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РОССИЙСКАЯ АКАДЕМИЯ НАУК
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CONTRIBUTIONS TO THE KNOWLEDGE OF INFRASPECIFIC STRUCTURE OF WHITEFIN GUDGEON, *ROMANOGOBIO ALBIPINNATUS* (LUKASCH, 1933) (CYPRINIDAE: GOBIONINAE), WITH A DESCRIPTION OF A NEW SUBSPECIES, *R. ALBIPINNATUS TANAITICUS*, FROM THE DON DRAINAGE

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External morphological and osteological characters are examined in more than 280 specimens of the whitefin gudgeon from most basins within the range of this species. For the first time, cephalic sensory canals and vertebrae are compared in samples from numerous localities. Variations are revealed in most morphometric, osteological and sensory canal characters. It is shown that the geographic variation in many characters has a mosaic-like pattern, rather than an unidirectional one. Fairly stable are combinations of certain characters in samples within each from river basins. This serves as a basis for considering different geographic groups as subspecies and description of a new one, *Romanogobio albipinnatus tanaiticus*, from the Don River basin.

In an earlier publication (Naseka *et al.,* 1999), a species *Romanogobio albipinnatus* (Lukasch, 1933) was described based upon data from all over its range. Characters are presented which are characteristic for the species in general and those subjected to geographic variations are shown.

Geographic variation of some external characters provided reasons for recognizing three subspecies of whitefin gudgeon (Bănărescu, 1946, 1961; Bănărescu, Nalbant, 1973): *Gobio albipinnatus albipinnatus* Lukasch, 1933, in the Volga River system (probably also Ural and Don), which has the smallest eye and a comparatively deep body; *G. albipinnatus vladykovi* Fang, 1943 from the Danube system, which has a larger eye; and the more distinct *G. albipinnatus belingi* Slastenenko, 1934 from the Dnieper and Dniester systems (probably also Vistula) with the largest eye, lower body and a relatively short head.

Movtchan and Smirnov (1981) have a contrary opinion recognizing only one subspecies all over the range from Danube to Volga. However, they refer *Romanogobio tenuicorpus* (Mori, 1934) as the second subspecies to *Gobio albipinnatus* following Nikolsky and Taranetz (1939), Berg (1949) and Nikolsky (1956).

The comparative morphological study of the gudgeons from the genus *Gobio* auctorum resulted in an extraction of the subgenus *Romanogobio* Bănărescu, 1961 from *Gobio* to the generic level (Naseka, 1996) confirmed a validity of *Romanogobio tenuicorpus* as a distinct species as it was earlier suggested by some authors (Taranetz, 1937; Bănărescu, 1961, 1992; and others).

The present study is devoted to an analysis of infraspecific structure of *R. albipinnatus* basing on examination of variations of significant external and anatomical characters and is working on the question whether there are subspecies within this species.

Material and Methods

In total, over 280 specimens of *Romanogobio albipinnatus* deposited in the collections of the Zoological Institute, Russian Academy of Sciences, St. Petersburg (ZISP) and Natural History Museum of the National Academy of Sciences of Ukraine, Kiev (NMU), were examined from different localities all over the species range:

ZISP 25069 (1, lectotype of *Gobio albipinnatus* Lukasch; River Voya in River Viatka system), ZISP 25070 (1, paralectotype of *Gobio albipinnatus* Lukasch; River Viatka), uncat. (1, River Pyzep in River Viatka system), ZISP 51156 (36, River Moskva), ZISP 51155 (10, Volga delta), ZISP 15154 (1, River Ural at Orenburg), ZISP 29653 (1, lectotype of *Gobio belingi* Slastenenko; River Dnieper), ZISP 51150 (4, paralectotypes of *Gobio belingi* Slastenenko; River Dnieper), ZISP 4734 (2, River Dnieper), uncat. (8, River San), ZISP 35411 (13, River Krish), ZISP 35412 (34, River Timis; 3 osteological preparations from specimens *SL* 58.1–62.4 mm), uncat (18, River Somes), ZISP 23754 (1, River Oskol), NMU 3451 (25, River Desna; 2 osteological preparations from specimens *SL* 96.7, 97.9 mm), NMU 3636 (2, River Trubehz), NMU 3943 (11, Kiev Reservoir), NMU 3635 (11, River Tisza), NMU 776 (10, River Dniester), NMU 3889 (21, River Zbruch; 2 osteological preparations from specimens *SL* 92.3 and 98.8 mm), NMU 3824 (18, River Strypa), NMU 3860 (6, River Western Bug), NMU 3994 (8, River Western Bug), NMU 3458 (12, River Evsyug flowing into River Severski

Donetz), NMU 3634 (4, River Severski Donetz), NMU 3640 (10, River Severski Donetz), NMU 3641 (6, River Severski Donetz), NMU 3661 (7, River Severski Donetz), NMU 4810 (15, River Severski Donetz; 3 osteological preparations from specimens *SL* 68.1–94.4 mm).

All specimens were radiographed. Osteological preparations were made after clearing and staining with alizarin red "S". The last two branched rays in both the dorsal and anal fins are counted as one ray. Pore counts were made from both left and right sides of the head; the number of canal opening on an individual bone includes entry and exit ones. Terminology of vertebral regions and subregions follow those given in Naseka (1996).

Abbreviations used are:

A – anal fin, *D* – dorsal fin, *d. ph.* – number of pharyngeal teeth, *l. l.* – number of lateral line scales on the left side of the body, *SL* – standard length, *sp. br.* – number of gill-rakers on outer/inner side of the first gill arch, *sq. d.* – number of scales above lateral line, *sq. v.* – number of scales below lateral line, *vert.* – total vertebrae, *abd. vert.* – abdominal vertebrae, *interm. vert.* – intermediate vertebrae, *preD vert.* – predorsal abdominal vertebrae, *caud. vert.* – caudal vertebrae, *preA vert.* – preanal caudal vertebrae, *postA vert.* – postanal vertebrae;

cephalic sensory canals: *CIO* – infraorbital canal, *CPM* – preopercular-mandibular canal, *CSO* – supraorbital canal, *CST* – supratemporal canal;

skull measurements: *H eth* – depth of ethmoid region, *H soc* – depth of occipital region, *H spho* – depth of otic region, *L bas. n.* – length of neurocranial base (from anterior end of vomer to posterior end of basioccipital without pharyngeal process), *L eth* – length of ethmoid region, *Lt eth* – width of neurocranium between lateral margins of lateral ethmoids, *Lt spho* – width of neurocranium between lateral margins of sphenotic lateral processes, *Lt pto* – width of neurocranium between lateral margins of pterotics;

Abbreviations used for external measurements in Tabl. 1 follow those accepted for "Freshwater fishes of Europe" by AULA-Verlag (see, for example, Naseka et a1., 1999).

Results and Discussion

A comparative study of external characters, cephalic sensory canals, vertebral column and skull revealed a certain morphological distinctness of groups of samples accordingly with separate river basins. Geographic

variations of most investigated characters do not meet in a scheme of clinal variation an existence of which is a usual argument against subspecies (Holčík, Jedlička, 1994). It should be noted nevertheless that the ranges of most morphometric characters in the populations examined have close limits and a chiatus is not clearly pronounced (Tabl. 1).

Data for a number of meristic characters show that the variations revealed have some mosaic-like pattern, rather than clinal – latitudinal or longitudinal – one. For example, there is no ordered variation in the numbers – ranges or averages – of cephalic sensory pores in the individual canals within a river basin or among basins. If the general vertebral pattern is concerned, the samples from the Vistula drainage have more in common with the samples from Dnieper and Volga, geographically quite remote from Vistula, than with the sample from nearest rivers of the Danube system. A west-east tendency in increasing total vertebrae is interrupted by the populations in the Severski Donetz and Oskol Rivers in the Don River system, which differs in having markedly lower counts from neighbouring Dnieper and Volga. In the Don populations markedly reduced is also the number of abdominal vertebrae, a count which does not vary between all other populations (Tabl. 2).

To summarize, morphologically uniform groups of populations are connected with four groups of river systems while variation within a single river system is not found. For example, samples from remote localities within the Dnieper system – from the Lower Dnieper and from the Middle Dnieper tributaries – do not differ while the samples from the Severski Donetz and Oskol Rivers (Don tributaries) are considerably different from those from the Middle Dnieper left-hand tributaries which are geographically very close.

Unique complexes of some external morphometric and meristic characters as well as certain features in vertebral and sensory canal structure characteristic for different groups of populations of whitefin gudgeon and their connection with different river basins provide good reasons to consider the four groups of *R. albipinnatus* as subspecies.

Key for identification of the subspecies of *Romanogobio albipinnatus*

1(2) Lateral line scales 44 and more; total vertebrae (40, 41)42–44; eye diameter usually less than interorbital width. Ural and Volga River basins . . . . . *R. a. albipinnatus*

2(1) Lateral line scales less than 44; total vertebrae usually less than 43

3(4) Snout length usually greater than postorbital distance; total vertebrae (40)41, 42(43); eye diameter commonly greater than interorbital width. Dnieper, Dniester, Vistula River basins . . . . . *R. a. belingi*

4(3) Snout length usually less than postorbital distance; total number of vertebrae 39–42(43), commonly 40 or 41

5(6) Total vertebrae 40–42(43), commonly 41; preanal caudal vertebrae 4 to 6, commonly 5; *V–an* distance 31–51% of *V–A*. Don River basin . . . . . *R. a. tanaiticus*

6(5) Total vertebrae 39–41(42), commonly 40; preanal caudal vertebrae 2 to 4, commonly 3; *V–an* distance 41–61% of *V–A*. Danube system . . . . . *R. a. vladykovi*

Romanogobio albipinnatus albipinnatus (Lukasch, 1933) – Volga whitefin gudgeon

Gobio uranoscopus (non Agassiz) – Kessler, 1870: 254 (partim: River Volga at Kazan'; Kama River); Sabaneyev, 1911: 139 (partim: River Oka); Berg, 1914: 464 (partim: Middle Volga River, Lower Kama River, Oka and Moskva Rivers); Shmidtov, 1956: 223 (River Volga at Kuibyshev)

Gobio ex gr. *uranoscopus* Berg, 1932: 412 (partim: rivers in the Volga system)

Gobio albipinnatus Lukasch, 1933: 57 (River Viatka in the Volga basin and its tributaries Kil'mez', Adzhimka, Buia, Voia and Shoshma)

Gobio albipinnatus – Berg, 1949: 654 (Volga and Kama Rivers); Viktorov, 1992: 42 (Tveretz River)

Gobio albipinnatus albipinnatus – Bănărescu, 1961: 335 (River Viatka); Bănărescu, Nalbant, 1973: 154 (excluding River Don); Bănărescu, 1992: 321 (excluding River Don)

Gobio ex gr. *uranoscopus* – Erofeyev, 1982: 108 (rivers in the Kuibyshev Province)

The description of *Gobio albipinnatus* by Lukasch is based on 42 specimens (six specimens are described in details and 36 mentioned as "additional material"). From this type-series, two specimens are deposited in ZISP, №№ 25069 and 25070, the first one is designated as a lectotype by Bănărescu and Nalbant (1973).

Lectotype: ZISP 25069, *SL* 59.5 mm, Voia River (a tributary of River Viatka), 21.VIII.1928, coll. B. Lukasch; *l. l.* 44, *sq. d.* 6, *sq. v.* 4, *D* III 7, *A* III 6, *P* I 14, *V* II 7, *sp. br.* 3, *d. ph.* 3.5–5.3; *vert.* 42; *abd. vert.* 20; *caud. vert.* 22.

Paralectotype: ZISP 25070, *SL* 110.0 mm, Viatka River at Staryje Bakury, 29.V.1930, coll. B. Lukasch; *l. l.* 44, *sq. d.* 6, *sq. v.* 4, *D* III 7, *A* III 6, *P* I 16, *V* II 7, *sp. br.* 2, *d. ph.* 3.5–5.3; *vert.* 42; *abd. vert.* 20; *caud. vert.* 22.

Diagnosis: *D* III 7; *P* I (14, 15)16(17); *l. l.* 44(45); *sp. br.* 1–3/7–9; *vert.* (40,41)42, 43(44); *abd. vert.* (19)20(21); *caud. vert.* (21)22, 23(24);

Measurements of four

	R. a. albipinnatus				*R. a. tanaiticus* ssp. n.			
	Lectotype ZISP 25069	n=19			Holotype NMU 3661-1	n=54		
	мм,	*lim*	*M*	s	*мм*	*Lim*	*M*	*s*
Sl, мм	59.5	59.5 -110.0	83.00	-	99.4	63.5 –107.0	81.42	-
	мм,	% of *Sl*			*мм*	% of *Sl*		
H	10.1	15.0-21.2	18.00	2.18	18.0	15.4-21.1	17.78	1.21
h	4.3	5.9- 7.7	6.97	0.60	7.5	6.6- 8.4	7.36	0.44
max *laco*	7.5	10.5-15.6	12.96	1.89	13.5	9.9-15.0	12.82	1.07
min *laco*	2.5	3.2- 4.2	3.70	0.30	3.8	3.1- 5.5	3.94	0.53
pD	27.0	42.6-46.0	44.38	1.14	44.5	42.0-47.9	44.78	1.25
poD	27.3	42.7-46.0	44.38	1.13	45.5	41.1-47.6	44.58	1.39
pV	28.0	47.0-50.5	48.24	1.18	46.5	45.6-51.0	47.75	1.39
pA	42.8	67.7-72.9	70.94	1.83	70.3	66.4-73.6	70.48	1.61
P-V	14.8	24.5-30.4	27.34	2.18	24.5	23.0-29.0	25.99	1.51
V-A	14.2	21.4-25.5	23.96	1.49	25.5	20.6-27.4	23.92	1.28
lpc	13.8	20.4-23.2	21.96	1.10	20.8	18.9-24.4	21.70	1.33
lD	7.9	11.9-13.6	12.73	0.62	13.7	11.7-14.3	13.24	0.58
hD	13.9	20.7-25.1	22.35	1.43	20.5	18.8-24.5	21.06	1.21
lA	4.1	6.8- 8.5	7.71	0.73	8.8	7.2-10.2	8.46	0.52
hA	9.2	15.4-18.0	16.12	0.84	15.1	14.0-17.9	16.33	0.96
lP	13.0	17.7-22.5	19.94	1.85	16.8	16.2-21.1	18.41	1.07
lV	10.0	15.3-18.0	16.58	0.93	13.4	13.7-18.4	15.86	0.92
lc	13.9	22.2-24.1	22.97	0.65	22.6	20.6-24.3	22.31	0.88
V-an	5.5	8.9-10.9	9.77	0.70	10.5	7.4-12.0	9.39	0.89
% of *V-A V-an*		31.2-43.2	39.16	3.81		31.4-50.9	39.35	3.66
	мм	% of *lc*			*мм*	% of *lc*		
hc	7.3	47.0-63.3	56.16	3.38	13.0	54.3-65.6	60.07	2.56
hco	5.5	38.4-50.6	44.60	3.41	10.2	44.1-57.1	48.81	2.59
prO	5.0	32.1-46.2	37.54	4.32	8.0	33.0-41.0	37.41	1.74
Oh	3.5	22.8-29.0	25.54	1.81	6.0	24.2-31.0	27.38	1.47
poO	5.5	36.7-43.9	41.18	2.34	9.4	33.3-46.1	38.80	2.33
lac	7.4	45.9-62.9	53.11	4.73	13.5	49.7-64.1	56.45	3.08
io	3.0	20.6-31.3	24.85	3.27	5.2	18.2-27.6	22.61	1.65
lb	4.5	29.0-40.4	33.31	3.20	7.3	27.6-51.8	36.72	4.18
			% of *io*					
Oh		75.0-131.4	104.66	16.40		88.9-150.0	121.82	11.30

preA vert. 4, 5(6).

Description. Morphometric data are given in Tabl. 1. The body is shallow, laterally compressed. Maximum depth and width of the body

Table 1

subspecies of *Romanogobio albipinnatus*

R. a. belingi				*R. a. vladykovi*		
ЗИН 29653-1	n=99			n=32		
мм	*lim*	*M*	s	*lim*	*M*	s
71.7	49.0 -110.0	78.52	-	39.0-93.0	60.42	-
мм	% of *Sl*			% of *Sl*		
11.5	14.7-22.9	18.85	2.05	15.8-22.6	18.58	1.70
6.5	6.8- 9.0	8.05	0.48	7.2-10.0	8.14	0.54
8.5	10.6-17.5	13.84	1.29	10.7-16.9	12.98	1.40
3.0	3.0- 6.3	4.50	0.66	3.6- 6.0	4.42	0.58
33.5	42.1-49.0	45.77	1.41	42.7-50.0	46.84	1.45
31.5	40.0-48.6	43.21	1.44	39.2-45.1	42.39	1.37
36.0	45.7-53.1	48.97	1.60	45.8-52.7	48.75	1.53
51.0	69.1-75.0	71.43	1.44	66.9-75.0	70.79	1.69
19.1	19.4-30.1	26.27	1.56	21.1-29.0	24.47	1.35
16.5	20.6-26.0	23.50	1.17	17.9-25.2	23.04	1.35
15.5	17.0-24.0	20.93	1.52	19.0-23.9	21.44	1.15
9.5	11.3-15.4	13.13	0.89	11.7-17.0	13.82	1.03
16.4	19.4-25.0	22.31	1.37	21.5-28.0	24.13	1.39
5.5	6.0- 9.6	8.13	0.66	6.00- 9.68	8.24	0.83
12.5	14.9-19.1	17.09	1.03	15.0-19.6	17.92	0.93
15.2	17.6-22.7	20.25	1.08	18.0-24.0	20.79	1.38
12.5	14.5-19.5	16.85	1.10	13.5-19.0	16.94	1.03
18.0	21.2-25.8	23.29	0.98	22.3-27.3	24.24	1.20
7.0	8.8-13.7	10.99	1.10	9.2-13.7	11.55	1.02
% of V-A V-an	38.2-57.1	46.29	3.64	41.2-60.7	50.31	5.76
мм	% of *lc*			% of *lc*		
10.4	51.5-76.7	61.41	3.78	55.2-68.6	61.82	2.96
9.6	39.4-63.2	50.84	4.56	46.1-62.9	52.06	4.08
7.3	34.6-45.7	39.66	2.38	32.0-44.4	36.81	3.86
4.6	22.5-33.3	26.83	2.34	23.8-36.0	29.45	2.97
7.1	30.5-43.3	38.53	2.40	33.7-51.5	40.07	3.09
9.5	51.8-71.0	62.54	4.41	54.3-69.6	58.35	3.56
3.7	19.3-29.0	24.33	2.22	22.2-31.6	25.68	2.20
7.0	28.5-47.2	37.50	3.97	29.4-48.2	37.46	4.03
% of *io*						
	84.6-140.0	113.25	12.43	78.6-150.0	115.69	10.16

are comparatively low. The caudal peduncle is elongated, its length exceeds the minimum body depth by an average factor of 3.1 The dorsal fin is located almost in the middle of the body, the predorsal distance (M=44.7% SL) is about equal to the postdorsal distance (M=44.4% SL).

The anus is markedly closer to the pelvic fin insertion than to the anal fin origin (*V–an* distance is always much less than 1/2 of *V–A* distance, *M*=39.16% of *V–A*).

The head is shallow and narrow, relatively short, its length exceeds the maximum body depth by an average factor of 1.4. The snout is moderately long (*M*=37.5% of *lc*), its length is considerably less than postorbital distance (*M*=41.2% of *lc*). The eye is the smallest among those in all other subspecies, its diameter averages 25.5% of *lc* which is 0.8 to 1.3 times the interorbital distance. The barbel is long, sometimes reaches the vertical of the posterior margin of the eye.

The gill-rakers on the outer side of the first arch are lacking or short, 1 to 3, there are 7 or 8 gill-rakers on the inner side of the same arch.

There are 44 or 45 lateral line scales (*M*=44.4). The lateral branch of the *CSO* communicates with the *CIO* in 43% of the canals, while in 57% lacking such an interconnection, the lateral branch terminates in a free pore. Among specimens examined, 28% have the *CSO–CIO* interconnection on both sides of the head while in 43% of the specimens such an interconnection is absent from both sides.

The number of total vertebrae varies between 40 and 44 with a mode of 43 (54%). The abdominal vertebrae number 19 to 21, with 20 occurring in 80% of the specimens. The number of predorsal vertebrae varies from 10 to 12, with 11 occurring in 84%. The number of intermediate vertebrae ranges from 4 to 6 with a mode of 5 (55%). The number of vertebrae in the caudal region is 21 to 24, and there are 22 or 23 in 47% and 45% of the specimens, respectively. There are many preanal caudal vertebrae, 4 to 6, commonly 5 (51%). The postanal vertebrae number 16 to 19, with a mode of 18 occurring in 49% of the specimens. The formulae showing the abdominal + the caudal vertebrae that are most frequently encounted are 20+22 and 20+23, which occur in 33% and 43% of the specimens, respectively. In general, *R. a. albipinnatus* is characterized by a high number of preanal caudal vertebrae and a greater number of caudal than abdominal vertebrae, which is the case in almost all (98%) of the specimens (Tabl. 2). The rest 2% had equal numbers of the abdominal and caudal vertebrae.

The skull is examined in one specimen. Depth of the neurocranium in different regions – *H eth*, *H spho* and *H soc* – is 20.3, 28.1 и 28.8% of *L bas. n.*, respectively. Width of the neurocranium in different regions – *Lt eth*, *Lt spho* and *Lt pto* – is 43.8, 48.4 и 53.6% of *L bas. n.*, respectively. The ethmoid region is relatively long, *L eth* is 28.8 % of *L bas. n.*, but the vomer is shortened and its head is only slightly protructed relative to

Table 2

Vertebral counts (averages and frequences of occurrence) in four subspecies of *Romanogobio albipinnatus*

Subspecies, river basin, n		*R. a. albipinnatus* Volga, Ural, n=49	*R. a. tanaiticus* Don, n=55	*R. a. belingi* Vistula, Dniester, Dnieper, n=85	*R. a. vladykovi* Danube, n=46
Vert.	*M*	42.5	41.3	41.7	40.1
	39	-	-	-	3
	40	1	3	5	31
	41	2	34	29	11
	42	18	17	41	1
	43	26	1	10	-
	44	2	-	-	-
Abd. vert.	*M*	20.0	19.1	20.0	20.0
	18	-	9	1	-
	19	4	31	13	4
	20	39	14	58	38
	21	6	1	13	4
Caud. vert.	*M*	22.5	22.2	21.7	20.1
	19	-	-	1	4
	20	-	-	2	29
	21	2	5	32	12
	22	23	37	39	1
	23	22	13	10	-
	24	2	-	1	-
PreA vert.	*M*	4.8	4.9	4.1	2.9
	2	-	-	-	8
	3	-	-	11	33
	4	15	13	57	5
	5	30	35	20	-
	6	4	7	-	-
PostA vert.	*M*	17.7	17.3	17.6	17.2
	16	4	6	7	3
	17	11	30	34	28
	18	29	18	37	14
	19	5	1	7	1

the anterior margin of the mesethmoid. The first infraorbital and the palatine are comparatively short, their length 34.6 and 22.9% of *L bas. n.*, respectively. The hyomandibular and operculum is not deep, their depth 37.3 and 39.9% of *L bas. n.*, respectively.

Comparative remarks. *Romanogobio albipinnatus albipinnatus* is characterized by a relatively shallow and narrow body, a narrow and long caudal peduncle, a shallow and short head, smaller scales in the lateral line. The anus is always placed closer to the pelvic fin insertion, so that the *V–an* distance is markedly less than 1/2 of *V–A*. By having the predorsal and postdorsal distances about equal, Volga whitefin gudgeon is closer to the subspecies from River Don. Its snout length is

between that of the "short-snouted" Danube gudgeon and that of the Don gudgeon while its postorbital distance is longest among those in all other subspecies. The eye diameter is relatively low while width of the interorbital space is comparatively large like that in the Danube subspecies.

Sensory canal topography is characterized by a high frequency of occurrence of disconnected *CSO* and *CIO* as it is also found in *R. a. tanaiticus* ssp.n. However *R. a. albipinnatus* differs from the latter by more frequent specimens with the *CSO–CIO* interconnection on ones side of the head and less frequent specimens with this interconnection on both sides.

Peculiar features of this subspecies are also a high total number of vertebrae and a comparatively high number of caudal vertebrae (Tabl. 2). By the number of abdominal and postanal caudal vertebrae the Volga subspecies is markedly different from the Don subspecies but close to the latter by having a high number of preanal caudal vertebrae. The Volga and Dnieper subspecies share the same on the average number ofabdominal and postanal vertebrae.

Distribution. *Romanogobio albipinnatus albipinnatus* is distributed in the basins of the Volga and Ural Rivers. In the Volga River system, the species is spread from the upper reaches downstream to the delta including the tributaries. Specimens have been found in the Volga River at Kazan' and in northeastern tributaries, including the Kama and Viatka. It is also found in the Tveretz River, in the Rybinsk Reservoir and at Yaroslavl' in the Upper Volga, in the right tributary Oka River with a tributary, the Moskva River, and in the Lower Volga at Astrakhan'. The species is also found in the Ural River at Orenburg (ZISP 51154).

Romanogobio albipinnatus belingi (Slastenenko, 1934) –

Dnieper whitefin gudgeon

Gobio uranoscopus (non Agassiz) – Berg, 1914: 464 (partim: Dnieper)

Gobio ex gr. *uranoscopus* Берг, 1932: 412 (partim: Dnieper)

Gobio Belingi Slastenenko, 1934: 350, Fig. 2, 3, Tabl. 1. (upper and middle Dnieper River)

Gobio albipinnatus – Berg, 1949: 654 (partim: Dnieper); Markevitch, Korotki, 1954: 108 (Ukraine; excl. Oskol River in the Don system); Brylinska, 1991: 244 (Vistula, San)

Gobio albipinnatus belingi – Bănărescu, 1961: 335 (Dnieper); Bănărescu, Nalbant, 1973: 153 (Dniester, Dnieper, (?) Southern Bug); Popa, 1977: 26 (Dniester); Brnrrescu, 1992: 321 (partim: Dnieper, Dniester, (?) Lake Il'men, Vistula)

Gobio albipinnatus albipinnatus – Movtchan, Smirnov, 1981: 338 (partim: Dnieper)

Lectotype (designated herein): ZISP 29653, *SL* 71.7 mm, "Dniepr pres du bois de Lioubimov", 30.VIII.1929; *l. l.* 44; *sq. d.* 6, *sq. v.* 4; *D* III 7; *A* III 6; *P* I 15; *V* II 7; *sp. br.* 3/10; *d. ph.* 3.5–5.3; *vert.* 42; *abd. vert.* 20; *caud. vert.* 22.

Paralectotypes: ZISP 51150 (4 specimens), the same locality and date, *SL* 47.0–68.5 mm; *l. l.* 43, 44; *sq. d.* 5, 6, *sq. v.* 4; *D* III 7; *A* III 6; *P* I 15; *V* II 7; *sp. br.* 1, 2/8–10; *d. ph.* 3.5–5.3; *vert.* 21, 22; *abd. vert.* 20, 21; *caud. vert.* 21, 22.

Diagnosis: *D* III 7; *P* I (14)15, 16(17); l. l. (41)42, 43(44); *sp. br.* 1–3/6–11; *vert.* (40)41, 42(43); *abd. vert.* (18, 19)20(21); *caud. vert.* (19, 20)21, 22(23, 24), *preA vert.* 3–5.

Description. Morphometric data are given in Tabl. 1. The body is comparatively deep and wide. The caudal peduncle is relatively deep, its length exceeds the minimum body depth by an average factor of 2.5. The dorsal fin is located behind the middle of the body, the predorsal distance (*M*=45.7% *SL*) is slightly larger than the postdorsal distance (*M*=43.2% *SL*). The anus is located at about the middle of the *V–A* distance (*V–an* averages 46.3% of *V–A*), in some specimens the anus is closer to the anal fin origin than to the pelvic fin insertion.

The head at the nape is deep, a little bit shallower on the vertical through the eye. Its length exceeds the maximum body depth by an average factor of 1.2. The snout is the longest one among those of all other subspecies (*M*=39.7% of *lc*), its length usually slightly exceeds the postorbital distance. The eye diameter averages 26.8% of *lc* which is larger than the interorbital distance (*M*=24.3% of *lc*). There are rare specimens with the eye diameter less than the interorbital distance. The barbel is long, reaches the vertical through the middle of the eye and sometimes attains behind the vertical of the posterior eye margin.

There are 6 to 11 gill-rakers on the inner side of the first gill arch.

There are 41 to 44 lateral line scales with a modal range of 42 (34%) and 43 (43%). The lateral branch of the *CSO* communicates with the CIO in 77% to 100% of the canals depending on a sample. Respectively, 0 to 23% lack such an interconnection. Among specimens examined, 28% have the *CSO–CIO* interconnection on both sides of the head while in 43% of the specimens such an interconnection is absent from both sides.

In the *CSO* there are 7 to 10, commonly 8 (84 %) pores. In the *CIO* 13 to 19, usually 15 (39%) or 16 (29%) pores, in the *CPM* 12 to 17, commonly 14 (31%) or 15 (39%) pores, in the *CST* 3 to 8, often 5 (86 %).

The number of total vertebrae varies between 40 and 43, commonly 41 (41%) or 42 (48%). The abdominal vertebrae number 18 to 21, with 20 occurring in 68% of the specimens. The number of predorsal abdominal vertebrae varies from 10 to 12, with 11 occurring in 81%. The number of intermediate vertebrae ranges from 3 to 6 with a mode of 5 (49%). The number of vertebrae in the caudal region is the most variable – from 19 to 24, 21 and 22 vertebrae met in 38% and 46% of specimens, respectively. There are 3 to 5, with a mode of 4 (67%), preanal caudal vertebrae. The postanal caudal vertebrae number 16 to 19, with a mode of 18 occurring in 45% of the specimens. The vertebral formulae are 20+21 and 20+22, which occur in 25% and 32% of the specimens, respectively. In general, *R. a. belingi* is also characterized by a greater number of caudal than abdominal vertebrae (found in 87% of the specimens) but the difference is about one vertebrae less than that in *R. a. albipinnatus*. Some specimens (10%) had equal numbers of the abdominal and caudal vertebrae and few of them (3%) had a greater number of abdominal vertebrae.

Measurements of the skull depth, *H eth*, *H spho* and *H soc*, are, respectively, 15.7–17.4, 24.3–27.0, 25.2–28.7% of *L bas. n.* Measurements of the skull width, *Lt eth*, *Lt spho* and *Lt pto*, are, respectively, 38.6–45.8, 42.9–48.7 and 50.0–56.8% of *L bas. n.* The ethmoid region of the neurocranium is comparatively long, its length is 25.7–30.0% of *L bas. n.* The vomer is somewhat elongated, its head is protructed anteriad relative to the anterior margin of the mesethmoid to more than 1/2 of its length. Length of the first infraorbital is 33.8–37.9% of *L bas. n.*, length of the palatine 21.4–26.0% of *L bas. n.* The operculum is deep, its depth constitutes 39.5–44.3% of *L bas. n.*, depth of the hyomandibular is 36.2–39.5% of *L bas. n.*

Comparative remarks. *Romanogobio albipinnatus belingi* differs from the other subspecies by a deeper and wider body, a shortened caudal peduncle. Only in this subspecies the snout is longer than the postorbital distance. This ratio is found in all samples from Dnieper as well as in those from Dniester and Vistula. A relatively small eye diameter is a feature shared with *R. a. albipinnatus* while the ratio between the eye diameter and the interorbital distance is similar to that characteristic for the Danube subspecies. The number of scales in the lateral line is closer to that found in the Don subspecies. A higher average number of the branched pectoral fin rays makes the Dnieper, the Don and the Volga subspecies different from the Danube gudgeon. On the other hand,

R. a. belingi shares with *R. a. vladykovi* a high frequency of occurrence of the *CSO–CIO* interconnection.

The Dnieper whitefin gudgeon differs from all other subspecies by the general vertebral pattern. Total number of vertebrae is higher than in the Danube and the Don subspecies. The caudal and preanal caudal vertebrae are fewer in *R. a. belingi* when compared to those in *R. a. albipinnatus* and *R. a. tanaiticus* ssp. n. but much more numerous when compared to *R. a. vladykovi*.

Distribution. In River Dniester, the subspecies occurs from its upper and middle sections in Ukraine downstream almost to the mouth of the river in the Black Sea.

In the Dnieper drainage area, *R. a. belingi* is widely distributed, being present from the middle to the lower sections of the Dnieper itself and such tributaries as the Pripiat', Desna, Seim, Psiol, Vorskla, Ros', and Trubezh.

Its known range in the Vistula River system includes the Vistula proper between Warsaw and Nieszawa, its eastern tributary, the Narew River, and the Western Bug in Ukraine.

Romanogobio albipinnatus vladykovi (Fang, 1943) –

Danube whitefin gudgeon

Gobio uranoscopus (non Agassiz) – Berg, 1914: 464 (partim: Danube)

Gobio gobio carpathicus x *Gobio persa carpathorossicus* Vladykov, 1931: 285 (tributaries of the upper Tisza River; Lake Cahul in the Danube delta)

Gobio vladykovi Fang, 1943: 403 (Lake Cahul in the Danube delta)

Gobio belingi (non Slastenenko) – Bănărescu, 1946: 143 (Rivers Banat, Bega and Timis, middle Danube River basin)

Gobio albipinnatus vladykovi – Bănărescu, 1961: 334 (Danube); Bănărescu, Nalbant, 1973: 151 (Danube with tributaries from the upper reaches in Austria downstream to the delta); Popa, 1977: 24 (Rivers Danube, Prut); Bănărescu, 1992b: 321 (Danube)

Gobio albipinnatus albipinnatus (non Lukusch) – Movtchan, Smirnov, 1981: 338 (partim: Danube from Bratislava downstream to the delta)

Holotype: Museum nationale de l'Histoire naturelle, Paris, № 25–4.

Diagnosis: *D* III 7(8); *P* I (13)14(15); l. l. (39, 40)41, 42(43, 44); *sp. br.* 2–4/7–9; *vert.* (39)40, 41(42); *abd. vert.* (19)20(21); *caud. vert.* (19)20(21, 22), *preA vert.* 2, 3(4).

Description. Morphometric data are given in Tabl. 1. The body is comparatively deep, slightly laterally compressed in its anterior part. The caudal peduncle is not rather elongated, its length exceeds the minimum body depth by an average factor of 2.6. The dorsal fin is located behind the middle of the body, the predorsal distance (*M*=46.8% *SL*)

markedly exceeds the postdorsal distance (*M*=42.4% *SL*). The anus has the most posterior position, it is markedly closer to the anal fin origin than to the pelvic fin insertion (*V–an* distance is often larger than 1/2 of *V–A* distance being up to 61% of *V–A*, M=50.3% of *V–A*).

The head is deep and the longest one among those of the other subspecies, its length exceeds the maximum body depth by an average factor of 1.3 The snout is not long (*M*=36.8% of *lc*), its length is almost always less than the postorbital distance. The eye is large, its diameter averages 29.5% of *lc* which is 0.8 to 1.5 times the interorbital distance. The barbel is long, but does not reach behind the vertical of the posterior margin of the eye.

There are 7 to 9 gill-rakers on the inner side of the first gill arch.

There are 39 to 4 lateral line scales (*M*=41.6). The *CSO* communicates with the CIO in 95–100% of the specimens depending on a sample. In the *CSO* there are 7 to 10 pores with a distinc mode of 8 found in 86% of the canals. In *CIO* there are 14 to 18, commonly 15 or 16 found in 33 and 43% of the canals, respectively. The *CPM* pores ranges between 12 (very rarely) and 17, 14 and 15 pores found in 30 and 35% of the canals, respectively. There are 4 to 6 *CST* pores with a mode of 5 (87%).

Romanogobio albipinnatus vladykovi is characterized by the lowest number of vertebrae (Tabl. 2) – the number of total vertebrae varies between 39 and 42 with a distinct mode of 40 (67%). The abdominal vertebrae number 19 to 21, with 20 occurring in 83% of the specimens. The number of vertebrae in the caudal region is also commonly (63%) 20, so that the most frequently met vertebral formulae is 20+20 (53%). The number of predorsal vertebrae is 10 (20%) or 11 (80%). The number of intermediate vertebrae ranges from 4 to 6 with a mode of 5 (67%). There are few preanal caudal vertebrae, 2 to 4, commonly 3 (72%). The postanal vertebrae number 16 to 19, with a mode of 17 occurring in 61% of the specimens. In general, *R. a. vladykovi* is characterized by a low number of preanal caudal vertebrae and a high frequency of occurrence (55%) of specimens with equal numbers of abdominal and caudal vertebrae. Only 36% of specimens have a greater number of caudal than abdominal vertebrae, and the rest 9% have a greater number of abdominal than caudal vertebrae.

Depth of the neurocranium in its different regions – *H eth*, *H spho* and *H soc* – is 17.4–18.8, 25.8–26.6, 27.3–30.5% of *L bas. n.*, respectively. Width of the neurocranium – *Lt eth*, *Lt spho* and *Lt pto* – is 43.8–44.4, 50.0–52.3, 53.8–57.3% of *L bas. n.*, respectively. The ethmoid

region is relatively shortened, *L eth* is 22.7–24.2% of *L bas. n.* The vomer is short, its head is only slightly protructed relative to the anterior margin of the mesethmoid. The first infraorbital is short, its length is 31.8–35.5% of *L bas. n.* The palatine length is 20.2–22.7% of *L bas. n.* The hyomandibular is not deep, its depth is 37.9–39.1% of *L bas. n.*

Comparative remarks. *Romanogobio albipinnatus vladykovi* is slightly different from the other subspecies by the following external characters: a deeper caudal peduncle, long predorsal and short postdorsal distances, a posterior position of the anus which located about the middle of the V–A distance, rather than closer to the pelvic fin insertion, a lower number of lateral line scales and a lower number of the pectoral fin branched rays. This subspecies has also a comparatively long head (*M*=24.2% *SL*) which is deeper at the nape and on the vertical through the middle of the eye, and a larger eye. The ratio of the eye diameter and the interorbital distance is similar to that in *R. a. tanaiticus* ssp. n.

An extremely high frequency of occurrence of the *CSO–CIO* interconnection is a character shared by only *R. a. vladykovi* and *R. a. belingi*.

The vertebral pattern is the most distinguishing character set of *R. a. vladykovi*: the fewest total vertebrae (40.1 on the average), a common equality of the abdominal and caudal regions (20+20), a low number of preanal caudal vertebrae (no more than 4).

Distribution. Accoring to Naseka and co-authors (1999) who summarized the data from a wide list of literature and their personal data, this subspecies is present in the Danube itself downstream from Neuburg as far as the river mouth in the Black Sea. It is the most abundant gudgeon in Austrian part of the Danube. It is the only gudgeon present in the middle Danube from Budapest to the Iron Gate and beyond. The westernmost tributary of the Danube that it inhabits is the Morava River in the Chech Republic and Austria. It is also present in the Vah and Hron Rivers of western Hungary, in the middle and lower Sava River of Croatia and Serbia, and in the Tisza River from its upper stretches to its confluence with the Danube including northern tributaries in Slovakia, Hungary and Ukraine. It is abundant in the Banat of southwestern Romania and northeastern Serbia, where it inhabits northern tributaries of the Danube, including the Bega, Timis, Caras, Nera, and Cerna Rivers. In the lower Danube system, it is found in the main northern tributaries crossing Romania including Jiu, Olt, Vedea, Arges, Ialomita, Prut, Siret, and its tributaries, the Buzau. It occurs in the southern tributaries of the Danube in Bulgaria.

Romanogobio albipinnatus tanaiticus ssp.n. –

Don whitefin gudgeon (Fig. 1).

Gobio uranoscopus (non Agassiz) – Sabaneyev, 1911: 139 (partim: River Serdoba in the Don River system); Берг, 1914: 464 (partim: River Serdoba in the Don River system)

Gobio ex gr. *uranoscopus* Берг, 1932: 412 (partim: River Oskol at Novyi Oskol)

Gobio albipinnatus – Berg, 1949: 654 (partim: Don); Dentschik, 1994: 14 (Severski Donetz, Derkul, Aidar and Lugan' Rivers)

Gobio albipinnatus albipinnatus (non Lukasch) – Bănărescu, Nalbant, 1973: 154 (partim: The Don River system); Movtchan, Smirnov, 1981: 338 (partim: River Don with the Severski Donetz tributary); Bănărescu, 1992b: 321 (partim: the Don River system)

Etymology. The subspecies name *tanaiticus* is derived from the ancient Greek name of River Don, Tanais, a type-locality of the subspecies.

Holotype: NMU 3661–1, *SL* 99.4 mm; River Severski Donetz, 7–8 km upstream from Izium, 18, 20.IX.1987; coll. Yu. Movtchan, Yu. Rabtzevitch; l. l. 43; *sq. d.* 6; *sq. v.* 4; *D* III 7; A III 6; *P* I 15; *V* II 7; *sp. br.* 2/9; *d. ph.* 3.5–5.3; *vert.* 41; *abd. vert.* 19; *caud. vert.* 22.

Paratypes: ZISP 23754 (1), *SL* 66 mm, River Oskol; ZISP 52276 (1), Don system, Tsymlyanskoje Reservoir; NMU 3458 (12), *SL* 72.0–95.5 mm, River Severski Donetz at mouth of River Evsiug; NMU 3634 (4), *SL* 69.2–81.6 mm, River Severski Donetz at Izium; NMU 3640 (10), *SL* 64.0–100.5 mm, River Severski Donetz at Stanichno-Lugansk; NMU 3641 (6), *SL* 63.5–86.0 mm, River Severski Donetz; NMU 3661–2 to 7 (6), *SL* 82.5–107.0 mm, River Severski Donetz 7–8 km upstream from Izium; NMU 4810 (15), *SL* 67.0–76.1 mm, River Severski Donetz.

Diagnosis: *D* III 7; A III 6; *P* I (12, 13)14–16; *V* II 7(8); *l. l.* (41)42, 43(44); *sq. d.* 5, 6; *sq. v.* 3, 4; *sp. br.* 1–4/7–11; *vert.* (40)41, 42(43); *abd. vert.* (18)19, 20(21); *caud. vert.* (21)23, 24, *preA vert.* 4–6.

Description. General appearance can be seen in Fig. 1. Morphometric data are given in Tabl. 1. The body is comparatively shallow, slightly laterally compressed in its anterior part. The caudal peduncle is rather elongated, its length exceeds the minimum body depth by an average factor of 2.9 The dorsal fin is located ar about the middle of the body, the predorsal distance (*M*=44.8% *SL*) equals to the postdorsal distance (*M*=44.6% *SL*). The anus has an anterior position being place closer to the pelvic fin insertion than to the anal fin origin (*V–an* distance averages 39.3% of *V–A* distance).

The head is relatively small, its length exceeds the maximum body depth by an average factor of 1.2. The snout is comparatively short (*M*=37.4% of *lc*), its length often less than the postorbital distance

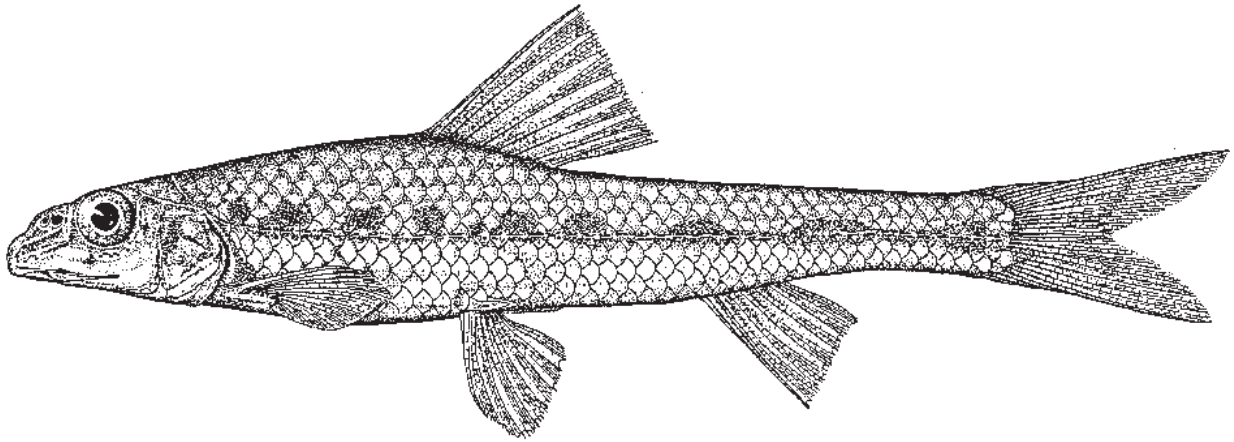

Fig.1. *Romanogobio albipinnatus tanaiticus* ssp.n., NMU 3661–1 (holotype). *SL* 99.4 mm.

(M=38.8% of *lc*). The eye is large, its diameter averages 27.4% of *lc* and is larger than the interorbital distance (*M*=22.6% of *lc*) which is relatively small. In only one specimen among 54 specimens examined the eye diameter is slightly less than the interorbital distance. The barbel is long, usually reaches the vertical through the posterior eye margin.

The gill-rakers are short, 1 to 4, commonly 3 (38%) on the outer side of the first gill arch and 7 to 11, commonly 8 (43%) on the inner side of the same arch. Pharyngeal teeth usually 3.5–5.3 (71 %), sometimes 2.5–5.3, 2.5–5.2, 3.5–5.2 or 1.5–5.3.

There are 41 to 44 lateral line scales with a modal range of 42 and 43 (*M*=42.7). There are commonly 5 scales above the lateral line and 4 scales below. Like in all other subspecies, there are well developed epithelial keels on the dorsal scales of the anterior part of the body in specimens of both sexes.

The *CSO* communicates with the *CIO* in 44% of the canals. Respectively, 56% of the canals lack such an interconnection. The *CSO* and *CIO* are connected on both sides of the head in 36% of the specimens.

In the *CSO* there are 7 to 11, commonly 8 (62%) pores. In the *CIO* 14 to 19, usually 16 (34%) or 17 (37%) pores, in the *CPM* 12 to 18, commonly 14 (37%) or 15 (38%) pores, in the *CST* 4 to 6, commonly 5 (86%).

The number of total vertebrae (Tabl. 2) varies between 40 and 43, commonly 41 (62%). The abdominal vertebrae number 18 to 21, with 19 found in 56% of the specimens. The number of predorsal abdominal vertebrae varies from 10 to 12, with 11 occurring in 71%. The number of intermediate vertebrae ranges from 3 to 6 with a mode of 4 (55%). The number of vertebrae in the caudal region is 21 to 23, with a distinct mode of 22 found in 67% of specimens. The preanal caudal vertebrae are numerous, 4 to 6, with a mode of 5 (64%). The postanal caudal vertebrae number 16 to 18, rarely 19, with a mode of 17 occurring in 55% of the specimens. The most frequently occurred vertebral formulae is 19+22, which is found in 46% of the specimens. In general, *R. a. tanaiticus* ssp. n. is characterized by a greater number of caudal than abdominal vertebrae (found in 98% of the specimens) and the difference is hight, 3.2 vertebrae on the average.

Measurements of the skull depth, *H eth*, *H spho* and *H soc*, are, respectively, 18.4–20.0, 26.3–29.6 and 28.6–29.6% of *L bas. n.* Measurements of the skull width, *Lt eth*, *Lt spho* and *Lt pto*, are, respectively, 40.0–44.6, 42.9–50.3 and 51.2–57.1% of *L bas. n.* The ethmoid region of the neurocranium is comparatively short, its length is

20.0–25.7% of *L bas. n.* However the vomer is elongated, its head is markedly protructed anteriad relative to the anterior margin of the mesethmoid. The first infraorbital is comparatively long, its length is 35.2–37.7% of *L bas. n.*, length of the palatine 22.2–24.6% of *L bas. n.* The operculum is not deep, its depth is 39.3–42.3% of *L bas. n.*, depth of the hyomandibular is 36.0–37.1% of *L bas. n.*

Comparative remarks. There are no significant differences in external morphometric characters of this subspecies from those in the other subspecies of *R. albipinnatus*. In general, it has the smallest head length, eye diameter and interorbital distance; a relatively shallow, narrow body, an elongated caudal peduncle, almost equal pre- and postdorsal distances and a short snout are characteristic for both the Don and the Volga subspecies.

In both *R. a. albipinnatus* and *R. a. tanaiticus*, the frequency of occurrence of discommunicated *CSO* and *CIO* is comparatively high, up to 57% while in two other subspecies this count does nor exceed 25%.

As it is seen from the description given above and Tabl. 2, *R. a. tanaiticus* ssp. n. differs from all other subspecies by its vertebral pattern. The total number is intermediate being approximately one vertebrae lower (M=41.3) than that in *R. a. albipinnatus* and one vertebrae higher than that in *R. a. vladykovi*. However the Don subspecies has the lowest number of the abdominal vertebrae which is 19.1 on the average in contrast to 20.0 in all other subspecies. The number of preanal caudal vertebrae is high similar to that in *R. a. albipinnatus* (a mode is 5) but the postanal subregion is shorter by one vertebrae than that in the latter.

Colouration. Colour pale, fins unspotted, sometimes with slight dark bands on the dorsal and caudal fins. There are 8 to 13 roundish dark spots on the sides above the lateral line like those in all other subspecies.

Distribution. *Romabogobio albipinnatus tanaiticus* is endemic to River Don. In its system, it is reliably known from River Serdoba, River Severski Donetz itself and the most of its tributaries including the Oskol, Derkul, Aidar, Lugan' and Bol'shya Kamenka.

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АННОТАЦИЯ

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МАТЕРИАЛЫ К ИЗУЧЕНИЮ ВНУТРИВИДОВОЙ СТРУКТУРЫ БЕЛОПЕРОГО ПЕСКАРЯ, *ROMANOGOBIO ALBIPINNATUS* (LUKASCH, 1933), С ОПИСАНИЕМ НОВОГО ПОДВИДА, *R. ALBIPINNATUS TANAITICUS*, ИЗ БАССЕЙНА ДОНА

Изучены внешнеморфологические и остеологические признаки у более чем 280 экземпляров белоперого пескаря из основных бассейнов ареала этого вида. Впервые изучены особенности строения сейсмосенсорной системы и позвоночного столба *R. albipinnatus* из отдельных мест ареала. Выявлена изменчивость большинства пластических признаков, остеологических, некоторых признаков сейсмосенсорной системы. Показано, что изменчивость части признаков имеет скорее мозаичный, а не географически направленный характер, и комбинации отдельных признаков, определяющих некоторую морфологическую однородность, свойственны выборкам белоперого пескаря из отдельных речных бассейнов или групп бассейнов. Это служит дополнительным основанием для выделения подвидов белоперого пескаря, в том числе нового, *R. albipinnatus tanaiticus*, обитающего в бассейне Дона.

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