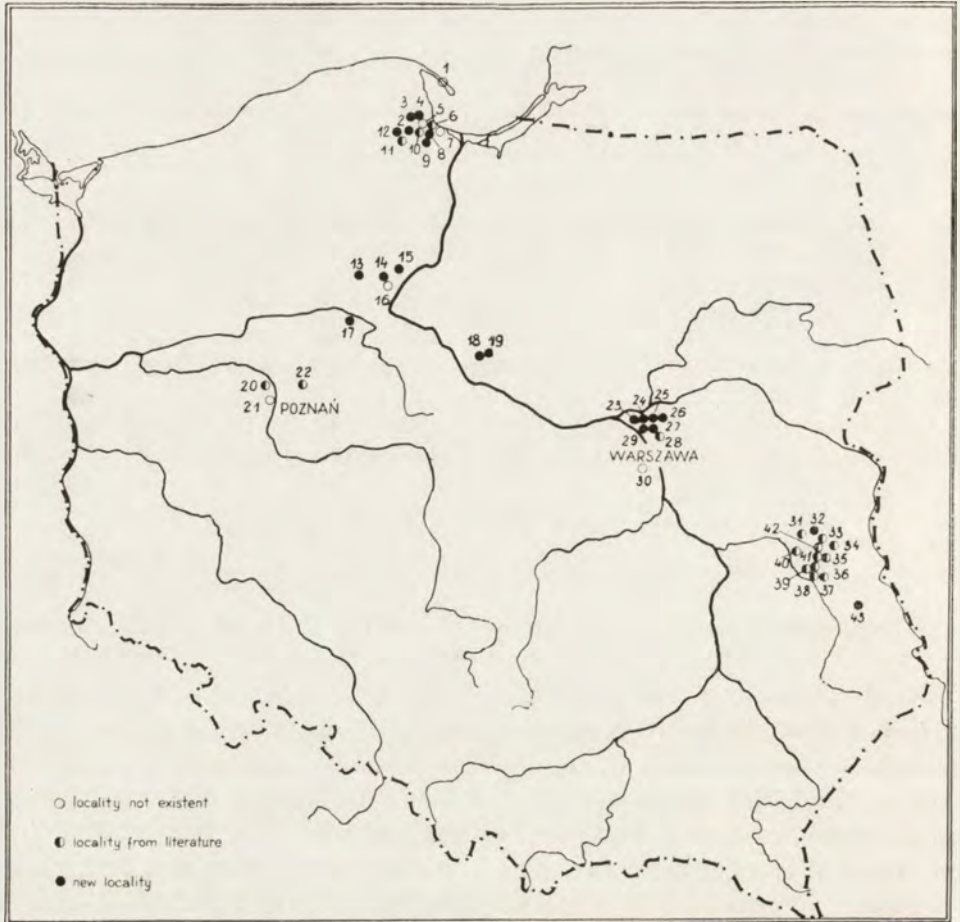
Pectoral fin length		Ventral fin length		Dorsal fin depth		Anal fin depth		Antedorsal distance		Postdorsal distance	
♂♂	♀♀	♂♂	♀♀	♂♂	♀♀	♂♂	♀♀	♂♂	♀♀	♂♂	♀♀
16.6	16.4	12.6	12.6	16.7	16.6	14.7	13.7	56.6	56.9	31.7	32.2
17.8	17.6	13.2	12.3	18.5	17.5	15.9	14.7	56.6	57.9	32.8	32.1
16.1	15.0	13.2	12.6	16.6	15.7	13.4	13.1	56.3	57.2	33.8	33.4
15.6	15.2	12.9	12.3	16.6	14.8	14.6	13.2	57.3	57.8	32.9	32.3
16.7	16.3	14.1	13.4	16.5	16.0	15.1	14.8	56.1	57.8	34.5	32.0
16.6	14.9	13.3	12.3	17.2	16.3	15.5	13.7	56.2	58.9	34.1	32.5
16.6	15.3	13.4	12.3	16.8	15.9	14.1	13.5	56.8	58.2	32.8	31.8
16.4	15.1	13.0	11.9	16.5	16.0	14.7	13.4	57.9	59.0	33.2	33.2
16.8	15.7	12.9	12.5	16.2	15.1	14.4	14.2	56.7	58.4	32.1	32.0
16.9	16.3	14.1	13.4	18.5	17.8	16.7	15.6	57.6	58.3	35.2	34.7

in our collection is definitely in favour of the females and may be expressed as 1 : 2.4.

Sexual dimorphism is evident in several plastic characters (Table I). The female's maximum body depth is slightly greater than the male's. The difference is very apparent in specimens caught in summer at spawning time. In the autumn, this difference becomes markedly smaller (f. i. the specimens from Łochocin, caught in October). As regards minimum body depth, it has been observed to be greater in males in 6 cases out of nine and in 3 cases to be a greater in females. On the whole the head of the female is longer and only in one case (Łochocin) have we observed a reversed relationship. There is also no strict dependence on sex in the length of the caudal peduncle which in 6 cases out of nine is longer in males, is of equal length in 2 cases and shorter than in the females in one case. Complete regularity is noted in the antedorsal distance which is always smaller in the male than in the female. Paired fins are definitely longer in males, the difference being more marked in the case of the pectoral fins. In the ventral fins not only is the difference a little smaller but in one case (Jasień, auth. 1965) the ventral fins of the males and females are of the same length. The depth of the dorsal and anal fins is in all noted cases greater in males.

DISTRIBUTION OF THE SWAMP-MINNOW IN POLAND

All records of swamp-minnow from Poland are shown in the Map 1. It is noticeable that so far they have been found in five voivodeships. The locali-



Map 1. Distribution of *Phoxinus phoxinus* (PALLAS) in Poland.

ties where the swamp-minnow appears form concentrations in which separate pools are sometimes only 1 km distance from one another.

In the places of its distribution the swamp-minnow is known to the local people who are however not conscious of its specific difference, and do not pay much attention to it as it is not a fish fit for consumption. Anglers sometimes use it as bait for catching predators. They use different names, depending on the region, to identify this little fish. In the vicinity of Warszawa it is called "linek morski" or "błotniak", the common people call it "kielbik". In the voivodeship of Lublin it goes by the name of "mlonka", while near Żukowo Zachodnie it is called "sztukiel". In Poland, the swamp-minnow is, so far, known in 43 localities. Our still very superficial penetration of the area allows us to suppose that the swamp-minnow is more common than has been

Table II. Meristic features of swamp-minnow, *Phoxinus phoxinus phoxinus* (PALLAS) from Poland and the USSR

Locality and authors	N	Total length in mm	Body length in mm	N	Dorsal fin rays	Anal fin rays	N	Pectoral fin rays	Ventral fin rays	N	Gill rakers	N	Lateral line scales	N	Vertebrae
Siberia (various localities), BERG, 1912	19	100-150 (180)	—	—	III 7	III (6) 7-8	—	I 13-14	I 6	—	—	—	70-80	—	—
Lena River system, KARANTONIS, KIRILLOV, MUHOMEDIJAROV, 1956	—	—	—	—	—	III 7-8	—	I 14-17	I 6-7	—	11-17	—	72-79	—	37-43
Jana River system, (near Verhojansk), authors ¹	11	94-145	80-125	11	(II) III (6) 7	III-IV 7-8	11	I 13-16	II 6-7	11	10-11	11	75-89	11	39-40 (41)
Viljuj River system, KIRILLOV, 1962	—	—	—	19	III 7	III 7	19	I 12-15	I-II 6	19	10-11	19	70-78	19	37-38
Sož River system, ŽUKOV, 1965	24	80-100	—	24	III (6) 7 (8)	III 7	22	12-15	5-7	16	8 (9)	24	70-82	16	36-41
Jasień, OLIVA, 1963	50	67.2	55.7	50	6-7	6-7 (8)	—	—	—	—	—	50	(68,69) 70-80 (81-85)	—	—
Karczemki Kiełpińskie, OLIVA, 1963	61	67.5	59.7	61	6-8	6-7 (8)	—	—	—	—	—	61	(69-71) 72-86 (87, 88)	—	—
Jasień, authors	35	53-69	45-59	25	III 7 (8)	III (6) 7	25	I 12-14	II 7-8	25	(7) 8-9	27	72-84	—	—
Migowo Górne, authors	20	56-116	46-99	21	III (6) 7	III (IV) 6-7	21	I (11) 12-14	II 6-7	21	(7) 8-10	20	68-79	—	—
Migowo Dolne, authors	5	80-103	70-90	5	III 7	III (IV) 7	5	I 12-13	II 7 (8)	5	8	5	77-78 (79)	—	—
Wyczehowo, KULAMOWICZ i KLIMKIEWICZ, 1962	25	60.5-79	—	25	III 7 (8)	(II) III 7 (8)	25	I 10-15	I 6 (7)	—	—	25	68-76	—	—
Żukowo Zachodnie, authors	25	58-114	50-99	25	III 6-7	III (5) 6-7	25	I 12-14	II 7	25	7-9	25	73-83	16	(37) 38-39
Kartuzy, authors	33	59-87	50-74	25	(II) III (6) 7	III (6) 7	25	I (12) 13-14	II (6) 7	25	7-10	25	70-82	—	—
Bukowiec, authors	25	62-82 (106)	51-69 (90)	26	III 7 (8)	III 7	26	I (13, 13) 14-15 (16)	II (6) 7	26	8-10	24	67-76	14	(36) 37-38
Rynarzewo, authors	25	72-93	62-80	25	III 7 (8)	III-IV 7	25	I 11-13	II 6-7	25	(6) 7-9 (10)	25	68-80	16	37-38
Małe Łąki, authors	25	59-98	50-83	25	III 7	III 7	25	I 13-14 (15, 16)	II (6) 7	25	(7) 8-10	25	(66) 71-82	—	—
Serock Pomorski, KAJ, 1953	—	?-45	—	44	7-8	7-8	—	11-14	6-7	—	—	—	—	—	—
Serock Pomorski, authors ¹	7	23.5-30	20.5-25	7	III 7	III 7	—	—	—	—	—	—	—	—	—
Łochocin, authors	26	63-96	54-84	48	III-IV (6, 6) 7 (8, 9)	III-IV (6) 7 (8)	48	I 12-15	II (6) 7	27	8-10	38	(65) 69-80	10	38-39
Suszewo, authors	14	(65) 78-107	(55) 67-91	14	III 7 (8)	III-IV (V) 7-8	14	I (12) 13-14 (15)	II 7 (8)	14	(7) 8-9 (10)	14	71-76 (83, 85, 86)	11	(37) 38-39 (40)
Złotkowo, KAJ, 1953	50	—	30-80	40	III 7-8	III 7-8	41	I 11-15	I-II 6-8	—	—	40	68-82	—	—
Złotkowo, authors ¹	—	—	—	5	III 7	III-IV 7	5	I 12-14	II 7	5	8-9	5	69-86	—	—
Ryszewo, KULAMOWICZ i JAŹDŹEWSKI, 1960	100	57-90	—	100	II-IV 7-9	II-IV 7-8	100	I 11-14	I 6-7	—	—	100	73-85 (88, 89)	—	—
Ryszewo, authors ¹	—	—	—	20	III (6) 7	III 7	—	—	—	—	—	—	—	—	—
Choszczówka, authors	25	53-65 (75, 85)	45-55 (65, 74)	71	III-IV 7	III-IV 7	40	I (12) 13-14	II 7	30	(7) 8-9 (10)	43	70-80	—	—
Choszczówka — lectotype	1	—	46	1	III 7	III 7	—	—	—	—	—	1	74	—	—
Choszczówka — paralectotypes	8	—	(41) 45-50	8	III (6) 7	III 7	—	—	—	—	—	7	71-79	—	—
Legionowo, authors	26	48-71	41-61	27	III-IV 6-7	III 6-7	27	I 12-14	II 7	24	(7, 7) 8-10	26	70-80	—	—
Kiełpin, near the road Michałów-Nieporęt, authors	25	(47) 50-68	(40) 43-58	25	III 7	III (IV) (6) 7 (8)	25	I 12-14	II 6-7	25	8-9 (10)	25	(68) 69-78 (80, 81)	—	—
Radzymin, authors	25	53-74	45-65	25	III 6-7	III-IV (6) 7	25	I (12) 13-14	II 6-7	25	8-9	25	(68) 72-82	20	37-39
Struga, authors	26	58-77	49-66	25	III-IV (6) 7	III-IV 7	25	I 12-14	II 6-7	25	(7) 8-9	25	66-82	18	37-39
Wola Tułnicka, KAJ, 1953	—	—	—	102	II-III 7-8	II-III 7-8 (9)	101	I 11-15	II 6-7	—	—	102	73-86	—	—
Jedlanka, KULAMOWICZ, 1962	11	57.5-90	—	11	(II) III 7	(II) III 7	11	I 11-14	6	—	—	11	67-83	—	—
Krasne, KULAMOWICZ, 1962	20	70-135	—	20	II-III (6) 7	II-III 6-7	20	I 10-14	I 6	—	—	20	66-82	—	—
Parzew, authors	—	—	—	30	III 6-7	III 6-7	—	—	—	—	—	—	—	—	—
Rejowiec, authors	—	—	—	12	III (6) 7	III 6-7	—	—	—	—	—	—	—	—	—

¹ borrowed material

considered hitherto as there are quite a lot of adequate biotopes for it in Poland.

In our conditions the existence of this species is subjected to great difficulties as different kinds of ameliorations and town planning do away with many small bodies of water. Thus the locality at Jasioń stated by OLIVA (1963) has ceased to exist as soon as a year after it was found by the author (our own statement ratified by letter L. ŁAWIŃSKI, 1965). We can only hope that owing to its great adaptability and the mild interest of anglers, who transport it from one place to another the swamp-minnow will not become totally extinct for some time yet.

ANALYSIS OF THE EXAMINED MATERIAL

Meristic features

A meristic analysis was made of 525 specimens comparing them with data from the literature. A total comparison in figures is given in Table II.

In view of the data in the literature concerning swamp-minnows from Poland as well as in adjacent countries and because we are confronted with the fact of the existence of subspecies established on the basis of their meristic features this chapter must be discussed more widely.

We shall start our analysis by counting the number of rays in the fins. The number of soft rays in the dorsal fins of our specimens oscillates between 6–8 (9), though 92,22 % of the material has only 7 rays, other figures being encountered only sporadically. It should be stressed that the last ray is sometimes clearly divided in two down to its base, thus seeming like two rays. We have, however, counted it as one because it is supported by only one basal. The rule of counting the last ray as one only, in spite of its division has been accepted by systematists, and is illustrated by many examples in BERG (1949, Fig. 396, 585) and HUBBS and LAGLER (1947, Fig. 2). The 8 soft rays in 92 % of the specimens from Ryszewo, announced by KULAMOWICZ and JAŹDŹEWSKI (1960) come of the fact of these investigators considering the last, composed ray as two rays. Thanks to Dr. A. KULAMOWICZ's kindness we were able to verify his counts on 20 specimens. According to our counts one specimen had 6 soft rays, 19 having the usual — 7. In all probability also KAJ (1953) applied the wrong system of counting in the analysis of the swamp-minnow from Wola Tulnicka in which the majority — 62 fishes had 8 rays and 40 fishes — 7 soft rays. The same applies to Złotkowo and Serock Pomorski (KAJ, 1953) where 4 specimens had 7 soft rays and 36 had 8. We had the possibility of verifying this feature in 5 specimens from Złotkowo and 7 from Serock Pomorski from KAJ's collection. All of them having 7 soft rays. We have, besides, investigated this feature in 42 specimens from Rejowiec and Parczew, thus, areas in the close neighbourhood of Wola Tulnicka and in none of the specimens did we note the presence of 8 soft rays. The table

Table III. Number of soft rays of dorsal, anal, pectoral and ventral fins and number
rus percunurus (PALLAS)

	Locality	N	Dorsal fin soft rays				Anal fin soft rays			
			6	7	8	9	5	6	7	8
Authors data	Jana River system ¹	11	1	10				8	3	
	Jasień	25		24	1		1	24		
	Migowo Górne	21	1	20			3	18		
	Migowo Dolne	5		5				5		
	Żukowo Zachodnie	25	7	18			1	10	14	
	Kartuzy	25	1	24			1	24		
	Bukowiec	26		25	1				26	
	Rynarzewo	25		24	1				25	
	Małe Łąki	25		25					25	
	Serock Pomorski ¹	7		7					7	
	Łochocin	48	2	44	1	1	1	46	1	
	Suszewo	14		13	1			11	3	
	Złotkowo ¹	5		5				5		
	Ryszewo ¹	20	1	19				20		
	Choszczówka	71	5	66			1	70		
	Choszczówka-lect., paralect.	9	1	8				9		
	Legionowo	27	3	24			3	24		
	Kielpin	25		25			1	23	1	
	Radzymin	25	2	23			1	24		
	Struga	25	1	24				25		
Parczew	30	6	24			3	27			
Rejowiec	12	1	11			2	10			
Totals		506	32	468	5	1	1	27	470	8
Cited after literature	Siberia (various localities)						←————→			
	Lena River system (not BERG)						←————→			
	Viljuij River system	19		↔			←————→			
	Soż River system	24	←-----↔-----→				←————→			
	Jasień	50	14	35			11	38	1	
	Karczemki Kiełpińskie	61	9	50	2		13	46	1	
	Wyczehowo	25		←-----→				←-----→		
	Złotkowo	40		4	36			22	18	
	Ryszewo	100		?	92	?		?	96	
	Wola Tulnicka	102		40	62		13	88	1	
Jedlanka	11		↔				↔			
Krasne	20		←-----→				←————→			

¹ borrowed material

←————→ range

←-----→ sporadic cases

of the gill rakers in referring to particular specimens of the swamp-minnow, *Phoxinus phoxinus* from various localities

N	Pectoral fin soft rays							Ventral fin soft rays				N	Gill rakers						
	10	11	12	13	14	15	16	17	5	6	7		8	6	7	8	9	10	11
25				2	2	5	2		4	7			11					5	6
21		9	12	4						15	10		25	1	15	9			
5	1	2	13	5					1	20			21	1	6	14	3		
25		2	3							4	1								
25		3	19	3						25			25	8	15	2			
25		1	17	7					1	24			25	3	8	9	5		
25			2	11	11	1			1	24			25		7	12	6		
25		6	12	7					12	13			25	1	4	9	10	1	
25			11	12	1	1			1	24			25		1	5	16	3	
48		2	14	27	5				1	47			27		7	16	4		
14		1	5	7	1					13	1		14	1	4	8	1		
5		3	1	1						5			5		4	1			
40		1	20	17	2					40			30	2	11	16	1		
27		9	14	4						27			24	2	13	4	5		
25		6	15	4					5	20			25		15	9	1		
25		2	13	10					3	22			25		5	20			
25		4	18	3					2	23			25	1	6	18			
396	1	51	191	124	25	4			31	353	12	357	1	24	130	161	35	6	
19				←→					↔				19						←→
22				←→					↔				16						←→
25				←→					↔										←→
41	←→			←→					↔										←→
100		2	10	15	11	3			11	23	8								←→
101		2	20	54	24				?	97									←→
11		5	28	40	17	11			47	65									←→
20	←→			←→					↔										←→

given below shows the percentage of soft rays the dorsal fin in 463 investigated specimens (without Ryszewo, Złotkowo, Serock Pomorski and Siberia).

number of soft dorsal fin rays	6	7	8	9
number of specimens	30	427	5	1
%	6.48	92.22	1.08	0.21

There is no doubt that in the case of Ryszewo, Wola Tulnicka, Złotkowo and Serock Pomorski an unconscious mistake has been made in the manner of counting these rays. In the fact of the above data, OLIVA's declaration as to the fundamental difference between *Ph. percunurus gdaniensis* BERG and other Polish subspecies is erroneous, (1963: 333) "In all Russian, Siberian and Gdańsk specimens 7 ramified rays of dorsal and anal fins predominate; in other Polish localities (Wola Tulnicka, Złotkowo, Ryszewo) 8 ramified rays in both fins predominate, except in the anal fin in the population of Złotkowo, where also 7 rays occur most frequently. This is a fundamental difference of *Phoxinus percunurus gdaniensis* from other Polish subspecies".

On the basis of the above considerations it should be noted that the swamp-minnow in Poland and the USSR has 6–8 (9) soft rays in the dorsal fin stressing the fact that individuals with 6 and especially with 8 or 9 soft rays are only very rarely encountered (Tables II and III).

As to the anal fin it is impossible too, to consider KAJ's (1953) data as correct, the same applying to KULAMOWICZ and JAŻDŻEWSKI (1960) who declare the presence of 8 soft rays in this fin in the majority of specimens. The number of these rays in the anal fin of the specimens we examined oscillates within the range (5) 6–8. The majority having 7 soft rays. In percentages the relationship for 463 specimens is expressed as follows:

number of anal fin soft rays	5	6	7	8
number of specimens	1	27	421	5
%	0.21	5.85	92.90	1.08

In the pectoral fin the pattern for about 800 specimens (our own material and data from the literature) is I 10–17. In our own material in 385 specimens examined for this feature the numerical relationship of the soft rays is given below:

number of pectoral fin soft rays	11	12	13	14	15	16
number of specimens	1	51	189	122	20	2

Specimens from the Jana River system ($n = 11$) are within the same range though the number of soft rays most often encountered equals 14–15.

In the ventral fin the number of soft rays oscillates between 6–8 though 7 rays predominate. In the material we examined ($n = 385$) all specimens had two hard rays. The literature gives I–II (Tables II and III).

The vertebrae have been counted in nearly a score of specimens from certain localities. In all, 116 specimens have been objects of these counts. Table IV gives the data for Poland and the USSR. As can be seen from this Table neither in the number of their vertebrae do swamp-minnows of Poland and the USSR differ significantly one from the other. However, swamp-minnows from certain localities in the USSR have a greater number of vertebrae. In the case of this feature, only investigations made on a large number of specimens —

Table IV. Number of vertebrae of the swamp-minnow, *Phoxinus phoxinus* (PALLAS)

Locality	N	Number of vertebrae							
		36	37	38	39	40	41	42	43
Jana River system	11				2	8	1		
Viljuj River system	19		←→						
Lena River system	—		←	←	←	←	←	←	→
Sož River system	16	←	←	←	←	←	←	→	
Żukowo	16		1	12	3				
Bukowiec	14	1	10	3					
Rynarzewo	16		4	12					
Łochocin	10			6	4				
Suszewo	11		1	6	3	1			
Radzymin	20		6	12	2				
Struga	18		6	9	3				

←→ range

— most frequent numbers

especially those coming from Russian localities — will allow us to draw proper conclusions. Some of the vertebrae were counted from X-ray pictures, sometimes insufficiently clear, therefore there may be slight inaccuracies in their numbers.

The number of the gill rakers according to our data oscillates between (6) 7–10 in 346 specimens from Poland and 10–11 in 11 specimens from the Jana River system. BERG (1949), according to the information of V. A. MAKUNOV, gives 9–11 gill rakers in *Phoxinus phoxinus* (PALLAS) from the Lena River system. KIRILLOV (1962) states 10–11 gill rakers in the swamp-minnow from the Viljuj River system. ŽUKOV (1965) states 8–9 for the Sož River system. KARANTONIS', KIRILLOV's and MUHOMEDIJAROV's (1956) data from the Lena River system, all differ significantly from the those given above. The latter authors all give the figure 11–17. In this case, only further investigations including a greater number of specimens from the mentioned territory will render a more accurate evaluation possible. Thus, we accept the figures

Table V. Number of the lateral line scales of the swamp-

Locality	N							
		65	66	67	68	69	70	71
Siberia (various localities), BERG, 1912								←
Lena River system, KARANTONIS, KIRILLOV, MUHOMEDIJAROV, 1956								←
Jana River system, authors ¹	11							←
Viljuj River system, KIRILLOV, 1962	19							←
Soż River system, ŻUKOV, 1965	24							←
Jasień, OLIVA, 1963	50				←	←		←
Karczemki Kielpińskie, OLIVA, 1963	61					←		←
Jasień, authors	27							
Migowo Górne, authors	20				2	1	2	2
Migowo Dolne, authors	5							
Wyczehowo, KULAMOWICZ and KLIMKIEWICZ, 1962	25				←			
Żukowo Zachodnie, authors	25							
Kartuzy, authors	25						1	2
Bukowiec, authors	24			1	3	2	6	2
Rynarzewo, authors	25				2	1		4
Małe Łąki, authors	25		1				1	2
Łochocin, authors	38	1				4	3	2
Suszewo, authors	14							1
Złotkowo, KAJ, 1953	40				←			
Złotkowo, authors ¹	5					1		
Ryszewo, KULAMOWICZ and JAŹDŹEWSKI, 1960	100							
Choszczówka, authors	43		1		2		3	5
Choszczówka-lectotype, paralectotypes (auth.)	8							1
Legionowo, authors	26						1	3
Kielpin, authors	25				1	3	1	2
Radzymin, authors	25				1			
Struga, authors	25		2		1		1	2
Wola Tulnicka, KAJ, 1953	102							
Jedlanka, KULAMOWICZ, 1962	11				←			
Krasne, KULAMOWICZ, 1962	20				←			
Totals (authors data)	396	1	4	1	12	12	19	28

←————→ range
 ←-----→ sporadic cases
 || || the most frequent cases

¹ borrowed material

(6) 7–11 as the number of gill rakers in the swamp-minnow from Poland and the USSR setting apart the data of the three lastly mentioned authors. The numerical relationship of the gill rakers in Poland and the USSR swamp-minnow forms is shown in Table III.

The lateral line in all the investigated cases was not full but usually interrupted. According to our data the number of scales along the sides of the body ranges from 65–86. The values 68–80 are the ones encountered most often — Table V. KAJ (1953) states 68–84 scales (Wola Tulnicka, Złotkowo), KULAMOWICZ and JAŹDŹEWSKI (1960) 73–83 (88, 89) for Ryszewo and OLIVA (1963) 68–88 for Jasień and Karczemki Kiepińskie. There is a great disparity between these figures and those of LOREC and WOLSKI (1910). These authors stated 83–97 scales on the side of the body of the swamp-minnow "*Phoxinus dybowskii* sp. nov.?" from Choszczówka and Siedliska. The data concerning the number of scales from territories outside Poland are very similar to our own, with the exclusion of LOREC's and WOLSKI's (1910). The swamp-minnow from the Jana River system has 75–89 scales, WARPACHOWSKI (1887) states 83–85 scales for the *Ph. sabaniejewi* WARP. (eastern side of the Ural). RUZSKIJ (1926) mentions 86–88 scales for the *Ph. percunurus syrakul* RUZSKIJ (Western Siberia, south of Čelabinsk). BERG (1912) states 70–80 for Siberia in general, KIRILLOV (1962) 70–78, KARANTONIS, KIRILLOV and MUHOMEDIJAROV (1956) 72–79, ŽUKOV (1965) 70–82. In the above survey of the number of scales neither in our own nor in foreign material did we find such high figures as those given by LOREC and WOLSKI (1910).

In view of this fact we have deemed it of prime necessity to make a revision of *Phoxinus percunurus dybowskii* LOR. et WOL. on the basis of the original material and the fresh one we caught in locus typicus in 1965. Nine swamp-minnows with the adnotation "typus descriptivus", from Choszczówka near Buchnik have been preserved in the Institute of Zoology of the Polish Academy of Sciences in Warszawa. They represent part of the typical material the rest of which has been lent to Prof. KAJ in Poznań and is still there.

By a stroke of luck the small body of water at Choszczówka has so far been preserved from destruction, which fact has allowed us to collect material again and study it. This small body of water is the only one existing at Choszczówka — formerly a suburban terrain — now joined into the city of Warszawa. It is positioned in the back part of Mr. SZLACHCIC's property at 328 Modlińska Street. This small pool forms the latter end of a long, former peat-ditch. It is not over 1 m deep. According to "Przewodnik Zoologiczny po okolicach Warszawy" (SUMIŃSKI and TENENBAUM, 1921) it is distinctly the same one from which LOREC and WOLSKI drew their material. The small body of water at Siedliska near Piaseczno the above authors speak about, has ceased to exist.

From the typical material we have chosen the lectotype (specimen No 8) which along with the remaining specimens (paralectotypes specimens No

1–7, 9) has been subjected to thorough analysis for meristic and plastic features. The data concerning these features are in Tables II, III, V, VI. In the lectotype the number of scales along the side of the body amounts to 74, in the paralectotypes to 71–79. In our material collected in Choszczówka the number of scales in 43 specimens ranges from 70–80. On the basis of the number of scales of the typical as well as the newly acquired material we consider the swamp-minnow from Choszczówka as belonging to the nominate subspecies *Phoxinus phoxinus phoxinus* (PALLAS). The data of LOREC and WOLSKI (1910) most probably result from wrong counting due to the difficulty in reading these scales. The folds in the thick skin may have been taken for a separate scales.

Moreover, we can state that BERG's (1949) data giving the range of 70–80 scales for *Ph. phoxinus phoxinus* (PALLAS) were based on very scant material and do not answer to reality. On the basis of our own data and the above cited examples from the Polish and Russian literature we consider that this range ought to be enlarged and value of (65) 66–89 scales accepted for *Ph. phoxinus phoxinus* (PALLAS) with the most often appearing values of 68–80.

Thus as a preliminary suggestion based on the number of their scales and soft rays on their fins the swamp-minnow from Poland must be considered as identical with the typical form of swamp-minnow from the USSR.

Plastic features

Before passing on to the confrontation of our material with the data from the literature it will be useful to quote BERG's (1907 : 199) opinion on the subject of the morphotic variability of this species: „The swamp-minnow is subject to innumerable changes; we can without exaggerating say that in every river system, even the system of secondary tributaries there exists a special local form of *Ph. phoxinus*. If we give specific names to individuals showing only slight feature-differences unending number of species will be born and we will not be able to tell one from another without mentioning their localities ...” „The cause of variability of the swamp-minnow undoubtedly is the isolation ... the swamp-minnow lives exclusively in marshy vegetated lakes that never join rivers. Having once found itself in such a body of water it is not subject to crossing and gradually turns into a different form”. KARANTONIS, KIRILLOV and MUHOMEDIJAROV (1956 : 87) are much of the same opinion: „... single specimens appear as an exception in the Lena River. As a result of its long stay in the river the swamp-minnow grows slender, changes its colouring, dark stripes appearing on the sides of its body. The thus changed swamp-minnow now resembles the Amur-minnow.” (*Phoxinus lagowskii* DYB.).

We, therefore, will conduct the analysis of the plastic features of the swamp-minnow from Poland according to BERG's (1949) key, analysis the same features of *Phoxinus phoxinus* (PALLAS) in turn. In single cases, especially in

Table VI. Plastic features of the swamp-minnow, *Phoxinus phoxinus*

Locality and author	N	1 Maximum body depth		
		Range	$M \pm m$	σ
Siberia (various localities), BERG, 1912	19	23.3–28.1	27.0 ¹	—
Lena River system, KARANTONIS, KIRILLOV and MUHOMEDIJAROV, 1956	—	24.1–28.8	—	—
Šargoldžin River system (near Čita), NIKOLSKIJ, 1956	14	23.0–29.0	26.4	—
Jana River system, authors	11	21.5–27.7	24.9	—
Sož River system, ŽUKOV, 1965	24	19.6–27.3	23.7 ± 0.35	1.73
Jasień, OLIVA, 1963	50	—	23.3	—
Karczemki Kiełpińskie, OLIVA, 1963	61	—	23.6	—
Jasień, authors	25	20.0–25.0	22.3 ± 0.23	1.17
Migowo Górne, authors	20	21.2–26.6	23.9	—
Wyczehowo, KULAMOWICZ and KLIMKIEWICZ, 1962	25	—	24.9	—
Żukowo Zachodnie, authors	25	21.5–27.0	24.2 ± 0.32	1.60
Kartuzy, authors	25	20.4–27.0	23.6 ± 0.38	1.82
Bukowiec, authors	25	21.8–27.5	24.7 ± 0.30	1.51
Rynarzewo, authors	25	21.7–26.7	24.0 ± 0.22	1.09
Małe Łąki, authors	25	22.0–26.8	25.2 ± 0.29	1.25
Serock Pomorski, KAJ, 1953	44	—	22.0	—
Łochocin, authors	25	22.2–29.0	25.9 ± 0.29	1.46
Złotkowo, KAJ, 1953	40	20.3–26.3	23.4 ± 0.22	1.02
Ryszewo, KULAMOWICZ and JAŹDŻEWSKI, 1960	100	20.9–27.4	23.1 ± 0.16	1.62
Choszczówka, authors	25	21.3–27.3	23.8 ± 0.33	1.62
Choszczówka, authors, lectotype	1	—	24.0	—
Choszczówka, authors, paralectotypes	8	22.1–26.0	23.9	—
Legionowo, authors	25	21.1–26.0	23.7 ± 0.26	1.32
Kiełpin, authors	25	20.2–24.4	22.1 ± 0.24	1.25
Radzymin, authors	25	19.2–25.1	23.0 ± 0.33	1.67
Struga, authors	25	21.4–26.2	23.7 ± 0.23	1.17
Wola Tulnicka, KAJ, 1953	102	—	25.4 ± 0.16	1.71
Jedlanka, KULAMOWICZ, 1962	11	23.9–27.5	25.1	—
Krasne, KULAMOWICZ, 1962	20	23.9–27.8	26.1	—

the analysis of *Ph. phoxinus occidentalis* KAJ, we will use OLIVA's (1963) key.

In accordance with BERG's criteria the swamp-minnow we investigated shows the following similarities and differences:

1. In all the investigated populations, in accordance with BERG's (1949) key, the maximum body depth is greater than the length of the caudal peduncle. Only very occasionally did a specimen occur whose maximum body

¹ our calculation

rus percnurus (PALLAS) expressed in percentages of the body length

2			3			4		
Minimum body depth			Caudal peduncle length			Minimum body depth in caudal peduncle length		
Range	$M \pm m$	σ	Range	$M \pm m$	σ	Range	$M \pm m$	σ
— —	— —	—	20.5–26.4	23.4 ¹	—	41.4–55.0	48.5 ¹	—
— —	— —	—	18.5–23.3	—	—	— —	— —	—
10.0–13.0	11.7	—	18.0–25.0	21.7	—	— —	54.0 ¹	—
9.5–11.2	10.3	—	20.7–23.4	22.0	—	40.0–51.0	45.7	—
8.9–12.3	10.6 ± 0.18	0.87	20.0–24.5	22.3 ± 0.25	1.24	— —	47.5 ¹	—
— —	11.4	—	— —	20.3	—	— —	56.0	—
— —	12.4	—	— —	21.1	—	— —	53.5	—
9.1–10.7	9.9 ± 0.08	0.38	19.6–22.8	21.3 ± 0.18	10.91	41.4–52.1	46.0 ± 0.61	3.07
10.0–11.8	10.9	—	18.5–21.7	20.6	—	47.1–59.0	53.1	—
— —	10.6	—	— —	21.9	—	— —	48.6	—
9.5–11.8	10.7 ± 0.12	0.60	19.1–25.0	22.0 ± 0.25	1.26	43.1–59.3	49.1 ± 0.75	3.76
9.0–12.6	10.7 ± 0.15	0.78	20.0–24.0	22.2 ± 0.20	1.02	40.5–54.5	45.5 ± 0.80	4.00
9.8–13.4	11.3 ± 0.20	1.98	18.3–21.6	19.7 ± 0.18	0.89	50.0–68.2	56.8 ± 1.11	5.60
10.0–12.5	11.3 ± 0.13	0.68	19.7–23.1	21.7 ± 0.21	1.05	46.7–60.8	51.8 ± 0.62	3.10
9.1–11.4	10.3 ± 0.10	0.52	19.0–23.7	21.2 ± 0.23	1.17	43.0–54.5	48.5 ± 0.60	3.03
— —	9.4	—	18.2–25.1	21.6	—	— —	— —	—
9.5–11.5	10.5 ± 0.08	0.39	19.2–24.4	22.6 ± 0.23	1.15	40.7–57.0	46.6 ± 0.82	4.08
8.0–12.0	9.9 ± 0.15	0.95	21.0–24.0	22.6 ± 0.17	0.80	— —	43.8 ¹	—
9.5–11.9	11.0 ± 0.05	0.54	19.7–24.3	22.3 ± 0.14	1.01	— —	49.3 ¹	—
9.0–12.3	10.8 ± 0.14	0.69	20.0–24.4	21.9 ± 0.18	0.90	41.0–57.8	48.6 ± 0.66	3.32
— —	12.4	—	— —	22.2	—	— —	56.0	—
10.4–12.4	11.1	—	20.4–24.0	22.1	—	45.5–52.3	50.6	—
9.1–12.0	10.7 ± 0.16	0.78	20.0–24.1	22.1 ± 0.25	1.28	41.7–57.1	48.4 ± 0.75	3.74
9.0–11.4	10.1 ± 0.11	0.66	20.9–23.8	22.5 ± 0.20	1.00	40.0–52.6	44.5 ± 0.61	3.04
8.2–12.3	10.9 ± 0.21	1.06	19.2–22.4	20.7 ± 0.18	0.91	40.0–62.0	52.2 ± 1.00	5.16
8.3–11.3	9.6 ± 0.14	0.72	18.9–22.8	20.9 ± 0.23	1.15	39.0–54.0	43.8 ± 0.77	3.88
— —	10.6 ± 0.06	0.70	— —	22.2 ± 0.12	1.25	— —	— —	—
10.0–11.3	10.6	—	21.4–23.8	22.1	—	42.5–51.9	47.7 ¹	—
10.1–12.3	11.0	—	18.8–22.2	20.9	—	46.4–54.9	52.6	—

depth equalled or was slightly less than the latter (also mentioned by BERG). He completes the maximum body depth with this definition: „... it usually equals more than 24 % of the body length”. This definition is very questionable. BERG (1949) based his key on the data from 1912 and on numerically very limited material. It did not represent the population and consisted of only single specimens from different bodies of water in Siberia (19 individuals from 14 localities). A more numerous and uniform material (NIKOLSKIJ, 1956 and our data), representing populations, showed the lower range designated by

¹ our calculation

Table VI.

Locality and author	N	5			
		Minimum body depth in maximum body depth			σ
		Range	$M \pm m$		
Siberia (various localities), BERG, 1912	19	40.0–51.3	42.1 ¹	—	—
Lena River system, KARANTONIS, KIRILLOV and MUHOMEDIJAROV, 1956	—	— —	— —	—	—
Šargoldžin River system (near Čita), NIKOLSKIJ, 1956	14	— —	44.3 ¹	—	—
Jana River system, authors	11	36.0–47.2	41.4	—	—
Sož River system, ŽUKOV, 1965	24	— —	44.6 ¹	—	—
Jasień, OLIVA, 1963	50	— —	47.5	—	—
Karczemki Kielpińskie, OLIVA, 1963	61	— —	49.0	—	—
Jasień, authors	25	40.8–49.0	44.5 ± 0.40	—	1.94
Migowo Górne, authors	20	40.1–52.9	45.6	—	—
Wyczehowo, KULAMOWICZ and KLIMKIEWICZ, 1962	25	— —	42.6 ¹	—	—
Żukowo Zachodnie, authors	25	38.4–47.6	43.3 ± 0.45	—	2.28
Kartuzy, authors	25	36.0–48.4	44.5 ± 0.60	—	3.02
Bukowiec, authors	25	38.0–53.8	45.4 ± 0.40	—	1.98
Rynarzewo, authors	25	41.2–50.0	46.8 ± 0.50	—	2.48
Małe Łąki, authors	25	35.3–44.4	40.8 ± 0.40	—	2.00
Serock Pomorski, KAJ, 1953	44	— —	42.6 ¹	—	—
Lochocin, authors	25	38.0–44.3	41.2 ± 0.48	—	1.91
Złotkowo, KAJ, 1953	40	— —	42.3 ¹	—	—
Ryszewo, KULAMOWICZ and JAŹDŹEWSKI, 1960	100	— —	47.5 ¹	—	—
Choszczówka, authors	25	40.7–52.0	45.5 ± 0.68	—	3.43
Choszczówka, authors, lectotype	1	— —	48.3	—	—
Choszczówka, authors, paralectotypes	8	44.4–47.7	46.4	—	—
Legionowo, authors	25	37.6–50.0	45.5 ± 0.64	—	3.22
Kielpin, authors	25	38.1–53.3	45.0 ± 0.30	—	1.55
Radzymin, authors	25	38.5–56.6	47.8 ± 0.87	—	4.34
Struga, authors	25	35.0–48.0	40.3 ± 0.62	—	3.13
Wola Tulnicka, KAJ, 1953	102	— —	41.7 ¹	—	—
Jedlanka, KULAMOWICZ, 1962	11	— —	42.2 ¹	—	—
Krasne, KULAMOWICZ, 1962	20	— —	42.1 ¹	—	—

BERG to be inaccurate. As for the Siberian swamp-minnow NIKOLSKIJ (1956) states the lower range in 14 specimens from one small body of water to equal 23 ‰, while our material consisting of 11 specimens from the Jana River system shows a lower range of 21.5 ‰. Also, the lower range of the maximum body depth in *Phoxinus phoxinus* (PALLAS) sensu lato from other Siberian areas as well as from Europe descends significantly below 24 ‰ of body length (Table VI, 1). In the basis of the data acquired so far, this size is enclosed within the range 19.2–29.0 ‰.

¹ our calculation

Continued

6					7				8			
Pectoral fin length in the distance between pectoral and ventral fin insertions					The head length				Antedorsal distance			
Range	$M \pm m$			σ	Range	$M \pm m$		σ	Range	$M \pm m$		σ
45.8-65.0	57.3 ¹	—	—	—	23.5-27.5	25.4 ¹	—	—	54.9-63.3	58.6 ¹	—	—
—	—	—	—	—	19.7-25.4	—	—	—	—	—	—	—
—	—	—	—	—	25.0-29.0	26.8	—	—	56.0-63.0	59.5	—	—
54.0-70.0	59.8	—	—	—	24.3-28.0	26.0	—	—	58.0-61.2	60.0	—	—
—	56.7 ¹	—	—	—	23.2-28.5	24.9 ± 0.29	1.42	—	52.7-60.4	56.1 ± 0.48	2.36	—
56.0-70.0	61.5	—	—	—	—	24.0	—	—	49.0-58.5	56.5	—	—
59.7-74.0	65.5	—	—	—	—	23.6	—	—	55.7-58.5	57.0	—	—
55.0-72.7	61.3 ± 0.92	4.60	—	—	24.1-27.8	25.6 ± 0.18	0.93	—	54.0-60.3	57.0 ± 0.29	1.48	—
53.3-69.2	62.0	—	—	—	24.5-28.2	26.4	—	—	55.4-59.4	57.8	—	—
—	56.7 ¹	—	—	—	—	26.9	—	—	—	58.2	—	—
47.3-66.6	57.3 ± 0.81	4.06	—	—	24.8-28.2	26.2 ± 0.16	0.82	—	54.0-59.7	56.8 ± 0.30	1.48	—
50.0-71.4	60.5 ± 1.22	6.12	—	—	24.5-26.6	25.7 ± 0.12	0.61	—	53.4-60.6	56.8 ± 0.37	1.88	—
52.7-68.0	60.0 ± 0.84	4.20	—	—	24.6-28.4	26.6 ± 0.15	0.75	—	56.2-61.0	59.0 ± 0.25	1.28	—
50.0-66.6	57.6 ± 0.81	4.08	—	—	23.1-27.4	25.2 ± 0.19	0.97	—	55.4-60.5	58.4 ± 0.30	1.52	—
56.6-70.8	63.5 ± 0.71	3.56	—	—	25.4-28.6	27.4 ± 0.14	0.70	—	56.4-61.2	58.9 ± 0.26	1.32	—
—	—	—	—	—	26.0-32.9	29.5	—	—	—	57.9	—	—
51.2-68.7	59.8 ± 0.79	3.94	—	—	23.4-26.7	25.0 ± 0.16	0.81	—	54.3-60.2	56.3 ± 0.29	1.46	—
50.0-60.0	57.2	—	—	—	—	26.8 ± 0.18	1.15	—	—	57.0	—	—
—	65.5 ¹	—	—	—	23.7-28.9	26.2 ± 0.11	1.09	—	54.4-60.8	57.9 ± 0.12	1.21	—
45.2-69.1	55.0 ± 1.28	6.44	—	—	24.0-28.1	25.7 ± 0.22	1.09	—	55.0-60.4	57.9 ± 0.28	1.39	—
—	66.6	—	—	—	—	27.0	—	—	—	56.5	—	—
69.2-79.0	72.3	—	—	—	25.4-29.4	27.2	—	—	56.0-59.2	57.4	—	—
50.6-68.1	60.8 ± 0.98	4.90	—	—	24.1-26.5	25.8 ± 0.11	0.57	—	55.1-62.0	57.6 ± 0.21	1.07	—
50.0-71.5	60.4 ± 1.20	6.00	—	—	23.0-28.0	26.2 ± 0.32	1.05	—	55.8-60.8	58.6 ± 0.27	1.36	—
48.8-73.0	60.0 ± 1.30	6.57	—	—	24.2-27.4	25.6 ± 0.15	0.77	—	55.6-60.0	57.0 ± 0.25	1.25	—
53.1-76.6	60.9 ± 1.00	5.20	—	—	23.2-27.4	25.1 ± 0.16	0.82	—	53.8-59.7	56.7 ± 0.31	1.58	—
50.0-60.0	57.2	—	—	—	—	27.5 ± 0.09	1.00	—	53.5-64.5	58.8	—	—
48.0-60.0	52.9	—	—	—	24.3-26.8	25.7	—	—	56.6-60.0	58.3	—	—
46.3-63.6	52.9	—	—	—	23.2-27.5	25.6	—	—	55.6-62.3	59.2	—	—

2. According to BERG (1949) the upper jaw of all the swamp-minnows we investigated is smaller than the interorbital width.

3. In accordance with BERG the length of the lower jaw of swamp-minnows we investigated is smaller than its minimum body depth except in the single case — the swamp-minnow from Małe Łąki — in which the length of the lower jaw equals, on the average, 10.42 % and the minimum body depth 10.33 %. Though the difference is small it is however noticeable and represents the only case in our collection. BERG (1912) separates the swamp-minnow with a lower jaw longer than its minimum body depth giving it the name *Ph. percunurus*

¹ our calculation

Table VI.

Locality and author	N	9		
		Postdorsal distance		
		Range	$M \pm m$	σ
Siberia (various localities), BERG, 1912	19	30.3–36.0	32.9 ¹	—
Lena River system, KARANTONIS, KIRILLOV and MUHOMEDIJAROV, 1956	—	—	—	—
Šargoldžin River system (near Čita), NIKOLSKIJ, 1956	14	—	—	—
Jana River system, authors	11	30.8–34.3	32.2	—
Sož River system, ŽUKOV, 1965	24	29.8–38.5	33.4 ± 0.42	2.06
Jasień, OLIVA, 1963	50	32.0–33.5	32.7	—
Karczemki Kielpińskie, OLIVA, 1963	61	30.4–34.3	33.7	—
Jasień, authors	25	28.8–34.0	32.1 ± 0.26	1.30
Migowo Górne, authors	20	30.2–34.6	32.4	—
Wyczehowo, KULAMOWICZ and KLIMKIEWICZ, 1962	25	—	—	—
Żukowo Zachodnie, authors	25	30.1–35.3	33.2 ± 0.27	1.37
Kartuzy, authors	25	30.7–35.2	33.7 ± 0.24	1.22
Bukowiec, authors	25	28.2–33.4	31.3 ± 0.28	1.42
Rynarzewo, authors	25	31.0–34.0	32.5 ± 0.18	0.91
Małe Łąki, authors	25	30.5–34.5	31.9 ± 0.20	1.01
Serock Pomorski, KAJ, 1953	44	—	33.4	—
Łochocin, authors	25	30.1–36.2	33.3 ± 0.24	1.19
Złotkowo, KAJ, 1953	40	—	33.6	—
Ryszewo, KULAMOWICZ and JAŻDŻEWSKI, 1960	100	31.9–37.0	34.9 ± 0.09	0.93
Choszczówka, authors	25	29.6–35.9	33.4 ± 0.27	1.36
Choszczówka, authors, lectotype	1	—	34.0	—
Choszczówka, authors, paralectotypes	8	30.9–35.0	32.8	—
Legionowo, authors	25	30.3–36.3	32.8 ± 0.27	1.35
Kielpin, authors	25	30.0–36.5	33.0 ± 0.30	1.50
Radzymin, authors	25	29.4–35.4	32.3 ± 0.34	1.71
Struga, authors	25	29.4–34.0	31.6 ± 0.23	1.19
Wola Tulnicka, KAJ, 1953	102	—	33.5	—
Jedlanka, KULAMOWICZ, 1962	11	—	—	—
Krasne, KULAMOWICZ, 1962	20	—	—	—

stagnalis WARP. In his opinion this feature is correlated with the upward deviation of the lower jaw at a sharp angle and the protrusion of the lower end of the dentary. In the case of the specimens of Małe Łąki we were not able to discover a definite dependence between the latter features.

4. The following criterion according to BERG (1949) "The length of the pectoral fin usually not greater than 65 % of the distance from the insertion between the pectoral and ventral fins" is characteristic for *Ph. percunurus percunurus* (PALLAS), *Ph. percunurus gdaniensis* BERG, *Ph. percunurus sachalinensis* BERG and *Ph. percunurus dybowski* LOR. et WOL. This value is fixed

¹ our calculation

Continund

10 Dorsal fin depth			11 Anal fin depth			12 Pectoral fin length		
Range	$M \pm m$	σ	Range	$M \pm m$	σ	Range	$M \pm m$	σ
12.3-17.2	14.7 ¹	—	10.0-15.5	12.0 ¹	—	12.8-16.9	15.1 ¹	—
— —	— —	—	— —	— —	—	— —	— —	—
17.0-23.0	20.2	—	14.0-19.0	15.8	—	15.0-19.0	16.5	—
12.6-17.3	15.0	—	10.8-13.7	12.8	—	14.1-16.9	15.5	—
15.0-19.3	16.2 ± 0.24	1.20	11.8-17.6	14.7 ± 0.28	1.38	12.5-18.8	15.5 ± 0.30	1.47
16.5-17.5	17.3	—	14.2-15.4	14.4	—	14.8-18.0	15.4	—
17.1-19.0	17.4	—	14.6-18.0	15.1	—	16.5-18.0	17.1	—
15.5-18.4	17.0 ± 0.16	0.75	12.2-16.0	14.3 ± 0.17	0.86	15.4-18.8	16.8 ± 0.19	0.98
16.9-20.0	18.0	—	13.2-17.0	15.2	—	16.2-19.1	17.6	—
— —	17.2	—	— —	14.5	—	— —	15.6	—
14.0-18.0	15.8 ± 0.16	0.83	10.1-15.3	13.4 ± 0.26	1.26	14.0-18.6	16.1 ± 0.22	1.13
14.3-17.2	16.1 ± 0.17	0.81	11.3-14.7	13.5 ± 0.20	0.91	13.7-17.3	15.6 ± 0.20	1.00
15.9-19.6	17.0 ± 0.21	1.09	13.1-16.9	15.1 ± 0.22	1.11	15.6-19.3	17.1 ± 0.21	1.06
13.1-18.7	15.3 ± 0.22	1.06	11.7-15.4	13.9 ± 0.20	1.00	13.6-16.7	15.0 ± 0.16	0.80
15.0-18.6	16.5 ± 0.21	1.07	11.6-16.6	14.2 ± 0.23	1.16	16.1-18.2	16.9 ± 0.13	0.65
— —	17.9	—	— —	15.9	—	— —	15.4	—
14.8-17.7	16.1 ± 0.16	0.82	13.1-16.4	14.6 ± 0.15	0.78	14.6-17.9	16.2 ± 0.11	0.88
— —	18.1	—	— —	15.7	—	— —	15.5 ± 0.20	1.22
15.9-20.1	18.2 ± 0.08	0.82	13.5-18.2	16.1 ± 0.10	0.97	14.2-18.8	16.5 ± 0.10	0.96
14.8-18.1	16.7 ± 0.11	0.54	12.0-16.2	14.5 ± 0.22	1.14	13.6-17.4	15.6 ± 0.21	1.05
— —	17.4	—	— —	15.2	—	— —	— —	—
18.0-22.2	20.9	—	11.7-17.4	15.0	—	— —	— —	—
15.0-19.0	16.7 ± 0.21	1.06	11.7-16.7	14.0 ± 0.22	1.10	13.8-18.5	16.4 ± 0.21	1.07
13.0-18.3	16.3 ± 0.24	1.20	11.6-15.6	14.1 ± 0.23	1.16	14.0-17.7	16.1 ± 0.22	1.13
13.9-18.0	15.9 ± 0.19	0.96	12.7-16.0	14.2 ± 0.16	0.81	13.8-18.0	15.9 ± 0.21	1.06
15.2-18.8	16.4 ± 0.20	1.02	12.1-16.7	14.1 ± 0.21	1.05	14.3-18.3	16.2 ± 0.21	1.02
— —	19.2	—	— —	17.2	—	— —	15.7 ± 0.09	0.99
15.0-19.8	17.4	—	13.2-16.9	14.7	—	13.1-17.1	14.7	—
12.9-18.3	16.2	—	12.0-16.9	14.8	—	12.3-16.9	15.0	—

by BERG on the basis of extreme data for 18 specimens of *Ph. percnurus percnurus* (PALLAS) from Siberia in which this feature equals 54.8–65.0 ‰, and for *Ph. percnurus gdaniensis* BERG, on the basis of SELIGO's (1916) data for 3 specimens with the mentioned feature within the range 48–50 ‰².

As for the data of KULMATYCKI (1920) concerning 5 specimens of *Ph. percnurus gdaniensis* BERG it seems that BERG (1932) did not take the value of this feature into consideration as the P in $P - V$ value is bigger in these specimens. After taking the correction into consideration (in KULMATYCKI, 1920 the summing up of the "Distantia inter P et V " is wrong; instead of 14.75 it ought to

¹ our calculation

² after the authors correction with reference to the first specimen of SELIGO (1916)

Table VI. Continued

Locality and author	N	13			
		Ventral fin length			
		Range	$M \pm m$	σ	
Siberia (various localities), BERG, 1912	19	10.6–14.3	12.2 ¹	—	—
Lena River system, KARANTONIS, KIRILLOV and MUHOMEDIJAROV, 1956	—	— —	— —	—	—
Šargoldžin River system (near Čita), NIKOLSKIJ, 1956	14	12.0–16.0	13.6	—	—
Jana River system, authors	11	10.3–13.1	12.0	—	—
Soż River system, ŽUKOV, 1965	24	10.7–15.3	12.9 ± 0.25	1.24	
Jasień, OLIVA, 1963	50	13.3–14.5	13.4	—	—
Karczemki Kielpińskie, OLIVA, 1963	61	12.8–14.4	13.7	—	—
Jasień, authors	25	11.0–13.9	12.5 ± 0.11	0.55	
Migowo Górne, authors	20	12.9–16.2	14.2	—	—
Wyczehowo, KULAMOWICZ and KLIMKIEWICZ, 1962	25	— —	12.8	—	—
Żukowo Zachodnie, authors	25	11.6–15.5	13.3 ± 0.18	0.90	
Kartuzy, authors	25	11.0–15.1	12.9 ± 0.21	1.03	
Bukowiec, authors	25	11.7–14.7	13.5 ± 0.14	0.70	
Rynarzewo, authors	25	11.7–14.4	12.7 ± 0.11	0.57	
Małe Łąki, authors	25	11.8–14.7	13.2 ± 0.14	0.73	
Serock Pomorski, KAJ, 1953	44	— —	12.1	—	—
Łochocin, authors	25	11.4–15.1	13.5 ± 0.20	0.99	
Złotkowo, KAJ, 1953	40	— —	12.4	—	—
Ryszewo, KULAMOWICZ and JAŻDŻEWSKI, 1960	100	12.4–15.4	13.7 ± 0.08	0.76	
Choszczówka, authors	25	11.1–14.5	12.7 ± 0.11	0.84	
Choszczówka, authors, lectotype	1	— —	— —	—	—
Choszczówka, authors, paralectotypes	8	— —	— —	—	—
Legionowo, authors	25	11.5–15.3	13.1 ± 0.18	0.92	
Kielpin, authors	25	10.4–14.0	12.5 ± 0.19	0.97	
Radzymin, authors	25	11.1–14.3	12.7 ± 0.16	0.83	
Struga, authors	25	11.3–14.7	13.1 ± 0.14	0.70	
Wola Tulnicka, KAJ, 1953	102	— —	12.4 ± 0.08	0.87	
Jedlanka, KULAMOWICZ, 1962	11	11.6–14.3	12.7	—	—
Krasne, KULAMOWICZ, 1962	20	11.1–14.4	12.6	—	—

be 12.7) the ranges of this feature oscillating between 67.9–90.5 % in the average 78.7 %.

The swamp-minnow whose value of P in $P-V$ is higher than 65 % BERG (1912) considers as *Ph. percunurus mantschuricus* BERG so in this case the value of 65 % probably applies to mean value not extreme one. BERG's material consisting of 5 specimens of *Ph. percunurus mantschuricus* BERG from different parts of Siberia shows that this feature ranges between 52.4–76.7 % the mean value being 66.6 %.

¹ our calculation

In OLIVA's (1963) key this feature is accepted as a diagnostic criterion based however on mean values. According to this author P in $P-V$ in the specimens from Jasień equals 61.5% with a range of 56.0–70.0% and for those from Karczemki Kiełpińskie 65.5% within the range of 59.7–74.0% (Table VI, 6).

Both BERG's (1912) and OLIVA's (1963) standpoint does not answer to reality. The value of the discussed feature, as is seen in the Table VI oscillates in Radzymin specimens within the range 48.8–73.0% and it is not possible to accept this feature as a diagnostic criterion as it puts the person who uses the key in a difficult position. The specimens from Radzymin one with the value of this feature equaling 48.8% another with the value 73.0% coming from the same sample according to BERG's (1949) criteria have been considered as two different subspecies. The same applies to the paralectotypes of *Ph. percunurus dybowskii* LOR. et WOL. (7 specimens) from Choszczówka with the value 69.2–79.0% in the average 72.3% which should be considered as *Ph. percunurus mantschuricus* BERG.

In our opinion the studied point of systematics has two weak aspects: 1. the range of this feature's value is too extensive (43.3–79.0), thus unpractical in the alternative composition of the key, 2. orientation according to mean values is only possible if we have a large number of fish at our disposal. It is deceptive in cases of single specimens. Moreover, the mean value is always affected by the sexual composition of the sample because of the males' pectoral fins being longer than the females (Table I).

5. The next feature of BERG's (1949) key "The minimum body depth 40–55% of the length of the caudal peduncle" is characteristic for *Ph. percunurus percunurus* (PALLAS) while 50–74% characterise the subspecies *Ph. percunurus gdaniensis* BERG, *Ph. percunurus sachalinensis* BERG and *Ph. percunurus dybowskii* LOR. et WOL. In connection with this feature we are only interested in the *Ph. percunurus gdaniensis* BERG as *Ph. percunurus dybowskii* LOR. et WOL. as a result of an inaccurate scale-count on the lateral line have gone out of existence as a subspecies. *Ph. percunurus sachalinensis* BERG is not included in our study.

Analysing the swamp-minnow from Poland for this feature (Table VI, 4) OLIVA's (1963) data – mean 56.0% for specimens from Jasień may exist within the range given by BERG (1949) for *Ph. percunurus gdaniensis* BERG. It is more difficult to reach a conclusion as to OLIVA's material from Karczemki Kiełpińskie which is characteristic by its mean of 53.5%. This value does not reach the higher range in the nominate form. Hence the identity of this population with *Ph. percunurus gdaniensis* BERG is highly improbable. Agreement with our way of thinking is expressed in the data on the specimens from nearby Migowo Górne, that state values within the range of 47.1–59.0% (mean 53.1%). They show that the swamp-minnow from Migowo Górne could be an intermediary form between the typical form and the "*gdaniensis*" one. Our data for the swamp-minnow from Jasień – 41.4–52.1% (mean 46%) are in accord with those of BERG (1949) for the typical form and are in abso-

Table VII. The confrontation of some taxonomic features to show their unsufficiency. Figures demonstrate

	Minimum body depth in the length of the caudal peduncle				Caudal peduncle length			
	<i>Phoxinus percnurus percnurus</i> (PALLAS)		<i>Phoxinus percnurus gdaniensis</i> BERG		<i>Phoxinus percnurus percnurus</i> (PALLAS)		<i>Phoxinus percnurus gdaniensis</i> BERG	
	Range	Mean	Range	Mean	Range	Mean	Range	Mean
BERG, 1949	40-55	—	50-74	—	20.5-26.4 ¹	—	16.5-20.5	—
OLIVA, 1963	—	—	—	—	—	—	18.8-21.1	—
Locality								
Jasień, OLIVA, 1963	—	—	—	56.0	—	—	—	20.3
Karczemki, OLIVA 1963	—	—	—	53.5	—	—	—	21.1
Jasień, authors, 1965	41.4-52.1	46.0	—	—	—	—	19.6-22.8	21.3
Struga, authors	39.0-54.0	43.8	—	—	—	—	18.9-22.8	20.9
Bukowiec, authors	—	—	50.0-68.2	56.8	—	—	18.3-21.6	19.7
Złotkowo, KAJ, 1953	—	43.8	—	—	21.0-24.0	22.6	—	—
Krasne, KULAMOWICZ, 1960	46.5-54.9	52.6	—	—	—	—	18.8-22.2	20.9

lute contrast with OLIVA's data which fact can only be explained by the swamp-minnow's great variability.

6. *Ph. percnurus gdaniensis* BERG is characterised by BERG (1949) as having a short caudal peduncle 16.5–20.5 % of its body length (data based on KULMATYCKI's 1920 material). On the basis of a much larger material OLIVA (1963) raises the upper range to 21.1 %. The difference between these data is great as BERG's refer to extreme ranges and OLIVA's to mean ranges. OLIVA's means 21.1 % are similar to our data for Jasień (1965) — mean 21.3 %, ranging 19.6–22.8. It results from the above that the upper range for this feature in the swamp-minnow from Gdańsk does not point to it as a separate subspecies. It will be sufficient to compare these value with those of this feature in the swamp-minnow from the Lena River system (NIKOLSKIJ, 1956) or with our counts for the material from the Jana River system, which are both recognized as *Ph. percnurus percnurus* (PALLAS) (Table VI, 3). As a result of the above discussion we may state that the length of the caudal peduncle cannot be accepted as a diagnostic feature for the differentiation of subspecies.

7. OLIVA (1963 : 326) restricts the subspecies *Ph. percnurus gdaniensis* BERG stressing the following feature: "... minimum body depth about 48 % of the maximum body depth ..." giving the mean value for this feature in *Ph. percnurus percnurus* (PALLAS) as 42 (40–52) %. Actually, OLIVA's data for

¹ BERG, 1912

cient diagnostic validity for determination the "subspecies" of the swamp-minnow. percentages values

Maximum body depth in minimum body depth		Minimum body depth							
<i>Phoxinus percunurus percunurus</i> (PALLAS)		<i>Phoxinus percunurus gdaniensis</i> BERG		<i>Phoxinus percunurus percunurus</i> (PALLAS)		<i>Phoxinus percunurus gdaniensis</i> BERG		<i>Phoxinus percunurus occidentalis</i> KAJ	
Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean
—	—	—	—	—	—	—	—	—	—
40–52	42	—	—	—	—	—	—	—	—
—	—	43.0–48.0	47.5	—	—	—	11.4	—	—
—	—	46.0–50.0	49.0	—	—	—	12.4	—	—
40.8–49.0	44.5	—	—	—	—	—	—	9.1–10.7	9.9
35.0–48.0	40.3	—	—	—	—	—	—	8.3–11.3	9.6
38.0–53.8	45.4	—	—	9.8–13.4	11.3	—	—	—	—
—	42.5	—	—	—	—	—	—	8.0–12.0	9.9
—	42.1	—	—	10.1–12.3	11.0	—	—	—	—

Jasień — 47.5 % and for Karczemki Kiełpińskie — 49 % agree with his statement (Table VI, 5). If, however, we glance at the value of this feature in the specimens from Jasień or from nearby Migowo Górne collected by us in 1965 we see that they should be considered as the typical form. The material from Bukowiec produces the further difficulties encountered in the selection and placing of the Polish swamp-minnow within the proper subspecies. The specimens of Bukowiec may be counted among the *Ph. percunurus gdaniensis* BERG on the basis of the length of their caudal peduncle. However the relation of their maximum to minimum body depth provides evidence of their belonging to the typical form (Tables VI, 5 and VII). On the basis of the considerations given above we have stated the fact of the none existence of the subspecies *Ph. percunurus gdaniensis* BERG and have placed its name on the list of synonyms of *Ph. percunurus percunurus* (PALLAS).

We still have the revision of the third subspecies of Poland before us — *Ph. percunurus occidentalis* KAJ. In this case we will quote the words of the author of this subspecies (KAJ, 1953: 61–62): "The comparison of the diagnostic features of the species *Phoxinus percunurus*, *Phoxinus czechanowskii*, and their forms encountered so far on the territory of Poland, with a population appearing in the mentioned small body of water gives evidence that there we have to do with a form of *Phoxinus percunurus* PALL., different however from the *Phoxinus percunurus dybowskii* LOREC et WOLSKI and different from *Phoxinus percunurus gdaniensis* BERG. This difference is most apparent

in the shape of their head and the relation between their body depth and the length of their caudal peduncle". — "The outline of the dorsal profile of the head from the mouth opening until the nostrils is slightly convex, then continues almost straight." — "The junction of the upper and lower jaws never forms a sharp angle at the bottom of the head." On page 64, he says concerning the caudal peduncle: "The figure for the length of the caudal peduncle is very similar to the one for body depth...". According to KAJ (1953) the length of the caudal peduncle in specimens of Złotkowo, amounts 22.60 ‰ and their body depth to 23.40 ‰. The difference between these two values amounts to 0.8. This difference is still smaller in the specimens from Serock Pomorski — 0.4 — as their caudal peduncle length is 21.64 ‰ and their body depth 22.04 ‰.

Table VIII. Numerical value in the differences between the maximum body depth and the caudal peduncle length of the swamp-minnow, *Phoxinus phoxinus phoxinus* (PALLAS) from various localities

Kielpin	-0.4	Karczemki	+2.5
Serock	+0.4	Struga	+2.8
Złotkowo	+0.8	Jana River system	+2.9
Ryszewo	+0.8	Wyczehowo	+3.0
Jasień (authors)	+1.0	Jasień (OLIVA, 1963)	+3.0
Kartuzy	+1.4	Jedlanka	+3.0
Soż River system	+1.4	Wola Tulnicka	+3.2
Legionowo	+1.6	Łochocin	+3.2
Choszczówka	+1.9	Małe Łąki	+4.0
Żukowo	+2.2	Lena River system	+4.7
Rynarzewo	+2.3	Bukowiec	+5.0
Radzymin	+2.3	Krasne	+5.2

According to us, the shape of the head is not a diagnostic feature in the case of the Polish swamp-minnows. Having the possibility of making a survey of these fish from a score of different localities in Poland, we state that in one and the same population, in sample taken on the same day, we have observed different configuration of the lower jaw. Next to individuals with a slightly arched dentary there are also some in which this bone rises sharply towards the top its ventral end then being visible and easily palpated.

As to the second diagnostic feature according to KAJ (1953) that is the feature of the small difference between the maximum body depth and the caudal peduncle length we also consider it questionable, because we fail to see how it is possible to class in accordance to this feature, which shows such large, chain-forming differences (Table VIII).

From among further objection to KAJ's (1953) diagnosis is the fact of the material from Serock Pomorski not being proper for drawing taxonomic conclusions. On page 67 he says: "I have never caught a specimen above 45 mm in length" — "It is a puzzling thing that among the number of more than

40 fishes youthful, sexually immature specimens appeared in an overwhelming majority”.

As an illustration of how insufficient are the data of both keys (BERG, 1949; OLIVA, 1963) for recognising subspecific forms among the swamp minnows of Poland and how variable is this fish we should like to point out the Table VII. From this it is evident how the swamp-minnow of the same locality when defined on the basis of different features may be recognized as different subspecies. Every population is different, depending on the character of the body of water. Reasuming, we have come to the conclusion that there is only one form of the swamp-minnow in Poland — *Phoxinus percunurus percunurus* (PALLAS).

It seems that on the basis of the above considerations the subspecies described from the USSR, Manchuria and Korea: *Ph. percunurus mantschuricus* BERG, *Ph. percunurus sachalinensis* BERG and *Ph. percunurus stagnalis* WARP. should be subjected to thorough revision.

LITERATURE

- BENECKE B. 1881. Fische, Fischerei und Fischzucht in Ost- und Westpreussen. Königsberg, 514 pp.
- BERG L. S. 1907. Zametki o nekotoryh palearkticheskih vidah r. *Phoxinus*. Ežeg. zool. Muz. imp. Akad. Nauk, Sanktpeterburg, **11**: 196–213.
- BERG L. S. 1912. Fauna Rossii i sopredel'nyh stran. 3. Petersburg, 336 pp.
- BERG L. S. 1932. Ryby presnyh vod SSSR sopredel'nyh stran. 1, Leningrad, 543 pp.
- BERG L. S. 1948–1949. Ryby presnyh vod SSSR i sopredel'nyh stran. 1–3. Moskva—Leningrad, 1382 pp.
- DYBOWSKI B. 1916. Systematyka ryb: *Teleostei Ostariophysi*. Według dzieła L. S. BERG'A "Fauna Rosyi, Ryby" z uwzględnieniem szczegółowem form naszego kraju. Pam. fizjogr., Warszawa, **23**: 84–126.
- HUBBS C. L., LAGLER K. F. 1947. Fishes of the Great Lakes Region. Michigan, 186 pp.
- KAJ J. 1953. Rozprzestrzenienie i zmienność rasowa ryb z gatunku *Phoxinus percunurus* PALL. na terenie Polski. Pol. Arch. Hydrobiol., Suwałki—Warszawa, **1**: 49–78.
- KARANTONIS F. E., KIRILLOV F. N., MUHOMEDIJAROV F. B. 1956. Ryby srednego tečenija reki Leny. Trudy Inst. Biol., Irkutsk, **2**: 3–144.
- KIRILLOV F. N. 1962. Ihtiofauna bassejna reki Viljuja. Trudy Inst. Biol., Moskva, **8**: 5–71.
- KULAMOWICZ A., JAŹDŻEWSKI K. 1960. Przyczynek do znajomości taksonomii i rozsiedlenia strzebli błotnej — *Phoxinus percunurus* (PALL.) (*Cyprinidae*) w Polsce. Zesz. Nauk. Uniw. łódz., Ser. 2, mat.-przyr., Łódź, **7**: 141–152.
- KULAMOWICZ A., KLIMKIEWICZ W. 1962. *Phoxinus percunurus percunurus* (PALL.) 1811 (*Cyprinidae*, *Osteichthyes*) na terenach przyujściowych Wisły. Zesz. Nauk. Uniw. łódz., Ser. 2. mat.-przyr., Łódź, **12**: 141–143.
- KULAMOWICZ A. 1962a. Nowe stanowiska *Phoxinus percunurus* (PALL.) (*Cyprinidae*, *Osteichthyes*) w Polsce. Zesz. Nauk. Uniw. łódz., Ser. 2. mat.-przyr., Łódź, **13**: 129–136.
- KULAMOWICZ A. 1962b. O zróżnicowaniu rasowym *Phoxinus percunurus* (PALL.) (*Cyprinidae*, *Osteichthyes*) w Polsce. Prz. zool., Wrocław, **6**: 224–226.

- KULAMOWICZ A. 1963. Przegląd materiałów do taksonomii i rozszerezenia *Phoxinus (Gila) percunurus* (PALLAS, 1811), *Cyprinidae*, *Osteichthyes*, w Polsce. Zesz. Nauk. Uniw. Łódz., Ser. 2. mat.-przyr., Łódź, 15: 47–86.
- KULMATYCKI W. 1920a. *Phoxinus Czekanowskii Czekanowskii* DYB. pod Poznaniem. Spraw. Kom. Fizjogr., Kraków, 53–54: 182–188.
- KULMATYCKI W. 1920b. *Phoxinus percunurus* PALLAS na ziemiach Polski. Prz. ryb. (STAFF), Warszawa, 2, 145–148.
- LOREC Z., WOLSKI T. 1910. Nowy gatunek z rodzaju strzebla (*Phoxinus* AGAS.) Strzebla przekopowa (*Phoxinus Dybowskii* spec. nov.?). Spraw. TNW, Wydz. mat.-przyr., Warszawa, 3: 114–120.
- NIKOLSKIJ G. N. 1956. Ryby bassejna Amura. Moskwa, 551 pp.
- OLIVA O. 1963. The Gdańsk swamp-minnow, *Phoxinus percunurus gdaniensis* BERG, 1932 its rediscovery and systematic position. Gdańskie TN, Gdańsk, 7: 307–337.
- PRAVDIN I. F. 1939. Rukowodstvo po izučeniju ryb. Leningrad, 245 pp.
- RUSKIJ M. D. 1926. O novej forme gol'jana iz vostočnogo Zaural'a, *Phoxinus percunurus sarykul* (nov. subsp.). Izv. tomsk. Univ., Tomsk, 77: 112.
- SCHULZ C. 1912. Studien über die Posener Wirbeltierfauna. Festschr. 51. Vers. dtsh. Phil. Schulm., Posen, 29 pp.
- SCHULZ K. 1913. Zur Posener Wirbeltierfauna. Zeitschr. nat. Abt. dtsh. Ges. Kunst Wiss., Posen, 20: 181–192.
- SELIGO A. 1916. Vorkommen der Sumpfelritze *Phoxinus percunurus* PALLAS, bei Danzig. Zool. Anz., Leipzig, 47: 241–257.
- SUMIŃSKI St. M., TENENBAUM Sz. 1921. Przewodnik Zoologiczny po okolicach Warszawy. Warszawa, 104 pp.
- URBAŃSKI J. 1946. Strzebla przekopowa (*Phoxinus percunurus* PALL.) w Lublinie. Prz. ryb. Warszawa, 13: 202–208.
- WARPACHOWSKI N. 1887. Notiz über die in Russland vorkommenden Arten der Gattung *Phoxinus*. Mém. biol., St.-Petersbourg, 12: 685–690.
- ŽUKOV P. I. 1965. Ryby Belorussii. Minsk, 415 pp.

STRESZCZENIE

Praca niniejsza przedstawia rewizję podgatunków strzebli błotnej, opisanych z obszaru Polski: *Ph. percunurus dybowskii* LOR. et WOL., *Ph. percunurus gdaniensis* BERG i *Ph. percunurus occidentalis* KAJ, w oparciu o analizę cech merystycznych i plastycznych. Za podstawę opracowania posłużył materiał z kilkunastu stanowisk z Polski, jednego z dorzecza Jany (łącznie 525 okazów) oraz dane z literatury. Osobny rozdział poświęcony jest dymorfizmowi płciowemu polskich strzebli. Obszernie także omówiono miejsca występowania strzebli błotnej, typy zbiorników, w których występuje, oraz jej częściową zależność od gospodarki człowieka. Wnioski autorów przedstawiają się następująco:

1. Odnośnie do liczby łusek w linii bocznej u *Ph. percunurus* (PALLAS) dane BERGA (1949) (70–80) muszą być znacznie rozszerzone. W oparciu o analizę materiałów z terenu Polski, Syberii i różnych punktów europejskiego terytorium ZSSR, granice rozpiętości tej cechy należy przyjąć jako 65–89. Podgatunek *Ph. percunurus dybowskii* LOR. et WOL., u którego liczba łusek powinna

być większa niż 80 (83–97), był wydzielony w wyniku błędnych obliczeń LORECA i WOLSKIEGO (1910). Autorzy niniejszej pracy sprawdzili wartość tej cechy na 9 syntypach i 43 nowych okazach z locus typicus, stwierdzając, że w rzeczywistości waha się ona od 70 do 80 i wobec tego strzeblę tę należy zaliczyć do formy typowej, a nazwę *Ph. percunurus dybowskii* LOR. et WOL. uznać za synonim *Ph. percunurus percunurus* (PALLAS).

2. W płetwie grzbietowej i odbytovej, licząc ostatni rozdwojony promień jako jeden, jest zasadniczo po 7 promieni miękkich. Mniejsza (6), a szczególnie większa (8, 9) liczba trafia się tylko sporadycznie. Podawana przez KAJA (1953) i KULAMOWICZA (1963) liczba 8 promieni u większości okazów z niektórych stanowisk Polski jest zapewne wynikiem uznawania ostatniego, rozwidłonego promienia za dwa odrębne.

3. Liczba kręgów u strzebli błotnej z Polski waha się w granicach 36–40, na całym jej areale 36–41. Dolna i górna granica dotyczy liczb trafiających się sporadycznie (Tab. IV).

4. Liczba wyrostków filtracyjnych w przeważającej liczbie przypadków zamyka się w granicach 6–11. Tylko KARANTONIS, KIRILLOV, MUHOMEDIJAROV (1956) podają 11–17. Definitywne ustalenie liczby wyrostków filtracyjnych jest zagadnieniem otwartym.

5. Analiza cech plastycznych wykazała szeroką rozpiętość ich granic. Podgatunek *Ph. percunurus gdaniensis* BERG wyróżniony został na podstawie następujących cech plastycznych: 1. wartość górnej granicy długości *P* w odległości $P-V$ 65 %; 2. długość trzonu ogonowego 16,5–20,5 % długości ciała; 3. najmniejsza wysokość ciała w długości trzonu ogonowego 50–74 %. Wyczerpania te (BERG, 1932) oparte są na danych SELIGO (1916) i KULMATYCKIEGO (1920). OLIVA (1963) poszerzył wartość długości trzonu ogonowego do 21,1 % długości ciała (średnie dane!) i wprowadził czwartą cechę – stosunek wysokości minimalnej do maksymalnej, którą określa "about 48 %".

Dane te nie mogą być przyjęte, ponieważ badania na większym materiale znacznie te granice rozszerzyły, przez co znikły bariery oddzielające poszczególne podgatunki. Strzeble z okolic Gdańska mają wartości nie wyróżniające ich jako odrębny podgatunek (Tab. VI), w wyniku czego nazwę *Ph. percunurus gdaniensis* BERG należy włączyć do synonimów *Ph. percunurus percunurus* (PALLAS).

6. Podgatunek *Ph. percunurus occidentalis* KAJ był m. in. również ustalony na podstawie cech plastycznych, a częściowo tylko na opisowych – jak kształt głowy. Cecha ta nie jest istotna, gdyż nawet w jednej próbie obserwuje się dużą zmienność kształtu głowy. Z cech plastycznych KAJ (1953) kładzie duży nacisk na istnienie małej różnicy między największą wysokością ciała a długością trzonu ogonowego. Cecha ta nie ma jednak żadnych wartości diagnostycznych. Tabela VIII pokazuje, jakiemu szerokiemu wahaniu cecha ta podlega (–0,4 – +5,2) i jak się stopniuje niezależnie od położenia geograficznego stanowisk.

7. Próbę rewizji form podgatunkowych zrobił już KULAMOWICZ (1963). Wypowiada się on za skreśleniem podgatunku *Ph. percunurus gdaniensis* BERG, poddając krytycznej analizie dane liczbowe KULMATYCKIEGO (1920), utrzymuje on jednak podgatunek *Ph. percunurus occidentalis* KAJ na podstawie danych o grubości ogona. Do grubości ogona, jako cechy diagnostycznej, autorzy, podobnie jak KULAMOWICZ, odnoszą się jednak sceptycznie.

Wartości cech diagnostycznych badanych strzebli błotnych, uzupełnione przez dane z literatury, wykazują ogromną mozaikowość wzajemnego układu tych cech. Ten stan rzeczy nie pozwala autorom zgodzić się z rozumowaniem KULAMOWICZA (1963) co do jego koncepcji traktowania strzebli błotnych ze stanowisk na zachód od Wisły jako "*natio dybowskii* LOREC et WOLSKI".

8. W Polsce, sądząc z dotychczasowych danych, występuje tylko forma *Ph. percunurus percunurus* (PALLAS). Wykazuje ona duże podobieństwo do strzebli błotnej zlewiska Soży, a od strzebli błotnych syberyjskich różni się nieznacznie niektórymi cechami, co można tłumaczyć brakiem liczniejszych danych z Syberii.

9. Jak wykazują materiały zbadane przez autorów, zmienność strzebli błotnej jest ogromna i kształtuje się w zależności od warunków klimatycznych i środowiskowych. Fakt, że nie ma powtarzalnych warunków środowiska, które rzutują na zamieszkujące je populacje ryb, zwłaszcza w przypadku małych zbiorników wodnych, daje w efekcie to, że w każdym takim zbiorniku mamy do czynienia tylko ze swoistym fenotypem.

10. Autorzy sugerują także konieczność poddania rewizji pozostałych trzech podgatunków: *Ph. percunurus mantchuricus* BERG, *Ph. percunurus stagnalis* WARPACHOWSKI i *Ph. percunurus sachalinensis* BERG, występujących na terenie ZSRR, Korei i Chin Północnych.

РЕЗЮМЕ

Настоящая работа является ревизией подвидов озерного гольяна (*Ph. percunurus dybowskii* LOR. et WOL., *Ph. percunurus gdaniensis* BERG и *Ph. percunurus occidentalis* KAJ), описанных из территории Польши, произведенной на основании анализа меристических и пластических признаков. Работа базируется на материалах, собранных в многих пунктах на территории Польши (карта 1) и серии экземпляров из бассейна р. Яны (всего 525 особей), а также библиографических данных. Отдельная глава в работе посвящена половому диморфизму озерного гольяна из Польши. Подробно рассмотрен вопрос место-нахождения озерного гольяна в Польше, характер водоемов, где он встречается, и влияние хозяйственной деятельности человека на его распространение. На основании анализа всех выше указанных материалов авторы приходят к следующим выводам:

1. Относительно числа чешуй в боковой линии *Ph. percunurus* (PALLAS) — данные BERGA (1949), который приводит 70–80 чешуй, должны быть значительно расширены. На основании анализа материала из Польши, Сибири и различных мест европейской

территории СССР авторы принимают в качестве пределов колебания этого признака 65–89 чешуй. Подвид *Ph. percnurus dybowskii* LOR. et WOL., число чешуй которого должно было быть выше 80 (83–97), был выделен в результате ошибочных просчетов Лорца и Вольского (LORES и WOLSKI, 1910). Авторы настоящей работы проверили величину этого признака на 9 синтипах, хранящихся в коллекциях Зоологического института ПАН в Варшаве, и 43 новых экземплярах, собранных авторами в *Iocus turicus*, и обнаружили, что в действительности число чешуй у них колеблется в пределах 70–80, в связи с чем этого гольяна следует причислить к типичной форме, а название *Ph. percnurus dybowskii* LOR. et WOL. отнести к синонимам *Ph. percnurus percnurus* (PALLAS).

2. В спинном и анальном плавнике встречается в основном 7 ветвистых лучей (считая последний раздвоенный луч за один). Меньшее число лучей (6), а особенно большее (8, 9) встречается спорадически. Приводимая некоторыми авторами (КАJ, 1953; КУЛАМОВИЧ, 1963) величина 8 лучей для большинства экземпляров озерного гольяна из некоторых местонахождений в Польше является, по всей вероятности, результатом того, что последний раздвоенный луч был принят за два.

3. Число позвонков озерного гольяна из Польши колеблется в пределах 36–40, на протяжении всего ареала 36–41. Крайние варианты встречаются спорадически (табл. IV).

4. Число жаберных тычинок в большинстве случаев колебалось в пределах 6–11. Только Карантонис, Кириллов и Мухомедияров (1956) приводят 11–17. Таким образом, вопрос установления числа жаберных тычинок остается открытым.

5. Путем анализа пластических признаков обнаружены широкие пределы колебания их величин. Подвид *Ph. percnurus gdaniensis* BERG был выделен на основании следующих пластических признаков: 1. максимальная величина P в процентах расстояния $P - V$ равна 65%; 2. длина хвостового стебля 16,5–20,5% длины тела; 3. минимальная высота тела в длине хвостового стебля 50–74%. Берг (1932) приводит эти цифры на основании данных Зелиго (SELIGO, 1916) и Кульматыцкого (КУМАТУСКИ, 1920). Олива (OLIVA, 1963) расширил пределы длины хвостового стебля до 21,1% длины тела (средняя величина !) и ввел четвертый признак — отношение минимальной высоты тела к максимальной, величину которого определил „about 48 %”.

Все эти данные не могут быть приняты, так как исследования, проведенные на более многочисленном материале, значительно расширили пределы колебания этих признаков, в связи с чем ликвидировались различия между отдельными подвидами. Гольян из окрестностей Гданьска не отличается по своим морфологическим признакам, ввиду чего название *Ph. percnurus gdaniensis* BERG должно быть отнесено к синонимам *Ph. percnurus percnurus* (PALLAS).

6. Подвид *Ph. percnurus occidentalis* КАJ также был описан на основании пластических признаков и частично габитуса — форма головы. Последний признак также является несущественным, так как даже в пределах одной пробы наблюдается значительная изменчивость формы головы. Среди пластических признаков Кай (КАJ, 1953) придает особое значение факту малого различия между максимальной высотой

тела и длиной хвостового стебля. Однако этот признак не может иметь существенного систематического значения. На таблице VIII видно, какой широкой изменчивости подвергнуто это отношение $(-0,4 - +5,2)$ и как оно изменяется независимо от географического положения местонахождения исследуемых экземпляров.

7. Попытка ревизии озерного гольяна была предпринята уже Кулямовичем (KULAMOWICZ, 1963). Этот автор, анализируя цифровой материал Кульматыцкого (KULMATYCKI, 1920) считает, что следует упразднить подвид *Ph. percunurus gdaniensis* BERG, но оставляет подвид *Ph. percunurus occidentalis* KAJ, исходя из данных относительно толщины хвостового стебля последнего. Однако авторы, как и сам Кулямович, относятся скептически к этому признаку как признаку систематическому.

Сопоставление данных относительно величин систематических признаков озерных гольянов, дополненное литературными материалами, дает чрезвычайно мозаичную картину, что не позволяет авторам согласиться с выводами Кулямовича (KULAMOWICZ 1963), который считает, что озерного гольяна из местонахождений лежащих на запад от Вислы следует рассматривать как „ssp. *occidentalis* KAJ”, а из местонахождений на восток от Вислы как „natio *dybowskii* LOREC et WOLSKI”.

8. Судя по данным собранным до настоящего времени, в Польше встречается только типичная форма *Ph. percunurus percunurus* (PALLAS). Озерный гольян из Польши характеризуется значительным сходством с озерным гольяном из р. Сож и лишь незначительно отличается по некоторым признакам от сибирского озерного гольяна, что можно объяснить отсутствием более многочисленных данных из Сибири.

9. Как свидетельствуют материалы, исследованные авторами, озерный гольян подвержен очень значительной изменчивости, формирующейся в зависимости от климатических условий и условий среды обитания. Неповторимость условий среды, особенно в случае небольших водоемов, обуславливает факт, что в каждом из таких водоемов мы имеем дело с популяцией, характеризующейся своеобразным фенотипом.

10. Авторы выражают также мнение, что необходимо произвести систематическую ревизию остальных трех подвидов озерного гольяна: *Ph. percunurus mantchuricus* BERG. *Ph. percunurus stagnalis* WARPACHOWSKI и *Ph. percunurus sachalinensis* BERG, распространенных на территории СССР, в Корею и Северном Китае.

Plate I

Phoxinus percunurus percunurus (PALLAS). 1, 2 — Male Łąki; 3, 4 — Migowo Górne; 5 — Pułstelnik; 6 — Legionowo. Preserved material, natural size. Phot. T. PŁODOWSKI.

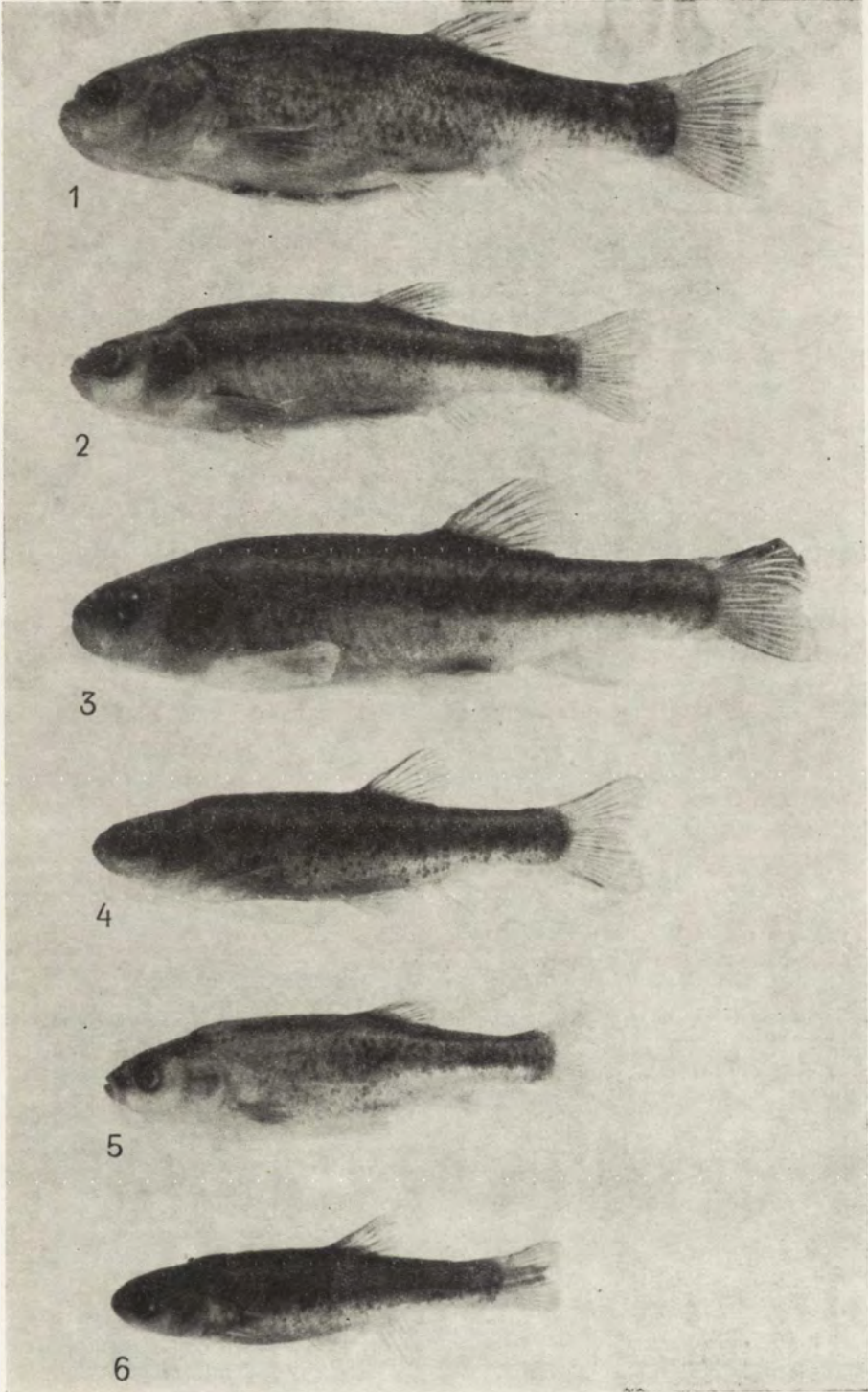
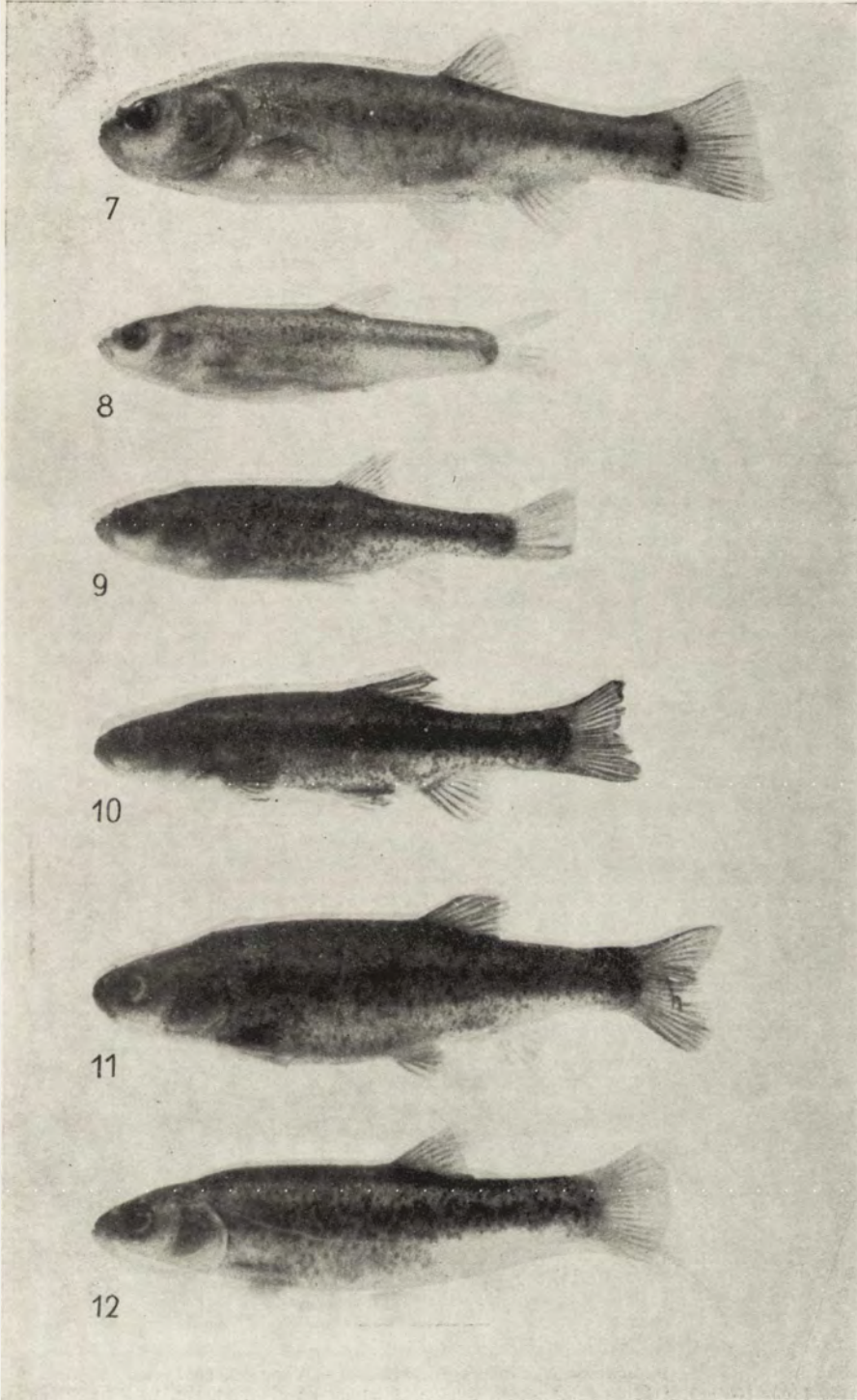


Plate II

Phoxinus percnurus percnurus (PALLAS). 7 — Zielonka; 8, 9 — Jasiień; 10 — Kartuzy;
11 — Warszawa-Choszczówka; 12 — Bukowiec. Preserved material, natural size. Phot.
T. PŁODOWSKI.



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