A review of vertebral and fin-ray counts in the genus *Alburnoides* (Teleostei: Cyprinidae) with a description of six new species

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Variations in the different vertebral patterns and unpaired fin counts in the genus *Alburnoides* are discussed based on an examination of over 1100 specimens from a wide area of distribution of the genus. Though it was commonly considered that the morphological differences between subspecies and local forms of *A. bipunctatus* auctorum appear slight, our study shows that there are pronounced differences between many of them in vertebral and dorsal and anal fin counts. To estimate reliability of differences, statistical tests were used and a cluster analysis (UPGMA – Average Linkage clustering method) was performed based on calculated values, and tree diagrams are presented and analyzed in their taxonomic context. The differences in fin ray and vertebral counts in combination with some other morphological characters, distinguished some of the former subspecies or local forms as distinct species. Along with five nominal taxa re-established to a species level (*A. rossicus, A. kubanicus, A. maculatus, A. eichwaldii, A. fasciatus*), we describe six new species: *A. gmelini* (type locality Sunzha River, Terek River drainage, Eastern Ciscaucasia, Russia), *A. varentsovi* (type locality Ashkhabadka River, northern slope of the Kopetdag, Turkmenistan), *A. petrubanarescui* (type locality Qasemlou Chay, Orumiyeh Lake basin, Iran), *A. namaki* (type locality qanat at Taveh, Namak Lake basin, Iran), *A. nicolausi* (type locality Simareh River in Karkheh River system, Tigris River drainage, Iran), and *A. idignensis* (type locality Bid Sorkh River, Gav Masiab River system, Tigris River drainage, Iran).

Key words: freshwater fishes, Cyprinidae, Alburnini, *Alburnoides,* new species, morphology, axial skeleton, unpaired fins

INTRODUCTION

Over 30 species, subspecies and local forms of the leuciscine cyprinid fishes were considered by Bogutskaya (1990a, 1990b, 1997b). They represent a monophyletic taxon, the tribe Alburnini, characterized by a set of derived characters, some of them unique, in external morphology, sensory canals and skeleton. *Alburnus* Rafinesque, 1820*, Chalcalburnus* Berg, 1932*, Alburnoides* Jeitteles, 1861, *Tropidophoxinellus* Stephanidis, 1974 and *Leucaspius* Heckel & Kner, 1858 were included in the tribe. Later, a number of molecular studies revealed that the group does form a clade and includes, if representatives genetically examined are considered, at least *Alburnus, Chalcalburnus, Leucaspius* and *Anaecypris* Collares-Pereira, 1983 (Gilles et al., 2001; Cunha et al., 2002; Durand et al., 2002; Freyhof et al., 2005). The latter genus was also shown to be morphologically close to the Alburnini (Bogutskaya & Collares-Pereira, 1997).

The uncertainty of the generic definitions of *Alburnus, Chalcalburnus* and *Alburnoides* was discussed earlier (Bianco, 1980; Krupp, 1985) and an opinion was proposed that they may be synonyms (Coad, 1991). Later, *Alburnus* and *Chalcalburnus* were synonymized by Bogutskaya (1997a) since the distinguishing characters of *Chalcalburnus* according to Berg (1932b, 1949) – a partly scaled ventral keel, numerous long gill rakers and slightly serrated or unserrated pharyngeal teeth – have no diagnostic value being variably present in most *Alburnus, Alburnoides* and *Chalcalburnus* species. On the other hand, according to Berg (1949), the only difference between *Alburnus* and *Alburnoides* is unserrated pharyngeal teeth. Synonymization of *Alburnus* and *Chalcalburnus* was supported by molecular studies (e.g. Durand et al., 2002) and is widely accepted (e.g. Bogutskaya & Naseka, 2004; Kottelat & Freyhof, 2007). In contrast, *Alburnoides* stands apart from *Alburnus* in molecular trees (Hänfling & Brandl, 2000; Gilles et al., 2001; Cunha et al., 2002; Freyhof et al., 2005). However, morphological definitions of the two genera appear to be quite obscure. They both include species which are characterized by a more or less pronounced ventral keel (from scaled to completely scaleless), a slightly to considerably elongated anal fin, pharyngeal teeth commonly 2.5-5.2 or 2.5-4.2, an absolutely and relatively elongated predorsal vertebral subregion (to 15-17 vertebrae which is commonly over 38% of total and 70% of abdominal vs. 33-37% and 60-66%, respectively, in most other groups of the Leuciscinae), a tendency to equality of the numbers of vertebrae in abdominal and caudal regions (modal difference between abdominal and caudal numbers decreases from 4 or 3 to 1, 0, and [-1] vs. modes 4 to 6 in the most Leuciscinae), and a large orbit with respective configuration of all the cranial elements it is formed from (Bogutskaya, 1990a, 1990b; Bogutskaya et al., 2000). Actually, the only character easy to use for distinguishing *Alburnus* and *Alburnoides* is the pattern of pigmentation. In *Alburnoides,* small black spots are located on each side of the lateral line canal pore outlining the canal at least along its anterior portion, and a dark stripe goes from behind the eye to the caudal fin base though both characters may be variably developed in live fish or are absent.

Besides *Alburnoides oblongus* Bulgakov, 1923 and *Alburnoides taeniatus* (Kessler, 1874) from the Aral Sea basin, *Alburnoides bipunctatus* (Bloch, 1782) has long been considered a complex species with a number of subspecies found from France through Europe north of the Alps eastwards to the Black, Caspian and Aral Sea basins (e.g. Berg, 1949; Bogutskaya & Naseka, 2004; Coad, 2009). *Alburnoides ohridanus* (Karaman, 1928) and *A. prespensis* (Karaman, 1924) were recently given a rank of species (Kottelat & Freyhof 2007) as well as *A. eichwaldii* (De Filippi, 1863) (Fricke *et al.*, 2007), and a new species from the Pulvar R. system in southern Iran will be described in a paper by Coad & Bogutskaya (2009).

The following nominal taxa, which have appeared in the literature as subspecies or distinct forms, have been historically synonymized with *A. bipunctatus*: *Alburnoides bipunctatus armeniensis* Dadikyan, 1972 (type locality: rivers Arpa, Vorotan, Vedi, Marmarik, Kasakh with tributaries of the Aras R. system in the Kura R. drainage, Caspian Sea basin, Armenia), *Alburnus eichwaldii* De Filippi, 1863 (Kura R. at Tiflis, Caspian Sea basin, now Georgia), *Aspius fasciatus* Nordmann, 1840 (rivers of the western coast of the Black Sea eastward to Mingrelia, now Russia and Georgia), *Alburnoides bipunctatus rossicus* natio *kubanicus* Berg, 1932 (unavailable name; Kuban' R., Sea of Azov basin, Russia), *Alburnus maculatus* Kessler, 1859 (Salgir R., Sea of Azov basin, Crimea Peninsula, now Ukraine), *Alburnus bipunctatus ohridanus* Karaman, 1928 (Ohrid L., Adriatic Sea basin, now the Former Yugoslav Republic of (FYRO) Macedonia), *Alburnus bipunctatus* var. *prespensis* Karaman, 1924 (Prespa L. and its tributaries, no direct link to any basin, now FYRO Macedonia), *Alburnoides bipunctatus rossicus* Berg, 1924 (Dnieper, Black Sea basin, and Volga, Caspian Sea basin, now Ukraine and Russia), *Alburnoides bipunctatus* var. *smyrnae* Pellegrin, 1927 (Mélèl stream near Smyrna, Aegean Sea basin, Turkey), *Alburnoides bipunctatus strymonicus* Chichkoff, 1940 (Struma R. drainage, Bulgaria), *Alburnoides bipunctatus tzanevi* Chichkoff, 1933 (Rezova R., Black Sea basin, Bulgaria and Turkey), and *Alburnoides bipunctatus* subsp.

(Berg, 1932a, 1932b) (Kuma, Terek, Sulak rivers, Caspian Sea basin, Russia).

The most comprehensive review of *A. bipunctatus* s.l. is still that by Berg (1949) who successfully used the number of pharyngeal teeth and the number of branched anal-fin rays for distinguishing six subspecies and infrasubspecies forms (one unnamed) within the species. Thought it was later considered that the morphological differences between subspecies and local forms of *A. bipunctatus* auctorum appear slight (Kottelat & Freyhof, 2007), our study shows that there are pronounced differences between many of them in vertebral and dorsal and anal fin counts, and these differences between the different vertebral patterns are discussed below. In combination with some other morphological characters this gave reason to distinguish some of them as distinct species. Along with five nominal taxa resurrected to a species level, we describe six new species from the eastern part of the area of distribution of the genus.

MATERIAL AND METHODS

Counts and measurements follow Hubbs & Lagler (1958). Measurements are to the nearest 0.1 mm. Head length and interorbital width were measured to their bony margins. Fin ray counts separate unbranched and branched rays. The last two branched rays articulated on a single pterygiophore in dorsal and anal fins are noted as "1½". All statistical calculations were done without "½". For morphometric data, t-tests were used to compare males and females for morphometric characters after testing for heteroscedascity; a non-parametric Mann-Whitney U-test was used if t-tests were not applicable. For fin ray and vertebrae counts, we calculated the most common statistical values and criteria. To estimate reliability of differences between means (averages), Student's t-tests were performed and the computed t-scores are presented. Besides, for getting additional information on degree of similarity of means between the samples with regard to the dispersion, we calculated Kul'bak's Divergence that has a meaning of average information measure of the difference between two empiric distributions (Kulbak, 1967) and a cluster analysis (UPGMA – Average Linkage clustering method), were performed based on calculated values. Similarity Indices (r) (Zhivotovskiy, 1991) were calculated for each character separately, for five vertebral characters and for all seven characters under consideration, and tree diagrams (UPGMA – Average Linkage clustering method) are presented and analyzed. Abbreviations used: n, number of specimens; min, minimum value; max, maximum value; avg, average (mean); m, standard error of the mean; std, standard deviation; Me – median; Mo – mode.

Below we provide two lateral line scale counts, the total lateral line scale count which includes all pierced scales, from the first one just behind the supracleithrum to the very posteriormost one, and the lateral line scale count which includes pierced scales from the first one just behind the supracleithrum caudad to the scale (inclusive) at the base of the caudal fin rays (i.e. posterior margin of hypurals); the second count thus excludes 1, 2 or 3 scales located on the bases of the caudal fin rays. Osteological characters are examined in cleared-and-stained specimens and from radiographs of 918 specimens from over 1100 listed below. We examined representatives of *Alburnoides* s.l. from most of its range; however, we did not discuss western Anatolian and Aegean (Greek and Bulgarian) forms for we have not had enough material for comparisons of, e.g. *A. bipunctatus* var. *smyrnae, A. bipunctatus strymonicus* and *A. bipunctatus tzanevi*. Vertebrae counts are given according to Naseka (1996) as discussed for the tribe Alburninae in Bogutskaya et al. (2000). Cephalic sensory canal terminology follows Illick (1956) and is discussed in Bogutskaya (1991): CIO, infraorbital canal; CPM, preopercular-mandibular canal; CSO, supraorbital canal; CST, supratemporal canal. Other abbreviations used: SL, standard length; HL, head length; institutions and collections: BMNH, Natural History Museum, London; CMNFI, Canadian Museum of Nature, Ottawa; DUM, Zoological Museum of Sciences and Art Faculty, Dicle University, Diyarbakir; MKC, private collection of Maurice Kottelat; MBL, Museu Bocage, Lisbon; MRSNT, Museo Regionale di Scienze Naturali, Zoologia, Torino; NMW, Naturhistorisches Museum, Wien; SMF, Senckenberg Museum, Frankfurt a. Main; VPC, collection of V. Poznyak in Elista State University; ZISP, Zoological Institute, Russian Academy of Sciences, St. Petersburg; ZMH, Zoologisches Museum und Institut, Universität Hamburg. C&S indicates cleared and stained specimens.

RESULTS AND DISCUSSION

Pharyngeal teeth. Teeth are hooked at tip, with a grinding area below lacking evident striations. We found no differences in the shape of the teeth that could serve for species diagnostics. The number of pharyngeal teeth was traditionally used for distinguishing subspecies among *A. bipunctatus* s.l. The groups of species within the former *A. bipunctatus* can be seen in Tables 1-3; the nominotypical subspecies, or "typical" *A. bipunctatus,* is almost exclusively characterized by 2.5-4.2 teeth along with *A. ohridanus* (e.g. Berg, 1949). *Alburnoides rossicus* and *A. kubanicus* (forming together *A. bipunctatus rossicus* auctorum) are different by commonly having 2.5-5.2 and other variants with 5 teeth in the main row on the right 5th ceratobranchial. However, Movchan & Smirnov (1983) found that the formula 2.5-4.2 is also often met – they found 4 teeth in the main row on the right 5th ceratobranchial in 30% of 108 specimens examined by them. In 15 specimens of *A. kubanicus* examined by us we found only 2.5-5.2. *Alburnoides maculatus* represents the north-western form of the former *A. bipunctatus fasciatus* s.l. which is characterized by the predominance of the 2.5-4.2 formula. Among 80 specimens from Crimea, Movchan & Smirnov (1983) found no single specimen with 5 teeth in the main row on the right 5th ceratobranchial among 80 examined specimens. According to Berg (1949), *A. fasciatus* invariably possess 2.5-4.2. In 27 specimens of *A. fasciatus* examined by us we found 2.5-4.2 (24), 2.4-4.2 (1) and 2.5-4.1 (2). Variants with 5 teeth in the longer row on the right ceratobranchial are more frequent in *A. eichwaldii,* and Berg (1949) considered this to be the main diagnostic feature of *A. bipunctatus eichwaldii* in his understanding. In a sample from Chaldyr Lake (Kura drainage), we found 2.5-5.2 teeth in 5 specimens along with 25 fishes possessing 2.5-4.2. As shown in the descriptions below, in all species of the former *A. bipunctatus eichwaldii* complex the formula 2.5-4.2 is the most common. It is worth mentioning that the formula 2.5-5.2, which should be considered a character state close to a condition plesiomorphic for the Leuciscinae as being widely presented in *Leuciscus* and other less specialized genera, is present among *Alburnoides* in species that should be considered the most derived if anal fin and vertebral counts are concerned (see below).

Branched dorsal-fin rays. The number of branched dorsal-fin rays is commonly 8½. However, in *A. eichwaldii* (Kura-Aras & Lenkoran) 7½ are rarely present (found in 6% of specimens) while in *A. idignensis* it was found in 29% of specimens. In *A. petrubanarescui* sp. n. and especially *A. nicolausi* sp. n. the number of 7½ clearly predominates, 67% and 91%, respectively (Table 1).

Branched anal-fin rays. The number of branched anal-fin rays is widely discussed below (see also Tables 1 and 4) for it has been long considered as one of the main diagnostic characters of *Alburnoides* species. The lowest counts are discovered in two Iranian species – *A. petrubanarescui* sp. n. from the Urmia basin (a mode is 9½) and *A. nicolausi* sp. n. from the Tigris drainage (a mode is 10½). Increase of the

Table 1. Frequency of occurrence of variants of the number of dorsal and anal fin branched rays (minimal and maximal modal counts shaded).

	Dorsal fin branched rays				Anal fin branched rays									
	6	**7**	**8**	**9**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
Western group, pharyngeal teeth 2.5-4.2														
A. bipunctatus (Danube), n=62		1	**59**	2					5	**21**	**21**	12	3	
A. ohridanus, n=18			18				1	2	**15**					
North-central group, pharyngeal teeth 2.5-5.2														
A. rossicus, n=21			21								1	**5**	11	4
A. kubanicus, n=45			45							2	5	**33**	5	
South-eastern group, pharyngeal teeth 2.5-4.2														
A. maculatus: Chiornaya R., n=24			24					7	**15**	2				
A. maculatus: Salgir, Alma, Kacha rivers, n=83			83					9	**53**	16	5			
A. fasciatus, n=54			54						4	**20**	**26**	4		
A. gmelini sp. n., n=53			53							6	**29**	13	5	
A. eichwaldii: Kura-Aras & Lenkoran, n=160		10	**148**	2			3	38	**62**	45	12			
A. cf. *eichwaldii*: Safid Rud, n=31		1	**30**						4	**18**	8	1		
A. varentsovi sp. n., n=42		1	**41**				1	5	14	**18**	4			
A. petrubanarescui sp. n., n=30		**20**	10		3	**16**	11							
A. namaki sp. n., n=48		2	**46**				3	17	**24**	4				
A. nicolausi sp. n., n=42		**38**	4		2	8	**23**	9						
A. idignensis sp. n., n=46	1	10	**35**			1	2	**23**	16					
Alburnoides sp. Pulvar R., n=30		3	**26**	1			3	**22**	5					
***A. taeniatus*, n=53**			**49**	4			5	**30**	18					
***A. oblongus*, n=6**			6				1	**4**	1					

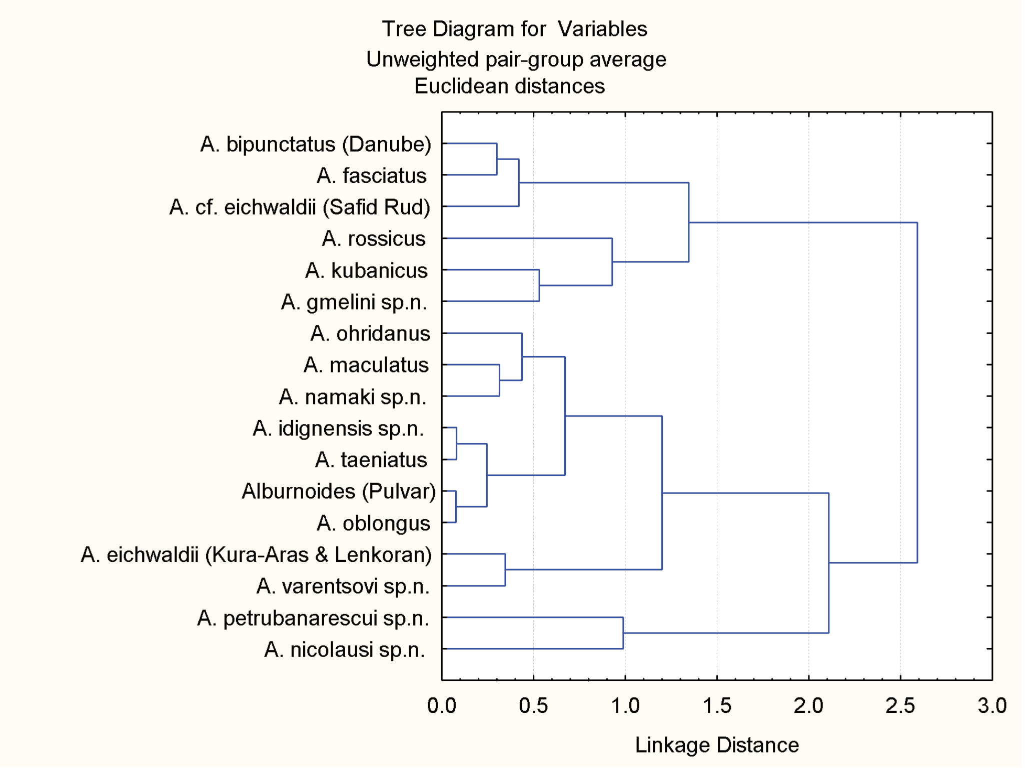

Fig. 1. Tree diagram (UPGMA) computed from means of the number of branched anal-fin rays. See also Tables 1, 4 and 7.

branched anal-fin rays number is observed in all groups delimited by the number of pharyngeal teeth – in the western 2.5-4.2 group (in *A. bipunctatus* from the Danube with the modes of 12½ and 13½), in the north-central 2.5-5.2 group (modes 15½ and 16½ in, respectively, *A. rossicus* and *A. kubanicus*), and in the south-eastern 2.5-4.2 group (a mode of 14½ in *A. gmelini* sp. n. and *A. fasciatus*). As seen in the Table 7, statistically reliable differences are found in the number of branched anal-fin rays between most taxa under consideration. Thus, total counts differ significantly between geographically close *A. rossicus* and *A. kubanicus,* between true *A. eichwaldii* (Kura & Lenkoran') and *A.* cf. *eichwaldii* from Safid River, between true *A. eichwaldii* and *A. namaki,* etc. Tree diagrams which represent the anal-fin rays data clustering are given in Figs 1 and 2.

Cephalic lateral line canals. The general topography of cephalic sensory canals and numbers of pores is rather similar in all examined *Alburnoides* species and is close in the main features to the typical pattern described by Bogutskaya (1988). The supraorbital canal is not lengthened in its posterior section and has 7-11, commonly 8-10 pores, with 2-4 and 5-7 canal openings on the nasal and frontal bones, respectively. The infraorbital canal has 10-16 pores (commonly 12-14) with 4 (commonly) or 5 canal openings on the first infraorbital. The preopercular-mandibular canal is complete, with 11-17, modally 13-16, pores with (3)4-6 and 7-10 canal openings on the dentary and preoperculum, respectively. The supratemporal canal is complete, with commonly 5-7 pores. We do not discuss below the counts of sensory pores and the canal pattern for they are not diagnostic for the species. However, it

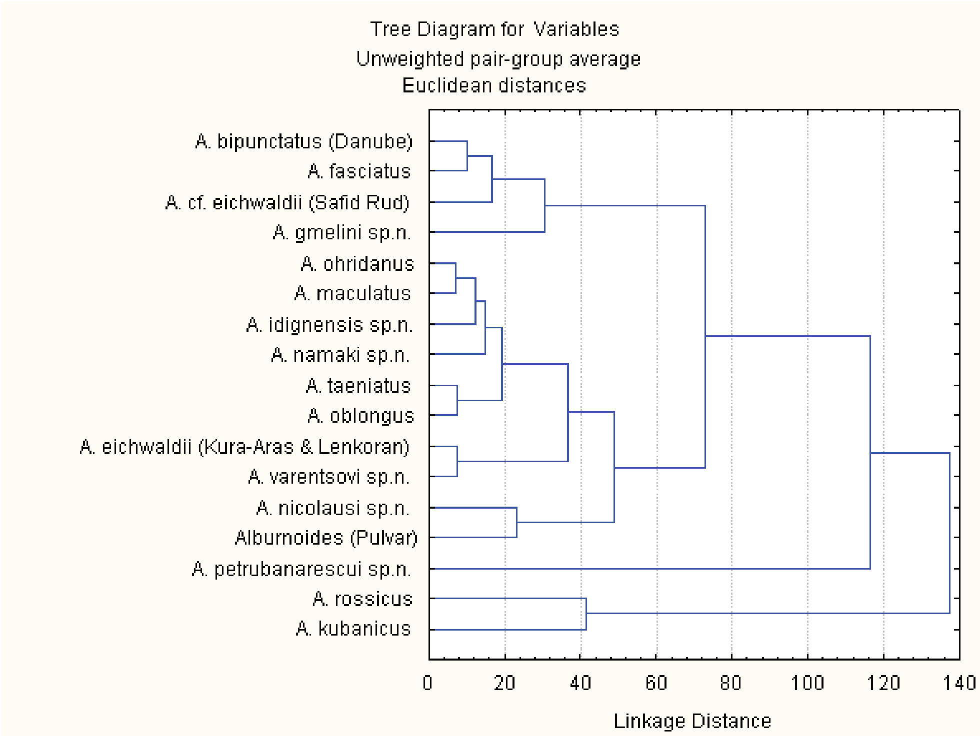

Fig. 2. Tree diagram (UPGMA) computed from similarity indices of the number of branched anal-fin rays.

may be useful for further comparisons with *Alburnus* and other genera.

Vertebrae. As it is seen from the Table 1, there is some correlation between the branched anal-fin rays count and the number of total vertebrae: the highest values of total vertebrae are found in *A. rossicus* and *A. kubanicus* which are characterized by the highest number of anal-fin rays (commonly 41-43). The lowest number is in *A. taeniatus* (a mode of 38). As it is seen from the Table 8, statistically reliable differences are found in the number of total vertebrae between most taxa under consideration. Thus, total counts differ significantly between geographically close *A. rossicus* and *A. kubanicus,* between true *A. eichwaldii* (Kura & Lenkoran') and *A.* cf. *eichwaldii* from Safid Rud, between true *A. eichwaldii* and *A. namaki* sp.np, etc. It is worth mentioning that the number of predorsal vertebrae that reflects the length of the predorsal distance in general considerably varies in terms of both absolute and relative values. For example, *A. bipunctatus* from the Danube and *A. taeniatus* possess equal means of this counts (13.6) while they have 41.2 and 37.9 mean total vertebrae indicating that the relative length of the predorsal vertebral region comprises 33% and 36% of the total vertebral column, respectively. The lowest predorsal count (mean 12.2) is found in *A. varentsovi* sp. n., *A. namaki* sp. n., and *A. idignensis* sp. n. Differences in the predorsal count give reasons for distinguishing some samples as distinct taxa. For example, true *A. eichwaldii* from the Kura drainage and Lenkoran' Province significantly differs from a sample from Safid Rud (fish from this river is commonly identified as *A. bipunctatus eichwaldii*) (13.7 vs. 12.5, Tables 5 and 9).

We paid special attention not only to absolute values of vertebrae in the abdominal and caudal regions (for differences between

Table 2. Frequency of occurrence of variants of the number of total and predorsal vertebrae (minimal and maximal modal counts shaded).

	Total vertebrae								Predorsal vertebrae					
	36	37	38	39	40	41	42	43	11	12	13	14	15	16
Western group, pharyngeal teeth 2.5-4.2														
A. bipunctatus (Danube), n=62					4	**41**	16	1			25	**34**	3	
A. ohridanus, n=18			2	**13**	2	1				3	**13**	2		
North-central group, pharyngeal teeth 2.5-5.2														
A. rossicus, n=21							11	10			1	**17**	3	
A. kubanicus, n=45					3	**18**	**18**	6			18	**27**		
South-eastern group, pharyngeal teeth 2.5-4.2														
A. maculatus: Chiornaya R., n=24					6	**14**	4				**14**	10		
A. maculatus: Salgir, Alma, Kacha rivers, n=83					24	**50**	9			3	**60**	20		
A. fasciatus, n=54				2	10	**30**	12				20	**30**	4	
A. gmelini sp. n., n=53				1	**26**	**20**	6				1	**40**	10	2
A. eichwaldii: Kura-Aras & Lenkoran, n=160			1	2	23	**73**	52	9		2	62	**86**	10	
A. cf. *eichwaldii*: Safid Rud, n=31				1	**21**	9				16	15			
A. varentsovi sp. n., n=42				10	**28**	3	1		2	**32**	7	1		
A. petrubanarescui sp. n., n=30				1	**14**	**14**	1				**18**	12		
A. namaki sp. n., n=48				18	**27**	3			2	**35**	10	1		
A. nicolausi sp. n., n=42			9	**28**	5					18	**24**			
A. idignensis sp. n., n=46		1	7	**30**	8				2	**34**	9	1		
Alburnoides sp. Pulvar R., n=30					**16**	14					**24**	6		
***A. taeniatus*, n=53**	1	16	**24**	12							**24**	**25**	4	
***A. oblongus*, n=6**					2	**3**	1					**5**	1	

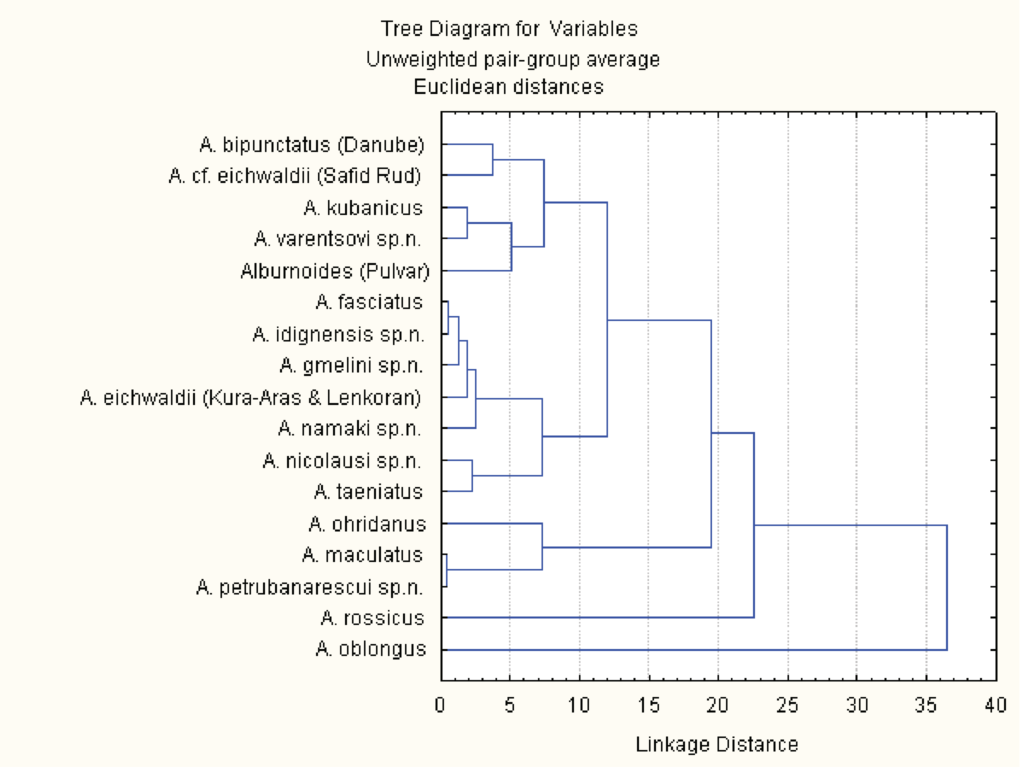

Fig. 3. Tree diagram (UPGMA) computed from similarity indices of the difference between the numbers of abdominal and caudal vertebrae.

samples see Tables 10 and 11) but also to their relative length. In most leuciscine cyprinids the abdominal region is 3-4 vertebrae longer than the caudal region and it may be considered as a probable primitive pattern while in the Alburnini (Bogutskaya et al., 2000) the caudal region is relatively elongate and is often longer than the abdominal region. A comparatively primitive character state (difference between the abdominal and caudal count is positive, from +3 to +1, or the counts are equal), is found in the Orumiyeh [Urmia] Lake basin (*A. petrubanarescui* sp. n.) and in the Crimea Peninsula (*A. maculatus*) (Tables 3 and 6). A relatively long abdominal region is also characteristic for *A. oblongus, A. ohridanus, A. taeniatus,* and *A. nicolausi* sp. n. The most specialized pattern (difference between the abdominal and caudal count is negative, from -1 to -3) is found in *A. rossicus, A. bipunctatus* (Danube), and *A.* cf. *eichwaldii* from Safid Rud (Tables 3, 6 and 12). Data clustering based on similarity indices (r) displays 6 major clusters which reflect the main types of vertebral pattern in terms of relative length of the abdominal and caudal region (Fig. 3, Table 3).

Data clustering which summarize all five vertebral characters, both by means and by frequency arrays, are presented in Figs 4 and 5. The tree diagrams given in these figures are rather similar for the main clusters are identical on the both diagrams. However, the second diagram seems to be a more appropriate one since it represents frequency arrays – frequency of distinct phenotype occurrence – rather than mean values. It is evident that the most main clusters are formed from geographically distant species. This may be explained by, first, the mosaic distribution of the primitive pattern

Table 3. Frequency of occurrence of variants of the number of abdominal and caudal vertebrae, anal the difference between the abdominal and caudal number (minimal and maximal modal counts shaded).

	Abdominal vertebrae					Caudal vertebrae							Difference between abdominal and caudal numbers						
	18	19	20	21	22	17	18	19	20	21	22	23	+3	+2	+1	0	-1	-2	-3
Western group, 2.5-4.2																			
A. bipunctatus (Danube), n=62		4	**50**	8					7	**39**	15	1			5	5	**34**	15	3
A. ohridanus, n=18		1	**16**	1			2	**12**	4					2	**13**	2	1		
North-central group, 2.5-5.2																			
A. rossicus, n=21			9	**12**						3	**17**	1				3	**9**	**8**	1
A. kubanicus, n=45			21	24					6	**27**	12				6	15	**18**	6	
South-eastern group, 2.5-4.2																			
A. maculatus: Chiornaya R., n=24				**20**	4			8	**14**	2			2	**8**	**12**	2			
A. maculatus: Salgir, Alma, Kacha rivers, n=83			5	**71**	7			20	**58**	5			2	23	**48**	10			
A. fasciatus, n=54			26	**28**				2	**28**	22	2				**20**	**20**	12	2	
A. gmelini sp. n., n=53		1	**34**	18				2	**35**	16				2	10	**30**	11		
A. eichwaldii: Kura-Aras & Lenkoran, n=160	1	2	46	**103**	8			9	66	**76**	9		2	9	49	**62**	33	5	
A. cf. *eichwaldii*: Safid Rud, n=31		11	**19**	1				2	9	**20**				1	1	**9**	**9**	11	
A. varentsovi sp. n., n=42		13	**27**	2				4	**28**	10					5	**22**	8	7	
A. petrubanarescui sp. n., n=30			3	**25**	2			**15**	**14**	1			2	**12**	**13**	3			
A. namaki sp. n., n=48		13	**33**	2				10	**32**	6				2	8	**22**	13	3	
A. nicolausi sp. n., n=42		12	**28**	2			7	**22**	13				1	7	**18**	7	9		
A. idignensis sp. n., n=46	1	21	**24**				1	**22**	**23**						**17**	14	14	1	
Alburnoides sp. Pulvar R., n=30			**28**	2					**18**	12					2	**16**	12		
***A. taeniatus*, n=53**	1	**33**	19			2	**24**	**23**	4				1	11	**22**	14	5		
***A. oblongus*, n=6**				3	3			**4**	2				2	**3**	1				

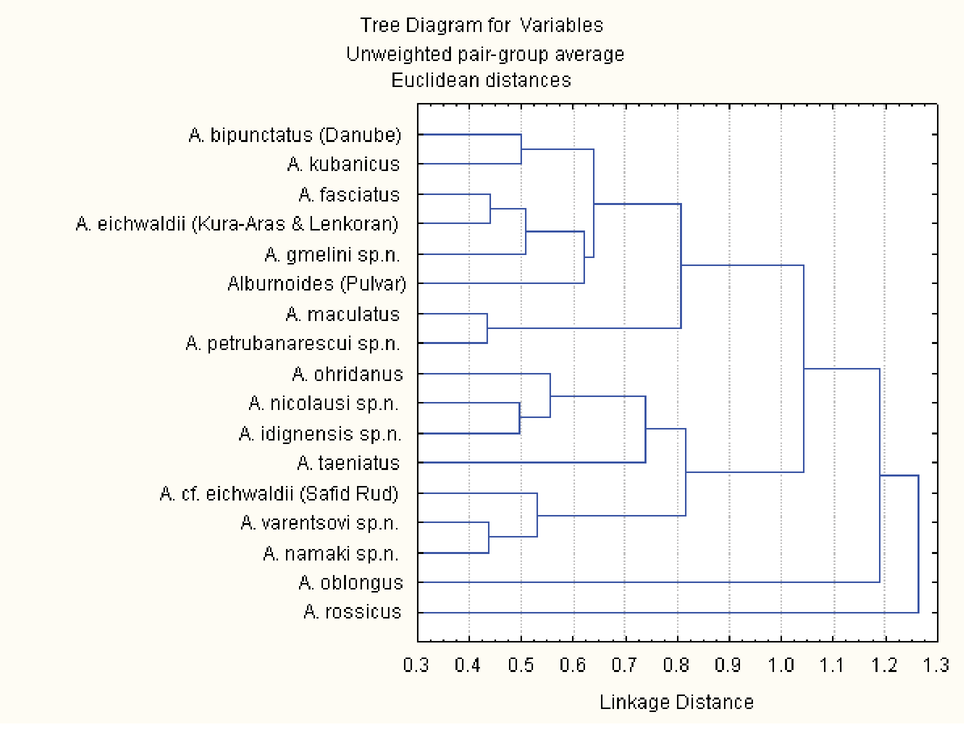

Fig. 4. Tree diagram (UPGMA) computed from means of the five vertebral counts. See also Tables 1-6.

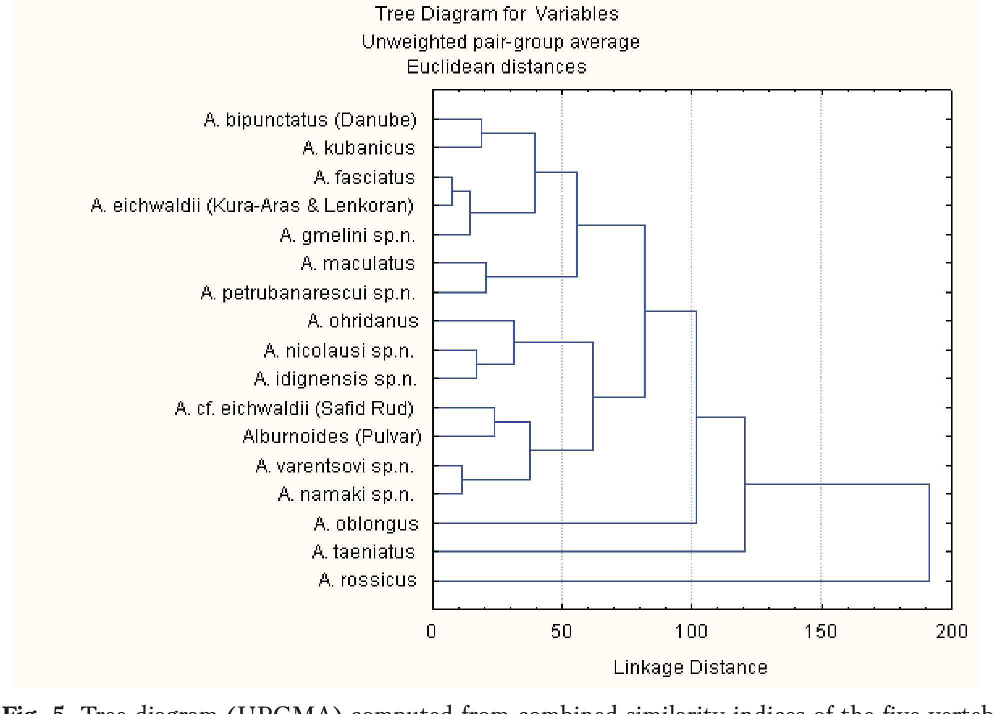

Fig. 5. Tree diagram (UPGMA) computed from combined similarity indices of the five vertebral counts.

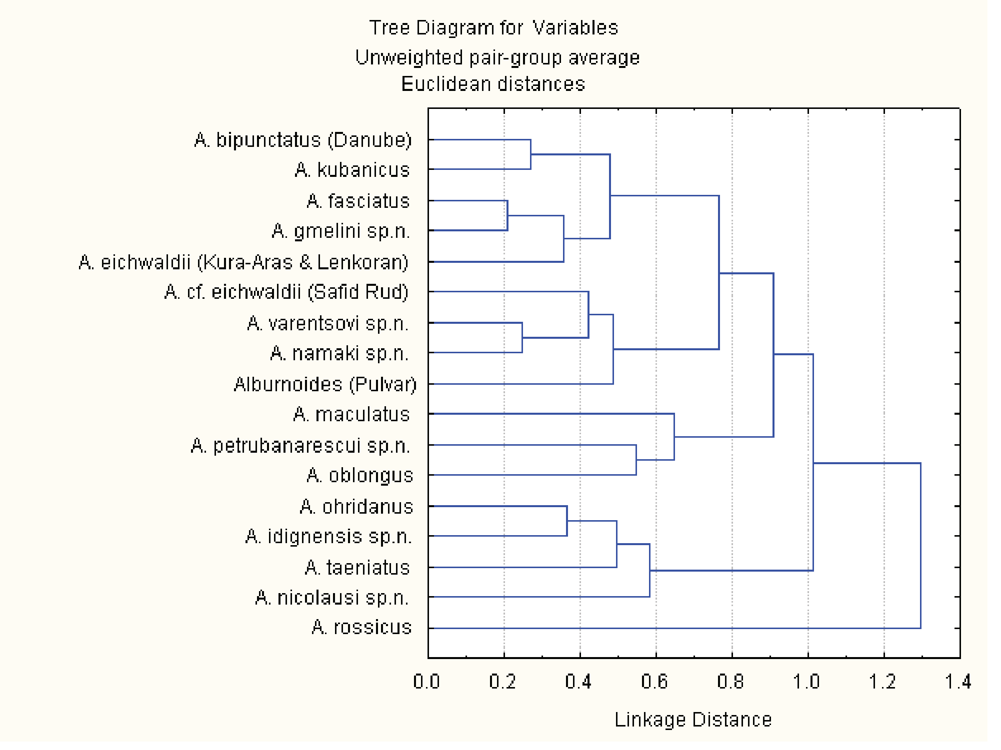

Fig. 6. Tree diagram (UPGMA) computed from combined similarity indices of the number of branched dorsal-fin rays, branched anal-fin rays and five vertebral counts.

(e.g. a Crimean *A. maculatus* is clustered with an Iranian *A. petrubanarescui* and *A. ohridanus* with Iranian *A. nicolausi* sp. n. and *A. idignensis* sp. n.) and, second, the convergent nature of some vertebral transformation which led to relative elongation of the caudal region, e.g. in *A. bipunctatus* and *A. kubanicus* with numerous (modally 42) total vertebrae or in *A. varentsovi* sp. n., *A. namaki, A.* cf. *eichwaldii* (Safid) and *Alburnoides* sp. (Pulvar) with fewer (modally 40) total vertebrae.

Data clustering based on means of 7 counts (branched fin rays and vertebrae) is presented in Fig. 6. It supports 5 main clusters which also display a clear geographical tendency: *A. rossicus* and 5 taxa in the upper part of the tree (three successive clusters) which are all characterized by a set of more or less considerably pronounced specializations (an elongated anal fin, an increased total number of vertebrae, and relatively numerous caudal vertebrae) are distributed in the northern and western parts of the area of occurrence of the genus *Alburnoides*. Two exceptions from this tendency are plesiomorphic *A. maculatus* and *A. ohridanus* which may represent relict forms of an ancestral *Alburnoides* species that might have come to the northern coast of the Ponto-Caspian from Central Asia and Middle East.

RESURRECTED TAXA

Alburnoides rossicus Berg, 1924

Alburnoides bipunctatus rossicus Berg, 1924: 56 (Dnieper and Volga rivers).

The number of syntypes as given in the original description is 27. Probable syntypes are those specimens deposited in ZISP 2684 (8), 7152 (5) and 10759 (8) (see below).

Original diagnosis (Berg, 1924): pharyngeal teeth 2.5-5.2.

Material examined: ZISP 2684 (8, Dnieper R.). – ZISP 5172 (5 [labeled as syntypes], Shishma R., Kama R. system). – ZISP 10759 (8, Rovno, Dnieper R.). – ZISP 52813 (26, Vyatka R.).

Diagnosis. The original description may be added to the following combination of characters: the caudal fin lobes are pointed, the fin is clearly forked; ventral keel is commonly scaleless, very rarely there are 1-2 scales (up to 1/3 of the keel length) covering the anterior portion of the keel; the head is triangular-shaped, elongated; the snout is clearly pointed; the upper jaw and the lower jaw are on the same level or the lower jaw is slightly protruding; the mouth is terminal or slightly to markedly upturned, the tip of the mouth cleft is on the level of the middle of the eye or above this level (up to the upper margin of the pupil); the number of dorsal-fin rays is 8½; the number of branched anal-fin rays is (14)15-17½ with a mode of 16½ (Berg, 1949, and Movchan & Smirnov, 1983, give up to 18 [=18½]); pharyngeal teeth commonly 2.5-5.2 (Berg, 1949, says that the formula 2.5-4.2 is more common in the western part of the range; Movchan & Smirnov, 1983, based on their material from Teterev R. in the Dnieper drainage, found four teeth in the longer row on the right ceratobranchial in 38% of the examined specimens); the number of total lateral line scales (41)42-50, commonly 43-49; gill rakers 6-8; the number of total vertebrae is 42-43 (almost equally); predorsal vertebrae are (13)14-15 with a mode of 14; the number of abdominal vertebrae is 20-21 with a mode of 21, and that of caudal vertebrae is 21-22(23) with a mode of 22; the caudal region is longer than the abdominal region, rarely the regions are equal, and the difference between the abdominal and caudal numbers varies from 0 to -3; the most common vertebral formulae are 21+22 and 20+22.

Comparative remarks. Data clustering (Figs 2-6) support a distinctly separate position of this species within the genus as possessing the greatest number of branched anal-fin rays, the most numerous total vertebrae count, the longest caudal region; besides, the species is distinct from *A. bipunctatus* from the Danube by having commonly 2.5-5.2 pharyngeal teeth (vs. commonly 2.5-4.2). It differs from *A. kubanicus* which also has 2.5-5.2 pharyngeal teeth by having larger scales (commonly 43-49 total lateral line scales vs. commonly 47-53), more numerous branched anal-fin rays (14-18½ with a mode of 16½ vs. 13-16½ with a mode of 15½), more numerous total vertebrae (42-43 vs. 40-43 with a mode of 41) due to a longer caudal region (modally 22 vertebrae vs. 21).

Distribution. Dniester, South Bug, Dnieper, rivers of the northern Sea of Azov coast and Don river drainages in the Black Sea (and Sea of Azov) basin, also Volga R., Caspian Sea basin from upper reaches in Tver' Province and upper reaches of Oka R. downstream to Kama R. (inclusive, with tributaries) and rivers and lakes of Samara Province.

Alburnoides kubanicus **Berg, 1932**

Alburnoides bipunctatus rossicus natio *kubanicus* Berg, 1932a: 150 (Kuban' R. drainage).

The name *Alburnoides bipunctatus rossicus* natio *kubanicus* was published by Berg (1932b: 493) once again during the same year; in both cases the name is unavailable as an addition to a trinomen and hence infrasubspecific (Art. 45.5 of the International Code of Zoological Nomenclature). According to Art. 45.5.1 of the Code, the name *kubanicus* could become an available name if a subsequent author would have applied the same word to a species or subspecies, even if he or she attributed authorship of the name to Berg, that subsequent author thereby could established a new name with its own authorship and date. However, we have not found any publication which treats *kubanicus* as a subspecies or species. This fish often appears in Russian literature under its vernacular name *kubanskaya bystryanka* (e.g. Tamanskaya & Troitsky, 1957; Emtyl', 1987; Emtyl' et al., 1993) or assigned to *A. bipunctatus* (e.g. Plotnikov, 2000, 2001). It has been also published under the name *A. bipunctatus rossicus kubanicus* (or misspelled as *cubanicum*) (an addition to the trinomen) (e.g. Troitsky & Tsunikova, 1988; Emtyl' et al., 1988; Reshetnikov et al., 1998).

The number of syntypes is not given in the original description. Probable syntypes may include a number of specimens from Kuban' that had been deposited in ZISP before 1932 (e.g. 15289, 15306, 15307) (see below).

Original diagnosis (Berg, 1932a): dorsal-fin rays III 8 [=8½]; anal-fin rays III (11)12-14, commonly 13-14 [=13-14½]; total lateral line scales (45)47-53(56); pharyngeal teeth 2.5-5.2.

Material examined (all from Kuban' R. drainage): ZISP 15289 (6, Labenok R.). – ZISP 15306 (8, Laba R.). – ZISP 15307 (8, Kuban R.). – ZISP uncat. (25, Laba R.).

Diagnosis. The original description may be added to the following combination of characters: the caudal fin lobes are pointed, the fin is clearly forked; ventral keel is scaleless; the head is triangular-shaped, elongated; the snout is clearly pointed; the upper jaw and the lower jaw are on the same level or the lower jaw is slightly to markedly protruding over the upper; the mouth is terminal or slightly to markedly upturned, the tip of the mouth cleft is on the level of the middle of the eye or above this level (up to the upper margin of the pupil); the number of dorsal-fin rays is 8½; the number of branched anal-fin rays is (13)14-16½ with a mode of 15½; gill rakers 6-8; the number of total vertebrae is (40)41-43 with the modal range of 41-42; predorsal vertebrae are 13-14 with a mode of 14; the number of abdominal vertebrae is 20-21 with a mode of 21, and that of caudal vertebrae is 20-22 with a mode of 21; the caudal region is longer than the abdominal region or the regions are equal, rarely the abdominal region is longer than the caudal one, and the difference between the abdominal and caudal numbers varies from +1 to -3 with a mode of -1; the most common vertebral formulae are 20+21 and 21+21.

Comparative remarks. Data clustering (Figs 3-6) support a separate position of this species within the genus. It is distinct from the closest species, *A. bipunctatus* from the Danube, by having commonly 2.5-5.2 pharyngeal teeth (vs. commonly 2.5-4.2). It differs from *A. rossicus* which also has 2.5-5.2 pharyngeal teeth by having smaller scales (commonly 47-53 total lateral line scales vs. commonly 43-49), fewer branched anal-fin rays (13-16½ with a mode of 15½ vs. 14-18½ with a mode of 16½), fewer total vertebrae (40-43 with a mode of 41 vs. 42-43) due to a shorter caudal region (modally 21 caudal vertebrae vs. 22).

Distribution. The Kuban' R. drainage where it is found from the upper mountainous reaches of tributaries down to the piedmont sections. It is commonly absent from lowland reaches of rivers. Kuban riffle minnow commonly occurs together with *Squalius* cf. *cephalus* and *Barbus kubanicus*. Also reported for Gastogay R. that formerly belonged to the Kuban' drainage but now flowing into the Vityazevskiy Liman of the Black Sea (Plotnikov & Emtyl', 1991)

Alburnoides fasciatus (Nordmann, 1840)

Aspius fasciatus Nordmann, 1840: 497, 1842: pl. 23 (fig. 2) (rivers of eastern coast of the Black Sea.

The number of individuals originally examined is not given. Syntypes are deposited in MNHN 0000-3897 (4, not seen) and NMW 10407-19 (13; see below).

Original diagnosis (Nordmann, 1840): body deep, compressed, greenish-silvery; double longitudinal band dark black, lateral line outlined by two rows of black dots; 9 scales above and 4 scales below lateral line; branched anal-fin rays 15.

Material examined (all from Western Transcaucasia and rivers of the Black Sea coast in Turkey westward to Kizilirmak): NMW 10407-19 (13 syntypes, rivers of eastern Black Sea coast). – ZISP 5296 (6, Rioni R.). – ZISP 11529 (3, Batum). – ZISP 14822 (6, Coruh R.). – ZISP 15157 (4, Kintrishi R.). – ZISP uncat. (35, Otap R.). – ZISP uncat. (25, Kyalasur R.). – ZMH 3585 (8, Kizilirmak R.). 5 C&S.

Diagnosis. The original description may be added to the following combination of characters: the caudal fin lobes are pointed, the fin is clearly forked; ventral keel is commonly scaleless though in some individuals may be scaled up to 2/3 of its length; the head is triangular-shaped, elongated; the snout is clearly pointed; the upper jaw is slightly protruding over the lower jaw or the jaws are on the same level; the tip of the mouth cleft is on the level from the middle of the eye to the lower margin of pupil; the number of dorsal-fin rays is 8½; the number of branched anal-fin rays is (12)13-14(15)½ with a mode of 14½; pharyngeal teeth commonly 2.5-4.2 (if there are other variants then always four teeth in the longer row of the right ceratobranchial); the number of total lateral line scales 44-49(50-54); gill rakers 6-7(8); the number of total vertebrae is (39)40-42 with a mode of 41; predorsal vertebrae are 13-14(15) with a mode of 14; the number of abdominal vertebrae is 20-21 (almost equally), and that of caudal vertebrae is (19)20-22 with a mode of 20; the caudal region is one vertebra shorter than, equal to or one or two vertebrae longer than the abdominal region, and the difference between the abdominal an caudal numbers varies from +1 to 0 with a mode of 0; the most common vertebral formulae are 21+20 and 20+21.

Comparative remarks. Our data give reasons for excluding the Crimea riffle minnow, *A. maculatus,* from *A. fasciatus*. Data clustering (Figs 2-6) support a distinctly separate position of these two species within the former *A. bipunctatus* complex though they are similar in the vertebral structure (Tables 1-3). *Alburnoides fasciatus* forms a well supported cluster with *A. bipunctatus* (Danube), *A. kubanicus, A. eichwaldii* (Kura and Lenkoran') and *A. gmelini* sp. n. (Figs 4-6). These species and *A. maculatus* belong to a group of riffle minnows characterized by a clearly forked caudal fin, a commonly scaleless ventral keel, a triangular-shaped elongated head with a more or less pointed snout and a terminal mouth. *Alburnoides fasciatus* significantly differs from *A. maculatus* by having more numerous branched anal-fin rays (12-15½, modally 13-14½, vs. 11-14½, modally 12½), more numerous predorsal vertebrae (modally 14 vs. 13), fewer total lateral line scales (44-49(50-54) vs. 48-56(57, 58), and lighter overall coloration (vs. considerably dark and spotty pigmentation with densely located clear black spots on almost all scales of the flanks).

Distribution. Berg (1949) supposed that *A. bipunctatus fasciatus* in his understanding is distributed in river drainages of the western (southwards from the Danube), southern and eastern coast of the Black Sea and in Crimea. We have no materials from the Bulgarian rivers (*tzanevi* Chichkoff, 1933) but Crimean riffle minnow belongs to another distinct species given below. We collected the species in biotopes with fast running shallow water, often over gravel, pebble or rocks.

Alburnoides maculatus **(Kessler, 1859)** (Fig. 7)

Alburnus maculatus Kessler, 1859: 535 (small rivers of Crimea, in particular in Salghir [Salgir]).

Type series included 10 specimens. They are most probably not extant for they are absent from ZISP and from Saint Petersburg State University collections where Kessler used to keep his material.

Original diagnosis (Kessler, 1859): pectoral fin rays 1/13-14, ventral fin rays 1/7, dorsal-fin rays 3/8 [=8½], anal-fin rays 3/11-14 [=11-14½], caudal fin rays 19, [total] lateral line scales 47-50, 9-10 scales above lateral line, 4 scales below lateral line, pharyngeal teeth 2.5-4.2, scales on sides of body with black spots that also outline lateral line.

Material examined (all from the Crimea Peninsula): ZISP uncat. (24, Chernaya R., western

Crimea Peninsula, Black Sea basin; coll. A. Naseka, N. Bogutskaya, J. Freyhof) .– ZISP uncat. (14, Alma R.).– ZISP uncat (32, Angara R., tributary of Salgir R.) .– ZISP uncat. (37, Kacha R.).

Diagnosis. The original description may be added to the following combination of characters: the caudal fin lobes are pointed, the fin is clearly forked; ventral keel is commonly scaleless, very rarely scaled up to 1/2 of its length; the head is triangular-shaped, elongated; the snout is clearly pointed though the upper jaw is protruding over the lower jaw, and the tip of the mouth cleft is on the level of the lower margin of pupil or slightly below it; the number of total lateral line scales 48-56(57, 58); gill rakers 6-9 (Movchan & Smirnov, 1983, give up to rarely 10); the number of branched dorsal-fin rays is (7)8(9)½; the number of branched anal-fin rays is 11-14½ with a mode of 12½; pharyngeal teeth commonly 2.5-4.2 (if there are other variants then always four teeth in the longer row of the right ceratobranchial); the number of total vertebrae is 40-42 with a mode of 41; predorsal vertebrae are (12)13-14 with a mode of 13; the number of abdominal vertebrae is 20-22 with a mode of 21, and that of caudal vertebrae is 19-21 with a mode of 20; the caudal region is always shorter than or equal to the abdominal region, and the difference between the abdominal an caudal numbers is from +3 to 0 with a mode of +1; the most common vertebral formula is 21+20.

Comparative remarks. The Chernaya R. has some endemic forms, e.g. among *Proterorhinus, Gobio* and *Cobitis,* which are not conspecific with representatives of their respective genera from Salgir or other Crimean rivers (Freyhof & Naseka, 2005, 2007; Janko et al., 2005). We compared a sample from Chernaya R. with samples from other rivers, including Salgir, to be sure they are similar with regards to the characters in consideration and, thus, may be considered conspecific (Tables 1-3). Our data give reasons for excluding the Crimea riffle minnow, *A. maculatus,* from *A. fasciatus*. Data clustering (Figs 2-6) support a distinctly separate position of these two species within the former *A. bipunctatus* complex though they are similar in the vertebral structure (Tables 1-3). *Alburnoides maculatus* is close to a group of species with modally 11-13½ branched anal-fin rays (Fig. 1), and forms a distinct cluster with a geographically distant species, *A. petrubanarescui* sp. n. from the Orumiyeh basin, when the whole set of fin and vertebral characters is concerned (Figs 3-5). However, *A. maculatus* is distinguish from *A. petrubanarescui* by having a clearly forked caudal fin with pointed lobes (vs. shallowly indented, with rounded lobes), a commonly scaleless ventral keel (vs. completely scaled), a clearly pointed snout (vs. markedly rounded), (7)8(9)½ branched dorsal-fin rays (vs. commonly 7½), 11-14½, with a mode of 12½, branched anal-fin rays (vs. 8-10½, commonly 9½). *Alburnoides maculatus* differs from *A. fasciatus* by having fewer branched anal-fin rays (11-14½, modally 12½, vs. 12-15½, modally 13-14½), fewer predorsal vertebrae (modally 13 vs. 14), more numerous total lateral line scales (48-56(57, 58) vs. 44-49(50-54), and considerably darker and spotty pigmentation with densely located distinct black spots on almost all scales of the flanks (vs. light overall coloration).

Distribution. Kessler (1859) mentioned all small rivers of the Crimea Peninsula, Berg (1949) recorded it from Chernaya, Bel'bek, Kacha, Al'ma and Salgir rivers; we collected the species in all these rivers in biotopes with fast running shallow water, often over gravel, pebble or rocks.

Alburnoides eichwaldii (De Filippi, 1863)

Alburnus eichwaldii De Filippi, 1863: 392 [18 of separatum] (Kura R. at Tiflis [Tbilisi]).

Alburnoides bipunctatus armeniensis Dadikyan, 1972: 566 (Marmarik R., Aras R. system).

The number of syntypes of *A. eichwaldii* is not specified in the original description; counts for a single specimen are given.

Syntypes are deposited in MZUT 677 (4) (not seen) and NMW 55516 (2).

Syntypes of *A. bipunctatus armeniensis* are in ZISP 37502 (10) (see below).

Original diagnosis of *A. eichwaldii* (De Filippi, 1863): the body is deep, its length exceeds the depth in four times; eye large; dorsal-fin rays branched rays 8 [=8½]; branched anal-fin rays 12 [=12½]; scales in the lateral series 50, 11 scales above and 7 scales below lateral line.

Material examined (all from Eastern Transcaucasia: Kura-Aras river drainage and rivers of the Lenkoran' Province in Azerbaijan): CMNFI 2007-0090 (14, Zilber R.). – NMW 55516 (2 syntypes, Kura R.). – ZISP 2916 (7, Kura R.). – ZISP 3860 (5, Lenkoran' R.). – ZISP 5188 (10, Childyr [Cildir] L.). – ZISP 9104 (5, Lenkoran' R.). – ZISP 9131 (8, Lenkoran' R.). – ZISP 9136 (5, Geoktapinka R.). – ZISP 10249 (5, Kura R.). – ZISP 25704 (31, Gilyan-chay R.). – ZISP 25713 (26, Gilyan-chay R.). – ZISP 37502 (10 syntypes of *Alburnoides bipunctatus armeniensis*, Marmarik R.). – ZISP 37503 (5, Dzoraget R.). – ZISP 37504 (5, Erer R.). – ZISP 41974 (9, Kura R.). – ZISP uncat. (30, Kura R.). – ZMH 3007-9 (4, Kura R.). – ZMH 3586 (21, Childyr [Cildir] L.). – ZMH 3587-88 (5, Kura R). 3 C&S.

Diagnosis of *A. eichwaldii* from the type drainage (Kura-Aras) and rivers of the Lenkoran' Province. We found, as described above, that there is a difference between the fish from Kura-Aras and Lenkoran' (Georgia, Turkey, Armenia and Azerbaijan) and the sample from Safid Rud (Iran). Thus we limit the diagnosis by the character states characteristic of only the set of samples from Kura-Aras and Lenkoran'.

The original description may be added to the following combination of characters: the caudal fin lobes are moderately rounded, the fin is not deeply forked; the ventral keel is commonly scaleless but may be variably scaled (up to completely scaled); the head is commonly deep and the snout is slightly to markedly rounded; the upper jaw is slightly protruding over the lower jaw; the tip of the mouth cleft is slightly below the level of the middle of the eye or at about the lower margin of pupil; the number of dorsal-fin rays is 8½, rarely 7½ or 9½; the number of branched anal-fin rays is (10)11-14½ with the modal range of 12-13½; pharyngeal teeth are commonly 2.5-4.2 and other variants with four teeth in the longer row of the right ceratobranchial, also, less frequently, 2.5-5.2 or 2.5-5.1; the number of total lateral line scales 44-56 (Dadikyan, 1972, 1973, gives 39-56, averaging 48.7, in *A. bipunctatus armeniensis*); gill rakers 6-10; the number of total vertebrae is (38, 39)40-43 with a mode of 41; predorsal vertebrae are (12)13-15 with a mode of 14; the number of abdominal vertebrae is (18)19-22 with a mode of 21, and that of caudal vertebrae is 19-22 with a mode of 21; the caudal region is commonly one vertebra shorter than, equal to the abdominal region or one vertebra longer than the abdominal region, and the difference between the abdominal and caudal numbers varies from +3 to -1 with a mode of 0; and the most common vertebral formulae are 21+21, 21+20 and 20+21.

Comparative remarks. We suppose that the riffle minnow from Safid Rud (we examined CMNFI 1979-0695, 30 specimens) may represent a distinct taxon and we do not include it here in *A. eichwaldii*. The Safid Rud riffle minnow is distinguished by more numerous branched anal-fin rays (12-15½ vs. 10-14½), fewer total vertebrae (commonly 40-41 vs. 40-43), fewer predorsal vertebrae (12-13 vs. 13-16) and by some other vertebral counts formalized in Tables 1-12. As seen in Figs 1-6, typical *A. eichwaldii* and the Safid Rud riffle minnow are located distantly in most tree diagrams.

Summarized data (Figs 4, 5) cluster *A. eichwaldii* from the Kura drainage and the Lenkoran' Province with *A. fasciatus* and *A. gmelini* sp. n. It is distinguished from *A. fasciatus* by having fewer branched anal-fin rays (11-14½, modally 12-13½, vs. 12-15½, modally 13-14½; respective means, 12.2 and 13.6 are statistically different), a rounded stout (vs. pointed) and a shallowly forked caudal fin (vs. clearly forked). According to our data, *A. eichwaldii* and *A. fasciatus* are the morphologically closest species within the genus. *Alburnoides eichwaldii* differs from *A. gmelini* sp. n. by having fewer branched anal-fin rays (11-14½, modally 12-13½, vs. 13-16½, modally 14-15½; means, 12.2 and 14.3, respectively) and a larger number of total vertebrae (mean 41.3 vs. 40.6, statistically different, see Table 8).

Distribution. *Alburnoides eichwaldii* is distributed in river drainages of the south-western Caspian coast from Samur (according to Berg, 1932b, 1949) down to rivers of the Lenkoran'. We have no material from water bodies between Lenkoran' and Safid Rud and thus do not know if the range of typical *A. eichwaldii* extends further southwards. The fish from Safid Rud probably do not belong to *A. eichwaldii* as discussed above. The riffle minnow from Tedzhen [Hari Rud] and Amu Darya drainages is considered as a distinct species which is described below. Commonly (e.g. Berg, 1949) the range of *A. eichwaldii* was thought to overlap drainages of the Caspian Sea from Derbent to Atrek as well as the Urmia Lake basin (a distinct species, see below), rivers of the southern slope of Elburz Mountains, Turkmenian rivers from Murghab to Archman, and upper reaches of Amu Darya (including Kashka Darya and Zeravshan).

NEW SPECIES

***Alburnoides gmelini* sp. n.**
(Fig. 8)

An unnamed subspecies in Berg (1932a, 1932b, 1949).

Holotype. ZISP 14733a, 98.6 mm TL, 79.9 mm SL, Sunzha R. at Groznyy, tributary of Terek R., Chechnya, Russia, a. 48°13´N, 45°40´E; 16 May 1909; coll. L. Berg.

Paratypes. ZISP 14733, 9 specimens, 68.1-83.1 mm SL; same data as holotype. – ZISP 58100, 16 specimens, 47.0-56.4 mm SL; Darvakhchay R. at Gerzhukh, 42°08.08´N 48°01.86´E; 17 June 2004; coll. A. Naseka. – ZISP 58101, 7 specimens, 49.2-56.9 mm SL; Darvakhchay R., at mouth, 42°09.72´N 48°12.90´E; 17 June 2004; coll. A. Naseka.

Additional material: ZISP 2879 (3, Sunzha R.; 1830; coll. Menetrie). – ZISP 10790 (6, Terek R. at Chervlennaya; 25 Oct. 1895; coll. I. Kuznetzov). – ZISP 14730 (1, Khanchaly-gol, Akhalkala; 21 June 1909; coll. L. Berg). – ZISP 14731 (2, Martan R., tributary of Sunzha, Terek R. drainage; 17 May 1909; coll. L. Berg). – ZISP 14732 (1, Sulak R. at Chir-Yurt, Daghestan; 28 May 1909; coll. L. Berg). – Poznyak's Collection (20, Darkhtaga R. 1.5 km upstream from mouth, Terek R. drainage; 5 July 1988; coll. V. Poznyak).

Diagnosis. The species is distinguished by a combination of characters which includes a small eye, the orbit diameter being considerably shorter than the interorbital width; caudal fin lobes moderately pointed and fin being clearly forked; a sharp scaleless ventral keel behind the pelvic fins along the abdomen to the anus; a triangular-shaped head; a slightly rounded snout and an upper jaw distinctly protruding over the lower jaw; a tip of the mouth cleft on the level below the lower margin of the pupil; 8½ branched dorsal-fin rays; 13-16½, commonly 15-14½, branched anal-fin rays; (44)46-51 total lateral line scales (44-49 scales to posterior margin of hypurals); 2.5-4.2 pharyngeal teeth; 40-42 total vertebrae; 12-14, commonly 13, predorsal vertebrae; 19-21, commonly 20, abdominal vertebrae; 19-21, commonly 20, caudal vertebrae; a caudal vertebral region most commonly equal to the abdominal region; and the most common vertebral formulae are 20+20, 20+21 and 21+20.

Description of holotype. The upper body profile is convex, similar to the lower profile. The snout is short and slightly rounded though not stout. The mouth is almost horizontal, and almost subterminal as the upper jaw protrudes over the lower jaw and the tip of the mouth cleft is on a level with the lower margin of the pupil. The caudal fin lobes are moderately pointed, the fin being clearly forked. A ventral keel between the pelvics and the anal fin is well developed, very sharp and completely scaleless. There is a pelvic axillary scale and scales extend over the proximal bases of the anal fin. The body depth enters SL 3.3 times, HL enters 4.2, predorsal length 1.9, postdorsal length

Table 4. Statistical data for the number of anal fin branched rays and the number of total vertebrae in 16 species of *Alburnoides*.

	Anal fin branched rays							Total vertebrae						
	min	max	avg	m	std	Me	Mo	min	max	avg	m	std	Me	Mo
A. bipunctatus (Danube), n=62	12	16	13.8	0.13	1.01	14	13	40	43	41.2	0.07	0.58	41	41
A. ohridanus, n=18	10	12	11.8	0.13	0.55	12	12	38	42	39.3	0.27	1.14	39	39
A. rossicus, n=21	14	17	15.9	0.17	0.79	16	16	42	43	42.5	0.11	0.51	42	42
A. kubanicus, n=45	13	16	14.9	0.09	0.63	15	15	40	43	41.6	0.12	0.81	42	41
A. fasciatus, n=54	12	15	13.6	0.10	0.74	14	14	39	42	41.0	0.10	0.75	41	41
A. maculatus, n=107	11	14	12.1	0.07	0.70	12	12	40	42	40.8	0.06	0.62	41	41
A. gmelini sp. n., n=53	13	16	14.3	0.11	0.80	14	14	39	42	40.6	0.10	0.72	40	40
A. eichwaldii: Kura-Aras & Lenkoran, n=160	10	14	12.2	0.07	0.94	12	12	38	43	41.3	0.07	0.86	41	41
A. cf. *eichwaldii*: Safid Rud, n=31	12	15	13.2	0.13	0.70	13	13	39	41	40.3	0.09	0.51	40	40
A. varentsovi sp. n., n=42	10	14	12.4	0.14	0.92	13	13	39	42	39.8	0.09	0.59	40	40
A. petrubanarescui sp. n., n=30	8	10	9.3	0.12	0.64	9	9	39	42	40.5	0.11	0.63	40.5	40
A. namaki sp. n., n=48	10	13	11.6	0.11	0.74	12	12	39	41	39.7	0.09	0.59	40	40
A. nicolausi sp. n., n=42	8	11	9.9	0.12	0.78	10	10	38	40	38.9	0.09	0.58	39	39
A. idignensis sp. n., n=46	9	12	11.3	0.10	0.67	11	11	37	40	39.0	0.10	0.65	39	39
Alburnoides sp. Pulvar R., n=30	10	12	11.1	0.10	0.52	11	11	40	41	40.5	0.09	0.51	40	40
A. taeniatus, n=53	10	12	11.2	0.08	0.62	11	11	36	39	37.9	0.11	0.78	38	38
A. oblongus, n=6	10	12	11.0	0.26	0.63	11	11	40	42	40.8	0.31	0.75	41	41

Table 5. Statistical data for the number of predorsal vertebrae and the number of abdominal vertebrae in 16 species of *Alburnoides*.

	Predorsal vertebrae							Abdominal vertebrae						
	min	max	avg	m	std	Me	Mo	min	max	avg	m	std	Me	Mo
A. bipunctatus (Danube), n=62	13	15	13.6	0.07	0.58	14	14	19	21	20.1	0.06	0.44	20	20
A. ohridanus, n=18	12	14	12.9	0.13	0.54	13	13	19	21	20.0	0.08	0.34	20	20
A. rossicus, n=21	13	15	14.1	0.10	0.44	14	14	20	21	20.6	0.11	0.51	21	21
A. kubanicus, n=45	13	14	13.6	0.07	0.50	14	14	20	21	20.5	0.08	0.50	21	21
A. fasciatus, n=54	13	15	13.7	0.08	0.60	14	14	20	21	20.5	0.07	0.50	21	21
A. maculatus, n=107	12	14	13.3	0.05	0.50	13	13	21	22	21.1	0.03	0.36	21	21
A. gmelini sp. n., n=53	13	16	14.2	0.08	0.55	14	14	19	21	20.3	0.07	0.51	20	20
A. eichwaldii: Kura-Aras & Lenkoran, n=160	12	15	13.7	0.05	0.62	14	14	18	22	20.7	0.05	0.61	21	21
A. cf. *eichwaldii*: Safid Rud, n=31	12	13	12.5	0.09	0.51	12	12	19	21	19.7	0.10	0.54	20	20
A. varentsovi sp. n., n=42	11	14	12.2	0.08	0.54	12	12	19	21	19.7	0.08	0.54	20	20
A. petrubanarescui sp. n., n=30	13	14	13.4	0.09	0.50	13	13	20	22	21.0	0.08	0.41	21	21
A. namaki sp. n., n=48	11	14	12.2	0.08	0.54	12	12	19	21	19.8	0.07	0.52	20	20
A. nicolausi sp. n., n=42	12	13	12.6	0.08	0.50	13	13	19	21	19.8	0.08	0.53	20	20
A. idignensis sp. n., n=46	11	14	12.2	0.08	0.54	12	12	18	20	19.5	0.08	0.55	20	20
Alburnoides sp. Pulvar R., n=30	13	14	13.2	0.07	0.41	13	13	20	21	20.1	0.05	0.25	20	20
A. taeniatus, n=53	13	15	13.6	0.09	0.63	14	14	18	20	19.3	0.07	0.52	19	19
A. oblongus, n=6	14	15	14.2	0.17	0.41	14	14	21	22	21.5	0.22	0.55	21.5	21

2.8, caudal peduncle depth 9.0, caudal peduncle length 4.7, length of longest dorsal fin ray 4.5, and length of longest anal fin ray to scale sheath 5.9. Orbit diameter enters HL 3.9 times, snout length enters 4.5, and interorbital width 2.7. Pectoral fin length enters pectoral fin origin to pelvic fin origin distance 1.2 times, and pelvic fin length enters pelvic fin origin to anal fin origin distance 1.2 times.

Dorsal fin rays are 3 unbranched and 8½ branched, anal fin rays are 3 unbranched and 14½ branched, branched pectoral fin rays are 13, pelvic fin branched rays are 7. The anal fin origin is in front of the posterior end of the dorsal fin base. Total lateral line scales number 50 and those to posterior margin of hypurals 48, scales above lateral line to dorsal fin origin are 9, scales below lateral line to anal fin origin are 4, scales below lateral line to pelvic fin origin are 4, and midline predorsal scales are 24. Total vertebrae are 41, comprising 20 abdominal and 21 caudal vertebrae. Predorsal vertebrae number 14.

Pigmentation of the holotype is almost lost though pigment dots are visible above and below the lateral line in its anterior part, and a black pigment is present along the supracleithrum and upper branch of the cleithrum.

Description of paratypes. The body is markedly compressed. The upper body profile is clearly convex in smaller and larger specimens, similar to the lower profile. The ventral keel between the pelvics and the anal fin is well developed, commonly very sharp and completely scaleless; rarely, there is a single scale at the very beginning of the keel. The anal fin origin is in front of the posterior end of the dorsal fin base. The snout is short and slightly pointed to moderately rounded but never stout. The mouth is horizontal and almost subterminal as the tip of the mouth cleft is on a level from the lower margin of the pupil to the lower margin of eye or below the latter. The upper jaw is slightly protruding over the lower jaw. The junction of the lower jaw and the quadrate is on about a vertical through the middle of the eye.

Body depth enters SL 3.0-3.6 times (mean 3.4, std 0.14), HL 4.0-4.4 (4.2, 0.12), predorsal length 1.7-2.2 (1.9, 0.9), postdorsal length 2.6-3.1 (2.8, 0.12), caudal peduncle depth 8.3-9.6 (9.0, 0.30), caudal peduncle length 4.1-5.2 (4.7, 0.27), length of longest dorsal fin ray 3.9-5.1 (4.5, 0.28), and length of longest anal fin ray to scale sheath 5.4-6.3 (5.9, 0.30). Orbit diameter enters HL 3.6-4.3 (3.9, 0.14) times, snout length enters 4.1-5.0 (4.5, 0.17), and interorbital width 2.3-3.1 (2.7, 0.18).

Dorsal fin unbranched rays commonly 3, 4 in 2 specimens, branched dorsal-fin rays 8½ (in all specimens). Anal fin unbranched rays 3, branched anal-fin rays 13½ (4), 14½ (18), 15½(8), 16½ (2). In 53 specimens (holotype, 32 paratypes and 20 additional specimens) branched anal-fin rays 13-16½ (14.3, 0.80) (Tables 1 and 4). The dorsal fin outer margin is truncate to slightly convex and the anal fin outer margin is slightly concave.

Pharyngeal tooth counts are 2.5-4.2 in 10 fish examined with one additional fish being a variant with 2.5-4.1. The lateral line is complete with none, 1 or 2 unpored scales at the posterior end of the lateral series; total lateral line scales 44(1), 46(5), 47(12), 48(20), 49(11), 50(2) or 51(2). Total gill rakers in the outer row on first left arch number in 10 specimens examined 6(2), 7(5), 8(2) or 9(1); gill rakers are not short though widely spaced, touching the adjacent raker base when appressed.

Vertebral counts are given below for 53 specimens (holotype, 32 paratypes and 20 additional specimens). Total vertebrae number 39-42, commonly 40-41 (40.6, 0.72) (Tables 2 and 4). Predorsal vertebrae number 13-16 with a mode of 14 (14.2, 0.55) (Tables 2 and 5). Abdominal vertebrae number 19-21 with a mode of 20 (20.3, 0.51) (Tables 3 and 5). Caudal vertebrae number 19-21 with a mode of 20 (20.3, 0.52) (Tables 3 and 6). The vertebral formula is 20+20 (in 24 specimens), 20+21 (10), 21+20 (10), 21+21 (6), 21+19 (2), and 19+20 (1). Thus, the caudal vertebral region is equal to the caudal region, longer than caudal region or (found in only 11 specimens) one vertebra shorter than the abdominal region, the mean difference between abdominal and caudal counts being +0.1 (std 0.74) (Tables 3 and 6).

Overall colouration in live individuals is silvery with the bases of the pectoral, pelvic and anal fins orange in life. The lateral line is outlined by black spots, rather than small dots, along ½ to 2/3 of its length, and similar spots are present on two, three or four longitudinal rows of scale above the lateral line forming two to four narrow dotted stripes. There is a clear black vertical spot along the supracleithrum and upper branch of the cleithrum similar to the one typical for *Squalius cephalus* s.l. Pigmentation in preserved fish is as described for the holotype. In recently preserved specimens the pigmentation is better pronounced though the mid-flank dotted lines of spots of black pigment may be variably developed, and the lateral line may be clearly or only faintly edged by pigment; the vertical spot is dark and always present along the supracleithrum and upper branch of the cleithrum.

Comparative remarks. Summarized data (Figs 4, 5) cluster *A. gmelini* sp. n. with *A. eichwaldii* from the Kura drainage and the Lenkoran' Province and *A. fasciatus*. *Alburnoides gmelini* sp. n. differs from a geographically neighbouring *A. eichwaldii* by having more numerous branched anal-fin rays (13-16½, modally 14-15½, vs. 11-14½, modally 12-13½; means 14.3 and 12.2, respectively), fewer total vertebrae (mean 40.6 vs. 41.3 statistically different, see Table 8), a sharp, completely scaleless ventral keel (vs. smooth, scaleless to completely scaled), a lower position of the mouth (mouth is horizontal and almost subterminal and the tip of the mouth cleft is on a level from the lower margin of the pupil to below the lower margin of the eye vs. slightly below the level from the middle of the eye to the lower margin of the pupil). From *A. fasciatus, A. gmelini* is distinguished by an anteriorly placed anal fin (its origin is markedly in front of the posterior end of the dorsal fin base vs. on a vertical from the posterior end of the dorsal fin base or behind it) and more numerous branched anal-fin rays (mean 14.3 vs. 13.6).

Etymology. The species is named after Samuel Georg Gotlieb Gmelin, a Russian naturalist of the German origin who in 1768-1774 traveled through the River Don area and the Caucasus region and along the western and southern Caspian Sea coasts. Gmelin was captured by Usmey-Khan who held him to ransom. He died in 1774 in captivity in the village of Akhmakent near Derbent. He presented the results of the expedition in his work entitled "Journey across Russia for studying the three kingdoms of nature" published posthumously.

Distribution. This species is found in rivers of the western Caspian coast (eastern Ciscaucasia) from Sulak southward to rivers at Derbent. Berg (1949) supposed that it is absent from Samur where *A. eichwaldii* is distributed. We examined no material from Samur to check this assumption. The fish prefers mountainous sections of rivers and streams though also found in small dam lakes and canals.

Alburnoides varentsovi **sp. n.**
(Fig. 9)

Holotype. ZISP 11053a, 80.6 mm TL, 67.8 mm SL, Askhabadka R., northern slope of Kopetdag Mountains, formely Zakaspiyskaya Oblast' of Russian Empire, now Turkmenistan, 37°56´N, 58°25´E; 18 Sept. 1896; coll. Varentsov.

Paratypes. ZISP 11050, 9 specimens, 28.8-47.2 mm SL; same data as holotype. – ZISP 11051, 14 specimens, 25.3-62.5 mm SL; same data as holotype. – ZISP 11053, 16 specimens, 33.4-65; same data as holotype.

Diagnosis. The species is distinguished by a combination of characters which includes a large eye, the orbit diameter being larger than the snout length and about equal to the interorbital width; caudal fin lobes moderately pointed and the fin clearly

Table 6. Statistical data for the number of caudal vertebrae and the difference between abdominal and caudal vertebrae in 16 species of *Alburnoides*.

	Caudal vertebrae							Difference between abdominal and caudal vertebrae						
	min	max	avg	m	std	Me	Mo	min	max	avg	m	std	Me	Mo
A. bipunctatus (Danube), n=62	20	23	21.2	0.08	0.63	21	21	-3	1	-1.1	0.12	0.92	-1	-1
A. ohridanus, n=18	18	20	19.1	0.14	0.58	19	19	-1	2	0.9	0.16	0.68	1	1
A. rossicus, n=21	21	23	21.9	0.10	0.44	22	22	-3	0	-1.3	0.17	0.80	-1	-1
A. kubanicus, n=45	20	22	21.1	0.09	0.63	21	21	-2	1	-0.5	0.13	0.89	-1	-1
A. fasciatus, n=54	19	22	20.4	0.09	0.63	20	20	-2	1	0.1	0.12	0.87	0	0
A. maculatus, n=107	19	21	19.8	0.05	0.54	20	20	0	3	1.3	0.07	0.70	1	1
A. gmelini sp. n., n=53	19	21	20.3	0.07	0.52	20	20	-1	2	0.1	0.10	0.74	0	0
A. eichwaldii: Kura-Aras & Lenkoran, n=160	19	22	20.5	0.05	0.69	21	21	-2	3	0.2	0.08	0.97	0	0
A. cf. *eichwaldii*: Safid Rud, n=31	19	21	20.6	0.11	0.62	21	21	-2	2	-0.9	0.19	1.04	-1	-2
A. varentsovi sp. n., n=42	19	21	20.1	0.09	0.57	20	20	-2	1	-0.4	0.14	0.91	0	0
A. petrubanarescui sp. n., n=30	19	21	19.5	0.10	0.57	19.5	19	0	3	1.4	0.14	0.77	1	1
A. namaki sp. n., n=48	19	21	19.9	0.08	0.58	20	20	-2	2	-0.1	0.13	0.92	0	0
A. nicolausi sp. n., n=42	18	20	19.1	0.11	0.68	19	19	-1	3	0.6	0.17	1.08	1	1
A. idignensis sp. n., n=46	18	20	19.5	0.08	0.55	19.5	20	-2	1	0.0	0.13	0.88	0	1
Alburnoides sp. Pulvar R., n=30	20	21	20.4	0.09	0.50	20	20	-1	1	-0.3	0.11	0.61	0	0
A. taeniatus, n=53	17	20	18.5	0.10	0.70	19	18	-1	3	0.8	0.13	0.95	1	1
A. oblongus, n=6	19	20	19.3	0.21	0.52	19	19	1	3	2.2	0.31	0.75	2	2

Table 7. t-test of anal fin branched rays means. t-test values for means significantly different at 99% confidence level are given in bold. Groups: 1 – *A. bipunctatus* (Danube); 2 – *A. ohridanus*; 3 – *A. rossicus*; 4 – *A. kubanicus*; 5 – *A. fasciatus*; 6 – *A. maculatus*; 7 – *A. gmelini* sp. n.; 8 – *A. eichwaldii*: Kura-Aras & Lenkoran; 9 – *A. eichwaldii*: Safid Rud; 10 – *A. varentsovi* sp. n.; 11 – *A. petrubanarescui* sp. n.; 12 – *A. namaki* sp. n.; 13 – *A. nicolausi* sp. n.; 14 – *A. idignensis* sp. n.; 15 – *Alburnoides* sp. Pulvar R.; 16 – *A. taeniatus*; 17 – *A. oblongus*.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	x	**11.050**	**9.595**	**7.036**	1.436	**11.373**	**3.134**	**11.034**	**3.314**	**7.008**	**26.071**	**13.121**	**21.983**	**15.172**	**17.053**	**16.548**	**9.678**
2		x	**18.890**	**19.578**	**10.829**	0.079	**14.965**	2.542	**7.834**	**3.522**	**14.416**	1.038	**10.486**	**2.968**	**4.432**	**3.445**	2.694
3			x	5.800	11.482	19.305	7.488	19.670	12.434	15.240	31.573	20.946	28.159	22.655	24.266	23.937	15.628
4				x	9.793	20.424	4.066	22.974	10.892	14.465	37.587	23.265	32.638	25.832	28.692	28.891	14.227
5					x	**11.231**	**5.110**	**11.162**	2.236	**6.345**	**27.749**	**13.295**	**23.105**	**15.651**	17.919	17.495	9.215
6						x	**15.510**	2.585	**8.044**	1.721	**21.039**	**4.009**	**10.976**	**3.187**	**4.733**	**3.717**	**4.157**
7							x	16.297	6.721	10.420	31.458	17.734	26.947	20.031	22.341	22.103	11.827
8								x	**7.087**	1.856	**20.904**	**4.264**	**15.807**	**6.829**	**9.045**	8.098	4.305
9									x	4.292	22.826	9.628	18.742	11.667	13.452	12.806	7.631
10										x	17.374	4.796	13.613	6.652	8.134	7.323	4.934
11											x	14.803	3.953	12.919	11.952	13.710	6.117
12												x	**10.455**	2.143	**3.769**	2.640	2.164
13													x	8.553	7.434	8.963	3.763
14														x	1.556	0.302	1.027
15															x	1.402	0.242
16																x	0.903
17																	x

forked; a partly scaleless ventral keel behind the pelvic fins along the abdomen to the anus; a triangular-shaped head, a slightly rounded snout and a lower jaw slightly protruding over the upper jaw; a tip of the mouth cleft on the level of the middle of the eye; 8½ branched dorsal-fin rays; 11-14½, commonly 12-13½, branched anal-fin rays; 44-51 total lateral line scales (42-49 scales to posterior margin of hypurals); 2.5-5.2 or 2.5-4.2 pharyngeal teeth; commonly 39-40 total vertebrae; 11-13, commonly 12, predorsal vertebrae; 19-21, commonly 20, abdominal vertebrae; 19-21, commonly 20, caudal vertebrae; a caudal vertebral region most commonly equal to the abdominal region; and the most common vertebral formula is 20+20.

Description of holotype. The upper body profile is convex, similar to the lower profile. The snout is slightly pointed, not stout. The mouth is oblique, terminal; the lower jaw slightly protrudes relative to the upper jaw; the tip of the mouth cleft is on a level with the middle of the eye. The caudal fin lobes are moderately pointed, the fin being clearly forked. A ventral keel between the pelvics and the anal fin is not sharp and is scaled along about 2/3 of its length. There is a pelvic axillary scale and scales extend over the proximal bases of the anal fin. The body depth enters SL 3.2 times, HL enters 4.1, predorsal length 1.8, postdorsal length 2.8, caudal peduncle depth 8.5, caudal peduncle length 5.5, length of longest dorsal fin ray 4.8, and length of longest anal fin ray to scale sheath 6.6. Orbit width enters HL 3.3 times, snout length enters 3.8, and interorbital width 3.1. Pectoral fin length enters pectoral fin origin to pelvic fin origin distance 1.1 times, and pelvic fin length enters pelvic fin origin to anal fin origin distance 1.2 times.

Dorsal fin rays are 3 unbranched and 8½ branched, anal fin rays are 3 unbranched and 12½ branched, branched pectoral fin rays are 15, pelvic fin branched rays are 7. The anal fin origin is on a vertical from the posterior end of the dorsal fin base. Total lateral line scales number 51 and those to posterior margin of hypurals 49, scales above lateral line to dorsal fin origin are 10, scales below lateral line to anal fin origin are 4, scales below lateral line to pelvic fin origin are 4, and midline predorsal scales are 25. Pharyngeal teeth 2.5-5.2. Total vertebrae are 40, comprising 20 abdominal and 20 caudal vertebrae. Predorsal vertebrae number 12.

Pigmentation of the holotype is almost lost though pigment dots are visible above and below the lateral line in its anterior part, dark dots are present in longitudinal rows above the lateral line on the anterior part of the flanks, and a black pigment is present along the supracleithrum and upper branch of the cleithrum.

Description of paratypes. The body is markedly compressed. The upper body profile is clearly convex in smaller and larger specimens, similar to the lower profile. The caudal fin lobes are clearly pointed. The ventral keel between the pelvics and the anal fin is not sharp; it is scaled completely (in 2 specimens), scaled along 1/3 to 2/3 of its length (in 25 specimens) or completely scaleless (12) but a naked area is very narrow. The anal fin origin is on a vertical from the posterior end of the dorsal fin base or only very slightly in front of it. The snout is not short and clearly pointed. The mouth is oblique and terminal, the tip of the mouth cleft is on a level from the middle of the eye, rarely somewhat higher. The lower jaw is slightly longer than the upper jaw and the lower jaws symphysis forms a small "chin" similar to that in *Alburnus* species. The junction of the lower jaw and the quadrate is on about a vertical through the anterior margin of the pupil.

Body depth enters SL 3.1-3.7 times (mean 3.4, std 0.27), HL 3.9-4.4 (4.2, 0.18), predorsal length 1.7-2.2 (1.8, 0.36), postdorsal length 2.6-3.1 (2.8, 0.16), caudal peduncle depth 8.3-9.2 (8.6, 0.14), caudal peduncle length 4.9-5.8 (5.5, 0.27), length of longest dorsal fin ray 3.9-5.1 (4.8, 0.38), and length of longest anal fin ray to scale sheath 5.8-6.7 (6.4, 0.30). Orbit width enters HL

2.8-3.4 (3.3, 0.14) times, snout length enters 3.6-4.3 (3.8, 0.27), and interorbital width 2.8-3.3 (3.0, 0.24).

Dorsal fin unbranched rays 3, branched dorsal-fin rays 8½, 7½ in one specimen. Anal fin unbranched rays 3, branched anal-fin rays 10-14½ (12.4, 0.92) (Tables 1 and 4). The dorsal fin outer margin is truncate to slightly convex and the anal fin outer margin is slightly concave.

Pharyngeal tooth counts are 2.5-5.2 in 6 specimens from 10 examined, and 2.5-4.2 in 4 specimens. The lateral line is complete with none or 1 unpored scales at the posterior end of the lateral series; total lateral line scales 44(2), 45 (3), 46(11), 47(10), 48(8), 49(2), 50(2) or 51(2) (lateral line scales to the margin of hypurals 42-49). Total gill rakers in the outer row on first left arch number 6(5), 7(3) or 8 (2); gill rakers are short and widely spaced, not touching the adjacent raker base when appressed.

Vertebral counts are given below including the holotype. Total vertebrae number 39-40(41, 42) (39.8, 0.59) (Tables 2 and 4). Predorsal vertebrae number 11-13 with a mode of 12 (12.2, 0.54) (Tables 2 and 5). Abdominal vertebrae number 19-20(21) with a mode of 20 (19.7, 0.54) (Tables 3 and 5). Caudal vertebrae number 19-21 with a mode of 20 (20.1, 0.57) (Tables 3 and 6). The vertebral formulae are 20+20 (in 21 specimens), 19+21 (7), 19+20 (6), 20+21 (1), 21+21 (1). Thus, the caudal vertebral region is equal to the caudal region, longer than caudal region or (found in only 4 specimens) one vertebra shorter than the abdominal region, the mean difference between abdominal and caudal counts being -0.4 (std 0.91) (Tables 3 and 6).

Overall colouration in preserved specimens is as described for the holotype.

Etymology. The species is named after a Russian naturalist Petr Aleksandrovich Varentsov who lived and widely travelled in the Transcaspian Province [Zakaspiyskaya Oblast'] of the former Russian Empire and was a collector of the type series of this species. He wrote a very informative book on different aspects of geography and natural history of the area (Varentsov, 1907).

Distribution. This species is described from a single river (Ashkhabadka R. at Ashgabat [Ashkhabad, Askhabad]) flowing northward from the Kopetdag Mountains. We suppose that this species is probably distributed in other rivers of the Kopetdag in the west from Tedzhen [Haru Rud]. It was commonly considered that one and the same species (identified as *A. bipunctatus eichwaldii*) (e.g. Nikolskiy, 1938; Berg, 1949) is distributed from the Kura River further eastward around the southern Caspian coast to the Amu Darya upper reaches inclusively. The data presented here show that another species than *A. varentsovi* sp. n. is distributed in Safid Rud, but we did not specifically compare samples from different localities of the eastern part of the mentioned range of *A. bipunctatus eichwaldii* auctorum because of the lack of sufficient number of specimens in the collection. Two specimens of *Alburnoides* from Zeravshan are discussed below.

Comparative remarks. Alburnoides varentsovi sp. n. differs from the fish from Zeravshan R. (which formerly belonged to the Amu Darya drainage) (ZISP 4491, 2 specimens) by having a shorter pectoral fin in both males and females that does not reach the pelvic fin base (vs. reaching), a shorter pelvic fin that does not reach the anus (vs. extending behind the origin of the anal fin), a posteriorly located anal fin that originates on a vertical from the posterior end of the dorsal fin (vs. markedly in front of this vertical). From the geographically close species of the Aral Sea basin, *A. taeniatus* and *A. oblongus,* which share with *A. varentsovi* sp. n. a smooth, often partly scaled ventral keel, the new species clearly differs, besides other characters (see Tables 1-3), by a low number of gill rakers (6-8 vs. 10-20). Summarized data on fin and vertebral counts (Figs 3-6) cluster *A. varentsovi* sp. n. with *A. namaki* sp. n., *A.* cf. *eichwaldii* from Safid Rud and *Alburnoides* sp. from Pilvar R. *Alburnoides varentsovi* sp. n. which shares with

Table 8. t-test of total vertebrae means. t-test values for means significantly different at 99% confidence level are given in bold. Numbers of groups as in Table 7.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	x	**6.802**	**9.325**	2.642	2.080	**4.150**	**5.188**	0.240	**8.166**	**10.967**	**5.304**	**13.628**	**20.037**	**18.551**	**6.395**	**25.704**	1.241
2		x	**10.820**	**7.710**	**5.679**	**5.286**	**4.380**	**6.928**	**3.261**	1.919	**3.999**	1.259	1.517	1.247	**3.995**	**5.013**	**3.678**
3			x	5.331	9.994	8.961	12.688	9.374	15.305	17.498	12.330	19.867	25.017	23.778	13.849	29.726	5.024
4				x	**4.029**	**3.799**	**6.513**	2.527	**8.833**	**11.080**	**6.602**	**12.960**	**17.987**	**17.025**	**7.452**	**23.068**	2.322
5					x	0.275	2.660	2.336	**5.115**	**7.654**	**3.009**	**9.590**	**15.188**	**14.168**	**3.597**	**20.824**	0.400
6						x	1.998	**4.629**	**4.058**	**6.264**	2.365	**7.767**	**12.544**	**11.801**	**3.597**	**17.738**	0.249
7							x	**5.545**	2.417	**5.070**	0.560	**6.887**	**12.644**	**11.681**	0.873	**18.569**	0.770
8								x	8.643	12.233	5.613	14.342	20.937	19.334	6.813	**26.586**	1.324
9									x	2.248	1.640	**4.544**	**10.554**	**9.619**	1.595	**16.811**	1.793
10										x	**4.105**	1.494	**7.393**	**6.602**	4.353	13.797	2.954
11											x	**5.682**	**10.975**	**10.171**	0.226	**16.667**	1.016
12												x	6.362	5.538	6.196	13.205	3.593
13													x	0.562	**12.163**	**7.333**	**6.028**
14														x	11.172	7.617	5.763
15															x	**18.267**	1.142
16																x	9.058
17																	x

Table 9. t-test of predorsal vertebrae. t-test values for means significantly different at 99% confidence level are given in bold. Numbers of groups as in Table 7.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	x	**4.779**	**3.749**	0.435	0.533	**4.519**	**5.702**	0.055	**9.935**	**13.380**	2.101	**13.394**	**10.095**	**13.381**	**4.272**	0.199	**2.866**
2		x	**7.245**	**4.459**	**5.019**	2.248	**8.791**	**5.183**	**2.944**	**5.125**	**2.914**	**4.926**	2.507	**4.986**	1.736	**4.417**	**5.831**
3			x	4.109	3.115	**7.922**	1.233	**4.162**	**12.218**	**15.274**	**5.279**	**15.285**	**12.424**	**15.275**	**7.412**	**3.680**	0.372
4				x	0.940	**3.574**	**6.100**	0.565	**9.508**	**12.910**	1.707	**12.908**	**9.622**	**12.901**	**3.819**	0.200	**3.108**
5					x	**4.774**	**4.851**	0.563	**9.942**	**13.179**	2.479	**13.167**	**10.046**	**13.163**	**4.552**	0.681	2.492
6						x	**6.489**	**5.848**	**6.786**	**9.465**	0.121	**9.340**	**6.572**	**9.375**	1.708	1.536	**3.830**
7							x	**6.610**	**14.854**	**18.511**	**7.141**	**18.668**	**15.468**	**18.608**	**9.853**	**5.428**	0.429
8								x	**11.274**	**15.426**	2.422	**15.598**	**11.805**	**15.530**	**5.066**	0.276	**2.975**
9									x	**3.338**	**7.110**	2.289	0.732	2.376	**6.087**	**9.075**	**8.857**
10										x	**10.021**	0.365	**3.571**	0.252	9.284	12.178	10.744
11											x	**9.915**	**6.941**	**9.943**	1.703	1.777	**4.038**
12												x	**3.295**	0.113	**9.173**	**12.132**	**10.629**
13													x	3.379	5.864	9.083	8.683
14														x	9.202	12.140	10.662
15															x	3.716	5.298
16																x	2.900
17																	x

A. namaki sp. n. (and *A. idignensis* sp. n.) the lowest number of predorsal vertebrae (modally 12) is distinguished by a clearly forked caudal fin with pointed lobes (vs. shallowly forked, with rounded lobes), an oblique terminal mouth with the tip of the mouth cleft on a level from the middle of the eye or slightly above (vs. small, almost subterminal, the tip of the mouth cleft on a level from the lower margin of the eye or below), a commonly partly scaled ventral keel (vs. sharp and commonly completely scaleless). *Alburnoides* sp. from Pulvar R. (Kor R. drainage) in Iran has fewer branched anal-fin rays (commonly 11½ vs. 12-13½ in *A. varentsovi* sp. n.) and more numerous predorsal vertebrae (13-14 vs. 11-13, commonly 12). By fin and vertebral counts, *A. varentsovi* sp. n. is rather similar to *A.* cf. *eichwaldii* from Safid Rud and their taxonomic relationships need a further study involving a wider range of samples from the rivers of the southern coast eastwards to the Amu Darya.

***Alburnoides petrubanarescui* sp. n.**
(Fig. 10)

Holotype. CMNFI 1970-0558, female, 109.1 mm TL, 88.8 mm SL; Iran, Azarbaijan-e Bakhtari, Qasemlou Chay, Orumiyeh [Urmia] Lake basin, ca. 37°21´N, 45°09´E; 27 June 1962; coll. V.D. Vladykov.

Paratypes. CMNFI 1970-0558A, 51, 28.7-87.3 mm SL, counts and measurements on 29 fish 33.6-87.3 mm SL; same data as holotype.

Diagnosis. The species is distinguished by a combination of characters which includes a small eye; the orbit width about equal to the snout length but markedly smaller than the interorbital width; caudal fin lobes rounded and the fin shallowly forked; a scaled ventral keel behind the pelvic fins along the abdomen to the anus, a deep head with a stout snout which is markedly rounded; a tip of the mouth cleft on the level below the lower margin of the eye; commonly 7½ (less frequently 8½) branched dorsal-fin rays; 8-10½, commonly 9½, branched anal-fin rays; 44-51 total lateral line scales (42-49 scales to posterior margin of hypurals); 2.5-4.2 pharyngeal teeth (or other variants with four teeth on the right ceratobranchial); commonly 40-41 total vertebrae; 13-14 predorsal vertebrae; 20-22, commonly 21, abdominal vertebrae; 19-20 caudal vertebrae; a caudal vertebral region most commonly shorter than the abdominal region; and the most common vertebral formulae are 21+19 and 21+20.

Description of holotype. The caudal fin lobes are rounded and the fin is shallowly forked. A ventral keel between the pelvics and the anal fin is smooth and completely scaled. There is a pelvic axillary scale and scales extend over the proximal bases of the anal fin forming a sheath. The upper body profile is convex, similar to the lower profile. The snout is markedly rounded, stout. The mouth is small, subterminal; the tip of the mouth cleft is on a level below the lower margin of the eye. The body depth enters SL 3.3 times, HL enters 4.3, predorsal length 1.8, caudal peduncle depth 7.7, caudal peduncle length 4.1, length of longest dorsal fin ray 5.2, and length of longest anal fin ray to scale sheath 6.8. Orbit diameter enters HL 3.5 times, snout length enters 3.6, and interorbital width 2.6. Pectoral fin length enters pectoral fin origin to pelvic fin origin distance 1.3 times, and pelvic fin length enters pelvic fin origin to anal fin origin distance 1.2 times.

Dorsal fin rays are 3 unbranched and 7½ branched, anal fin rays are 3 unbranched and 9½ branched, branched pectoral fin rays are 13, pelvic fin branched rays are 7. The anal fin origin is on a vertical from the posterior end of the dorsal fin base. Total lateral line scales number 46 and those to posterior margin of hypurals 45, scales around caudal peduncle 15, scales above lateral line to dorsal fin origin are 9, scales below lateral line to anal fin origin are 5, scales below lateral line to pelvic fin origin are 6, and midline predorsal scales are 21. Pharyngeal teeth 2.5-4.2. Gill rakers number 7, they are short and stubby, the longest touching the adjacent one when appressed. Total vertebrae are 41, comprising 21 abdominal and 20 caudal vertebrae. Predorsal vertebrae number 13.

The peritoneum is silvery with fine melanophores and some large spots. The lateral line is clearly delineated by darker pigment above and below. Some pigment on flank scales above and below the lateral line give the impression of stripes. A mid-flank stripe is evident. The back is dark and obscures a predorsal and postdorsal stripe. The fins are mostly immaculate, with some melanophores lining the rays of the dorsal and pectoral fins. The unbranched pectoral fin ray is strongly lined with melanophores on its inner margin.

Description of paratypes.

The body is compressed but relatively thick. The ventral keel between the pelvics and anal fin is not sharp and is completely covered by scales in all specimens. The anal fin origin is below the posterior end of the dorsal fin base. The snout is short and markedly rounded in smaller and larger individuals. The mouth is subterminal, with the tip of the mouth cleft on a level below the lower margin of the eye. The junction of the lower jaw and the quadrate is on about a vertical through the anterior eye margin.

Males (n = 5): head depth in SL 4.3-4.7 (mean 4.6, std 0.18), body depth in SL 3.2-3.5 (3.4, 0.13), HL in SL 3.6-3.9 (3.7, 0.12), predorsal length in SL 1.8-2.0 (1.9, 0.05), head width in SL 6.2-7.2 (6.6, 0.37), caudal peduncle depth in SL 7.3-8.1 (7.7, 0.31), caudal peduncle length in SL 3.9-4.1 (4.0, 0.08), pectoral fin length in SL 4.6-5.2 (4.9, 0.24), pelvic fin length in SL 5.6-8.4 (6.4, 0.49), pectoral fin origin to pelvic fin origin distance in SL 4.2-4.6 (4.3, 0.16), pelvic fin origin to anal fin origin distance in SL 5.7-6.3 (6.0, 0.27), prepelvic length in SL 1.9-2.2 (2.1, 0.10), preanal length in SL 1.5-1.6 (1.5, 0.03), longest dorsal fin ray in SL 4.4-5.4 (5.1, 0.39), longest anal fin ray in SL 5.8-7.1 (6.4, 0.46), mouth width in HL 3.2-4.4 (3.6, 0.45), snout length in HL 3.5-3.8 (3.6, 0.12), orbit diameter in HL 3.2-3.4 (3.3, 0.10), interorbital distance in HL 2.7-3.2 (2.9, 0.24), postorbital length in HL 2.1-2.3 (2.2, 0.06), caudal peduncle depth in caudal peduncle length 1.8-2.1 (2.0, 0.11), pectoral fin length in pectoral fin origin to pelvic fin origin distance 1.1-1.2 (1.1, 0.06), and pelvic fin length in pelvic fin origin to anal fin origin distance 1.0-1.1 (1.1, 0.07).

Females (n = 24): head depth in SL 4.3-5.1 (mean 4.6, std 0.21), body depth in SL 2.8-3.8 (3.3, 0.23), HL in SL 3.7-4.3 (4.0, 0.18), predorsal length in SL 1.8-1.9 (1.8, 0.03), head width in SL 6.1-7.5 (6.9. 0.32), caudal peduncle depth in SL 4.2-8.6 (7.8, 0.86), caudal peduncle length in SL 3.9-6.7 (4.3, 0.53), pectoral fin length in SL 4.6-5.3 (5.0, 0.21), pelvic fin length in SL 5.9-7.1 (6.5, 0.29), pectoral fin origin to pelvic fin origin distance in SL 3.7-5.4 (4.1, 0.22), pelvic fin origin to anal fin origin distance in SL 4.8-6.3 (5.5, 0.45), prepelvic length in SL 1.9-2.2 (2.1, 0.06), preanal length in SL 1.5-1.6 (1.5, 0.03), longest dorsal fin ray in SL 4.6-5.9 (5.3, 0.29), longest anal fin ray in SL 6.2-7.8 (6.8, 0.40), mouth width in HL 3.1-4.1 (3.6, 0.27), snout length in HL 3.2-3.8 (3.6, 0.16), orbit diameter in HL 3.1-3.7 (3.4, 0.14), interorbital distance in HL 2.7-3.2 (2.9, 0.11), postorbital length in HL 2.0-2.3 (2.1, 0.08), caudal peduncle depth in caudal peduncle length 1.0-2.1 (1.8, 0.25), pectoral fin length in pectoral fin origin to pelvic fin origin distance 1.1-1.4 (1.2, 0.09), and pelvic fin length in pelvic fin origin to anal fin origin distance 1.0-1.5 (1.2, 0.10).

The following characters were significantly different between sexes ($p<0.05$). Greater in females: postorbital length, predorsal length, pectoral fin origin to pelvic fin origin distance, pelvic fin origin to anal fin origin distance. Greater in males: HL, pectoral fin length in pectoral fin origin to pelvic fin origin distance, and pelvic fin length in pelvic fin origin to anal fin origin distance.

Dorsal fin unbranched rays 3, branched dorsal-fin rays 7½ (19) or 8½ (10) (7.3, 0.48). Anal fin unbranched rays 3, branched anal-fin rays 8-10½ (9.3, 0.64, including holotype) (Tables 1 and 4). The dorsal fin outer

Table 10. t-test of abdominal vertebrae means. t-test values for means significantly different at 99% confidence level are given in bold. Numbers of groups as in Table 7.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	x	0.657	**4.092**	**5.009**	**5.136**	**11.526**	**2.861**	**8.905**	**3.457**	**3.241**	**9.610**	**3.160**	**3.049**	**5.754**	0.030	**8.033**	**6.229**
2		x	**4.170**	**4.830**	**4.889**	**10.404**	**2.997**	**7.649**	2.553	2.248	**8.736**	2.086	2.066	**4.376**	0.716	**6.138**	**6.309**
3			x	0.285	0.406	**4.402**	1.914	1.222	**6.072**	**6.001**	**2.950**	**6.005**	**5.874**	**7.821**	**4.208**	**9.370**	**3.722**
4				x	0.146	**5.856**	2.067	2.080	**6.967**	7.058	4.065	7.209	6.927	9.364	5.283	11.543	4.097
5					x	**6.252**	2.016	2.393	**7.072**	**7.200**	**4.390**	**7.388**	**7.068**	**9.610**	5.457	11.940	4.196
6						x	8.082	**4.907**	**11.972**	**12.493**	1.845	**12.977**	**12.423**	**14.871**	**12.159**	**17.359**	1.408
7							x	4.688	5.370	5.329	6.266	5.380	5.175	7.675	3.024	9.834	5.032
8								x	**9.616**	**10.152**	2.771	**10.716**	**10.063**	**12.981**	**9.787**	16.106	3.416
9									x	0.473	**10.477**	0.764	0.664	1.405	**3.617**	2.808	**7.476**
10										x	**10.882**	0.292	0.203	2.045	3.429	3.626	7.377
11											x	**11.279**	**10.795**	**13.262**	**10.155**	**15.694**	2.260
12												x	0.081	2.467	**3.376**	**4.194**	**7.338**
13													x	2.274	**3.232**	**3.890**	**7.296**
14														x	**6.087**	1.492	**8.412**
15															x	8.578	6.277
16																x	9.209
17																	x

Table 11. t-test of caudal vertebrae means. t-test values for means significantly different at 99% confidence level are given in bold. Numbers of groups as in Table 7.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	x	**12.882**	**5.968**	0.227	**6.080**	**9.548**	**8.316**	**6.488**	**4.227**	**8.583**	**12.367**	**10.755**	**15.251**	**14.784**	**6.274**	**20.952**	**8.103**
2		x	**16.710**	**12.179**	**8.216**	**4.689**	**7.432**	**9.605**	**8.306**	**6.336**	2.447	**5.013**	0.167	2.304	**7.821**	**3.370**	0.883
3			x	5.789	11.360	19.397	13.739	12.512	9.033	13.633	16.789	15.710	19.459	19.439	11.425	24.895	11.116
4				x	5.422	12.493	7.379	5.574	3.804	7.753	11.438	9.731	14.165	13.425	5.631	19.381	7.809
5					x	**6.394**	1.603	0.850	0.966	2.455	**6.729**	**4.398**	**9.572**	**8.176**	0.354	**14.738**	**4.877**
6						x	**5.224**	**9.698**	**6.348**	**3.372**	2.288	1.188	**5.614**	**3.352**	**5.762**	**11.522**	2.149
7							x	**2.955**	2.385	1.071	**5.765**	**3.155**	**8.803**	**7.265**	1.171	**14.354**	**4.178**
8								x	0.398	**3.770**	**8.476**	**6.169**	**11.717**	**10.808**	1.237	18.037	5.501
9									x	**3.092**	**6.861**	**4.772**	**9.391**	**8.013**	1.256	**13.856**	**5.231**
10										x	**4.480**	1.873	**7.324**	**5.588**	2.039	**12.329**	**3.547**
11											x	**2.871**	2.652	0.418	**6.262**	**6.973**	0.850
12												x	**5.779**	**3.779**	**3.918**	**10.805**	2.573
13													x	2.548	**9.048**	**4.167**	0.850
14														x	**7.580**	**7.447**	0.642
15															x	14.048	4.646
16																x	3.397
17																	x

margin is truncate to markedly convex and the anal fin outer margin is slightly concave. Pectoral fin branched rays 13(16), 14(12), 15(1) (13.5, 0.57), pelvic fin branched rays 6(5), 7(24) (6.8, 0.38)

Pharyngeal tooth counts are 2.5-4.2 (18), 2.4-4.2 (4), 2.5-4.1 (5), 1.4-4.1 (1), 1.5-4.0 (1). The lateral line is complete with none or 1 unpored scales at the posterior end of the lateral series; total lateral line scales 43(1), 44(3), 45(2), 46(8), 47(5), 48(6), 49(3), 50(1) (46.7, 1.73); lateral line scales to the margin of hypurals 42(1), 43(3), 44(4), 45(5), 46(6), 47(6), 48(3), 49(1) (45.6, 1.76). Scales around caudal peduncle 14(2), 15(7) 16(10), 17(9), 18(-), 19(1) (16.0, 1.09); scales between dorsal fin origin and lateral line 9(7), 10(18), 11(4) (9.9, 0.62); scales between anal fin origin and lateral line 4(5), 5(23), 6(1) (4.9, 0.44); scales between pelvic fin origin and lateral line 3(1), 4(8), 5(20) (4.7, 0.55); predorsal scales 20(1), 21(10), 22(14), 23(3), 24(1) (21.8, 0.83). Total gill rakers in the outer row on first left arch number 6(3), 7(18), 8(8) (7.2, 0.60).

Vertebral counts given below include holotype. Total vertebrae number (39)40-41(42) (40.5, 0.63) (Tables 2 and 4). Predorsal vertebrae number 13-14 with a mode of 13 (13.4, 0.50) (Tables 2 and 5). Abdominal vertebrae number 20-22 with a mode of 21 (21.0, 0.41) (Tables 3, 5). Caudal vertebrae number 19-20(21) (19.5, 0.57) (Tables 3 and 6). The vertebral formulae are 21+19 (in 12 specimens), 21+20 (10), 22+19 (3), 20+19 (1), and 21+21 (1). Thus, the caudal vertebral region is shorter than the abdominal region, rarely equal to it (in 3 specimens), the mean difference between abdominal and caudal counts being +1.4 (std 0.77) (Tables 3 and 6).

Other characters as in holotype.

Most paratypes bear strong pigmentation above and below the lateral line pores, forming an evident pale line margined with dark. The broad mid-flank stripe is well-developed. The pigment on scales above and below the lateral line (and below the mid-flank stripe) form a series of thin, discontinuous stripes. Some fish have a series of strong melanophores on the inner margin of the pectoral fin unbranched ray. The lateral line over the pectoral and pelvic fins can be wavy rather than a smooth decurved line.

Comparative remarks. *Alburnoides petrubanarescui* sp. n. differs from all the congeners primarily by having a combination of a scaled keel, the lowest number of branched anal-fin rays (modal value 9½ vs. 10½ and more), and the highest value of the difference between the abdominal and vertebral counts. A completely scaled keel is a character shared by *A. petrubanarescui* sp. n., *A. oblongus* distributed in the lower reaches of the Syr Darya and *Alburnoides* sp. from Pulvar (Kor River drainage). However, *A. petrubanarescui* sp. n. is distinguished from the two other species of this group by having fewer branched dorsal-fin rays (commonly 7½ vs. 8½) and fewer branched anal-fin rays (8-10½ vs. 10-12½). Besides, *A. petrubanarescui* sp. n. is clearly different from *A. oblongus* by having larger scales (43-50 total lateral line scales vs. 50-56), 2.5-4.2 and 2.4-4.2 pharyngeal teeth (vs. 2.5-5.2 or 1.5-5.1), fewer gill rakers (6-9 vs. 10-13), a truncate or rounded margin of the dorsal fin (vs. concave). *A. petrubanarescui* sp. n. differs from *Alburnoides* sp. from Pulvar, besides some other characters, by fewer dorsal-fin branched rays (commonly 7½ vs. 8½), fewer anal-fin branched rays (8-10½, commonly 9½, vs. 10-12½, commonly 11½) and 21+19 or 21+20 vertebrae (vs. 20+20 or 20+21) the difference between abdominal and caudal counts averaging +1.4 (vs. -0.3).

Etymology. The species is named after the late Petru Bănărescu, a great freshwater ichthyologist who contributed significantly to our knowledge of fishes of Eurasia.

Distribution. This species is described from a river in the Orumiyeh [Urmia] lake basin and we suppose that it may be an endemic species to the Orumiyeh lake basin. Habitat data for the type locality (June 1962): water 18 °C, fast current in stream, pebbles and sand bottom, shore grassy, much aquatic plant life, caught with dipnet, other species included *Alburnus atropatenae, Barbus lacerta, "Nemacheilus"* sp.

Alburnoides namaki **sp. n.**

(Fig. 11)

Holotype. CMNFI 1979-0461, female, 110.4 mm TL, 91.2 mm SL; Iran, Hamadan, qanat at Taveh, 35°07´N, 49°02´E; 10 June 1978; coll. Brian W. Coad and N. Yaghar.

Paratypes. CMNFI 1979-0461A, 188, 27.2-96.9 mm SL, most counts and measurements on 58 fish 36.8-96.9 mm SL; same data as holotype.

*Additional materia*l. CMNFI 2007-0121 (3, 28.0-74.8 mm SL, Iran, Hamadan, stream in Qareh Chay basin north of Razan, ca. 35°25´N, 49°02´E; 1976; Department of Environment, Tehran. – CMNFI 2007-0074, 4, 33.1-41.8 mm SL, Iran, Markazi, Qareh Chay, 32 km west of Arak, 34°03´N, 49°21´E; 1 Dec. 1974, coll. R.J. Behnke & N.B. Armantrout. – ZMH 4183 (7, Tehran).

Diagnosis. The species is distinguished by a combination of characters which includes the lack of strong spots or dark outline to the lateral line canal; a small eye, the orbit width about equal to the snout length but markedly smaller than the interorbital width; caudal fin lobes rounded and fin shallowly forked; a sharp scaleless ventral keel behind the pelvic fins along the abdomen to the anus; a deep head with a stout snout which is markedly rounded; a tip of the mouth cleft on the level below the lower margin of the eye; commonly 8½ branched dorsal-fin rays; 10-13½, commonly 11-12½, branched anal-fin rays; (43)44-50(52) total lateral line scales (42-51 scales to posterior margin of hypurals); 2.5-4.2 pharyngeal teeth (or other variants with four teeth on the right ceratobranchial); commonly 39-41 total vertebrae; 11-13(14), commonly12-13, predorsal vertebrae; 19-20(21) abdominal vertebrae; 19-21 caudal vertebrae; a caudal vertebral region most commonly equal to the abdominal region; and the most common vertebral formulae are 20+20, 20+19 and 19+20.

Description of holotype. A ventral keel between the pelvics and the anal fin is completely scaleless. There is a pelvic axillary scale and scales extend over the proximal bases of the anal fin forming a sheath. Dorsal fin rays are 3 unbranched and 8½ branched, anal fin rays are 3 unbranched and 12½ branched, branched pectoral fin rays are 13, pelvic fin branched rays are 6. The anal fin origin is on a vertical from the posterior end of the dorsal fin base. Total lateral line scales number 50 and those to posterior margin of hypurals 51, scales around caudal peduncle 16, scales above lateral line to dorsal fin origin are 12, scales below lateral line to anal fin origin are 6, scales below lateral line to pelvic fin origin are 7, and midline predorsal scales are 25. Pharyngeal teeth 2.5-4.3. Gill rakers number 7, they are short and stubby, the longest touching the adjacent one when appressed. Total vertebrae are 40, comprising 20 abdominal and 20 caudal vertebrae. Predorsal vertebrae number 13.

The upper body profile is convex, similar to the lower profile. The snout is markedly rounded, stout. The mouth is small, almost subterminal; the tip of the mouth cleft is on a level from the lower margin of the eye. The body depth enters SL 3.1 times, HL enters 4.1, predorsal length 1.8, caudal peduncle depth 8.4, caudal peduncle length 5.3, length of longest dorsal fin ray 5.5, and length of longest anal fin ray to scale sheath 7.4. Orbit diameter enters HL 3.6 times, snout length enters 3.6, and interorbital width 2.8. Pectoral fin length enters pectoral fin origin to pelvic fin origin distance 1.4 times, and pelvic fin length enters pelvic fin origin to anal fin origin distance 1.3 times.

The peritoneum is silvery with a few melanophores. The lateral line is somewhat darker than the surrounding flank but there are no strong spots or dark outline to canal. Some pigment on flank scales above and below the lateral line give a faint impression of stripes. A mid-flank stripe is only weakly apparent. A predorsal and postdorsal stripe is present on the back. The fins are mostly immaculate, with some melanophores lining the rays of the dorsal and pectoral fins. The flanks were a golden-yellow, belly white, back dark green, base of paired and anal fins orange, other fins hyaline in life.

Description of paratypes. The body is compressed. The ventral keel between the pelvics and anal fin is completely scaleless, very sharp and prominent in all specimens. The anal fin origin is below the posterior end of the dorsal fin base. The snout is short and markedly rounded in smaller and larger individuals. The mouth is almost subterminal, with the tip of the mouth cleft on a level of the lower margin of the eye or below. The junction of the lower jaw and the quadrate is on about a vertical through the middle of the eye.

Males (n = 37): head depth in SL 4.1-5.0 (mean 4.5, std 0.24), body depth in SL 3.0-3.6 (3.3, 0.16), HL in SL 3.6-4.4 (3.9, 0.16), predorsal length in SL 1.8-2.0 (1.9, 0.04), head width in SL 6.3-7.9 (7.0, 0.35), caudal peduncle depth in SL 7.1-9.0 (8.1, 0.43), caudal peduncle length in SL 4.2-5.4 (4.7, 0.27), pectoral fin length in SL 4.3-5.5 (4.9, 0.33), pelvic fin length in SL 5.4-6.7 (6.1, 0.33), pectoral fin origin to pelvic fin origin distance in SL 4.0-4.8 (4.4, 0.22), pelvic fin origin to anal fin origin distance in SL 4.8-6.5 (5.6, 0.33), prepelvic length in SL 2.0-2.2 (2.1, 0.05), preanal length in SL 1.5-1.6 (1.6, 0.03), longest dorsal fin ray in SL 4.5-5.5 (5.0, 0.24), longest anal fin ray in SL 5.9-8.1 (7.0, 0.47), mouth width in HL 3.1-4.8 (4.1, 0.32), snout length in HL 3.5-4.1 (3.7, 0.13), orbit diameter in HL 2.9-3.6 (3.3, 0.18), interorbital distance in HL 2.7-3.3 (3.0, 0.13), postorbital length in HL 2.0-2.3 (2.1, 0.09), caudal peduncle depth in caudal peduncle length 1.5-2.0 (1.7, 0.13), pectoral fin length in pectoral fin origin to pelvic fin origin distance 1.0-1.3 (1.1, 0.08), and pelvic fin length in pelvic fin origin to anal fin origin distance 0.9-1.3 (1.1, 0.08).

Females (n = 21): head depth in SL 3.9-4.8 (mean 4.4, std 0.22), body depth in SL 3.0-3.6 (3.2, 0.14), HL in SL 3.4-4.1 (3.9, 0.16), predorsal length in SL 1.8-2.0 (1.9, 0.04), head width in SL 6.2-7.2 (6.7, 0.30), caudal peduncle depth in SL 7.5-8.9 (8.2, 0.40), caudal peduncle length in SL 4.5-5.2 (4.8, 0.22), pectoral fin length in SL 4.5-6.3 (5.4, 0.36), pelvic fin length in SL 5.9-7.3 (6.8, 0.32), pectoral fin origin to pelvic fin origin distance in SL 3.9-5.1 (4.4, 0.30), pelvic fin origin to anal fin origin distance in SL 4.6-6.5 (5.5, 0.51), prepelvic length in SL 2.0-2.2 (2.1, 0.05), preanal length in SL 1.5-1.6 (1.5, 0.03), longest dorsal fin ray in SL 4.6-6.1 (5.2, 0.39), longest anal fin ray in SL 5.6-8.4 (7.2, 0.59), mouth width in HL 3.4-4.4 (3.9, 0.25), snout length in HL 3.4-4.1 (3.7, 0.14), orbit diameter in HL 2.9-3.6 (3.2, 0.18), interorbital distance in HL 2.7-3.3 (3.0, 0.16), postorbital length in HL 1.9-2.3 (2.2, 0.09), caudal peduncle depth in caudal peduncle length 1.5-1.9 (1.7, 0.12), pectoral fin length in pectoral fin origin to pelvic fin origin distance 0.9-1.5 (1.2, 0.14), and pelvic fin length in pelvic fin origin to anal fin origin distance 0.9-1.6 (1.2, 0.14).

The following characters were significantly different between sexes ($p<0.05$). Greater in females – head depth, body depth, head width, orbit diameter, predorsal length. Greater in males – pectoral fin length, pelvic fin length, longest dorsal fin ray length, pectoral fin length in pectoral fin origin to pelvic fin origin distance and pelvic fin length in pelvic fin origin to anal fin origin distance.

Dorsal fin unbranched rays 3, branched dorsal-fin rays 7½ (2), 8½ (48), 9½ (8) (8.1, 0.41). Anal fin unbranched rays 3, branched anal-fin rays 10½ (5), 11½ (14), 12½ (29), 13½ (9), 14½ (1) (11.8, 0.88) (see also Tables 1 and 4 for data based on a set of another 48 specimens which were radiographed). The dorsal fin outer margin is truncate to markedly convex and the anal fin outer margin is slightly concave. Pectoral fin branched rays 12(6), 13(33), 14(17), 15(2) (13.3, 0.69), pelvic fin branched rays 6(7), 7(51) (6.9, 0.33).

Pharyngeal tooth counts are 2.5-4.2 (20), 2.4-4.2 (5), 2.5-4.1 (2), 2.5-4.3 (2), 1.5-4.2 (1). The lateral line is complete with none or 1 unpored scales at the posterior end of the lateral series; total lateral line scales 43(1), 44(3), 45(3), 46(11),

Table 12. t-test of means of difference between abdominal and caudal vertebrae. t-test values for means significantly different at 99% confidence level are given in bold. Numbers of groups as in Table 7.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	x	**10.053**	1.131	**3.181**	**7.065**	**12.784**	**7.436**	**9.195**	0.876	**3.786**	**13.812**	**5.374**	**8.431**	**6.405**	**4.748**	**10.809**	**9.928**
2		x	**9.426**	**6.843**	**4.111**	**2.349**	**4.394**	**3.963**	**7.281**	**6.083**	2.556	**4.982**	1.170	**4.215**	**6.297**	0.469	**3.691**
3			x	3.654	6.707	**11.703**	**6.896**	**8.008**	1.683	**4.154**	**12.358**	**5.427**	**8.108**	**6.247**	**4.855**	**9.794**	**9.915**
4				x	**3.414**	**9.421**	**3.511**	**4.683**	1.607	0.663	**10.124**	2.057	**5.397**	**2.981**	1.154	**7.114**	**8.060**
5					x	**6.804**	0.112	0.806	**4.413**	2.609	**7.390**	1.237	2.669	0.298	2.520	**4.092**	**6.358**
6						x	**7.216**	**6.984**	**9.453**	**8.598**	0.079	**7.554**	**3.469**	**6.810**	**9.059**	**3.045**	2.170
7							x	1.023	**4.493**	2.652	**7.893**	1.206	**2.875**	0.211	**2.587**	**4.444**	**6.515**
8								x	**5.381**	**3.693**	**7.745**	2.168	2.350	1.098	**3.864**	4.001	6.248
9									x	2.126	**9.951**	**3.293**	**6.065**	**4.054**	2.617	**7.427**	**8.527**
10										x	**9.216**	1.336	**4.691**	2.226	0.399	**6.244**	**7.607**
11											x	**8.135**	**3.725**	**7.353**	**9.842**	**3.336**	2.168
12												x	**3.584**	0.901	1.083	**5.039**	**6.905**
13													x	**2.825**	**4.757**	0.820	**4.426**
14														x	2.079	**4.189**	**6.428**
15															x	6.587	7.653
16																x	4.117
17																	x

47(12), 48(16), 49(8), 50(3), 51(-), 52(1) (47.3, 1.68); lateral line scales to the margin of hypurals 42(1), 43(4), 44(5), 45(12), 46(15), 47(10), 48(9), 49(1), 50(-), 51(1) (46.1, 1.70). Scales around caudal peduncle 14(2), 15(9) 16(13), 17(19), 18(14), 19(1) (16.6, 1.17); scales between dorsal fin origin and lateral line 9(4), 10(29), 11(24), 12(-), 13(1) (10.4, 0.70); scales between anal fin origin and lateral line 4(10), 5(37), 6(10), 7(1) (5.0, 0.65); scales between pelvic fin origin and lateral line 4(3), 5(31), 6(22), 7(2) (5.4, 0.65), and predorsal scales 18(1), 19(4), 20(13), 21(16), 22(13), 23(4), 24(3), 25(4) (21.3, 1.58). Total gill rakers in the outer row on first left arch number 5(1), 6(14), 7(26), 8(14), 9(3) (7.0, 0.90).

Vertebral counts were calculated for 48 specimens (including holotype). Total vertebrae number 39-40(41) (39.7, 0.59) (Tables 2 and 4). Predorsal vertebrae number (11)12-13(14) (12.2, 0.54) (Tables 2 and 5). Abdominal vertebrae number 19-21with a mode of 20 (19.8, 0.52) (Tables 3 and 5). Caudal vertebrae number 19-21 (19.9, 0.58) (Tables 3 and 6). The vertebral formulae are 20+20 (in 21 specimens), 19+20 (10), 20+19 (8), 19+21 (3), 20+21 (3), and 21+19 (2). Thus, the mean difference between abdominal and caudal counts varies between +3 and -2 with a mode of 0 (-0.1, 0.92) (Tables 3 and 6).

Other characters as in holotype. Many scales are regenerated in various fish from this collection, perhaps indicating a traumatic life.

Some paratypes bear strong pigmentation above and below the lateral line pores, forming an evident pale line margined with dark. A broad mid-flank stripe can be well-developed or weakly expressed and, on the caudal peduncle, obscures the lateral line pigment pattern. However, the lateral line pattern can be weak and this can be seen over the anal fin where the flank stripe does not extend down to the decurved lateral line. The pigment on scales above and below the lateral line (and below the mid-flank stripe) can be strongly or weakly expressed, and in the former case it appears as a series of thin, discontinuous stripes. Some fish have a series of strong melanophores on the inner margin of the pectoral fin unbranched ray. Dorsal fin membranes may be dusky and lack pigment lining the rays.

A male bears tubercles lining scale margins and sparsely on the top and sides of the head. Tubercles are strongeat on scales of the caudal peduncle. The anal-fin rays bear tubercles which follow the branching of the distal rays. Tubercles are present on the dorsal, pectoral and pelvic fin rays but are less developed than those on the anal fin.

Comparative remarks. Alburnoides namaki sp. n. differs from all the congeners primarily by having a combination of a sharp scaleles keel, a short markedly rounded snout, an almost subterminal mouth and a low number of predorsal vertebrae (modally 12). In tree diagrams based on combined data (Figs 3-6) *A. namaki* is clustered together with *A. varentsovi* sp. n. from the northern slope of Kopetdag. *Alburnoides namaki* which shares with *A. varentsovi* sp. n. (and *A. idignensis* sp. n.) the lowest number of predorsal vertebrae (modally 12) is distinguished by a shallowly forked caudal fin with rounded lobes (vs. clearly forked, with pointed lobes), a small, almost subterminal mouth with the tip of the mouth cleft on a level from the lower margin of the eye or below (vs. oblique and terminal, the tip of the mouth cleft on a level from the middle of the eye or slightly above), a sharp and commonly completely scaleless ventral keel (vs. commonly partly scaled).

Etymology. The species is named for the Namak Lake. Namak means salt in Farsi.

Distribution. The qanat is in the Qareh Chay drainage of the Namak Lake basin. Habitat data: altitude, 1640 m, water temp. 15.5 °C, pH 6.0, conductivity 1.2 mS, qanat stream width 1.5 m, maximum depth 75 cm, vegetation in water encrusting, shore grassy, gravel and mud bottom, medium current, water clear in parts, others cloudy and polluted, other species is *Capoeta buhsei*.

Alburnoides nicolausi sp. n.
(Fig. 12)

Holotype. CMNFI 1979-0281, female, 89.4 mm TL, 75.0 mm SL; Iran, Lorestan, stream in Simareh River drainage, 5 km south of Nurabad, 34°03´30´´N, 47°58´30´´E; 6 July 1977; coll. Kelvin Evans and Hamid Assadi.

Paratypes. CMNFI 1979-0281A, 164, 21.3-65.0 mm SL, most counts and measurements on 59 fish 36.8-65.0 mm SL; same data as holotype.

Diagnosis. The species is distinguished by a combination of characters which includes an eye of an average size, the orbit diameter larger than the snout length and smaller than the interorbital width; caudal fin lobes rounded and fin shallowly forked; a variably scaled ventral keel though most commonly scaled only along about 1/3 of its length or scaleless; a deep head with a moderately stout snout which is slightly pointed; a tip of the mouth cleft on the level about the lower margin of the pupil, commonly 7½ branched dorsal-fin rays; 8-11½ branched anal-fin rays; (43)43-47(48-50) total lateral line scales (42-48 scales to posterior margin of hypurals); commonly 2.5-4.2 or 2.4-4.2 pharyngeal teeth; commonly 39-40 total vertebrae; 12-13 predorsal vertebrae; 19-20(21) abdominal vertebrae; 18-20 caudal vertebrae; a caudal vertebral region most commonly one vertebra shorter than the abdominal region; and the most common vertebral formulae are 20+19, 19+20 and 20+20.

Description of holotype. The caudal fin lobes are rounded, the fin is shallowly forked. A ventral keel between the pelvics and the anal fin is not sharp, almost scaleless (scaled along about ¼ of its length). There is a pelvic axillary scale and scales extend over the proximal bases of the anal fin forming a sheath. The upper body profile is convex, similar to the lower profile. The snout is only slightly rounded, almost pointed. The mouth is oblique, slightly below than terminal; the tip of the mouth cleft is slightly below a level of the lower margin of the pupil. The body depth enters SL 3.2 times, HL enters 4.0, predorsal length 1.8, caudal peduncle depth 7.6, caudal peduncle length 4.8, length of longest dorsal fin ray 5.4, and length of longest anal fin ray to scale sheath 7.1. Caudal peduncle depth enters caudal peduncle length 1.6 times. The orbit diameter enters HL 3.3 times, snout length enters 3.7, and interorbital width 3.0. The pectoral fin length enters pectoral fin origin to pelvic fin origin distance 1.4 times, and pelvic fin length enters pelvic fin origin to anal fin origin distance 1.3 times.

Dorsal fin rays are 3 unbranched and 7½ branched, anal fin rays are 3 unbranched and 10½ branched, branched pectoral fin rays are 13, pelvic fin branched rays are 7. The anal fin origin is slightly behind a vertical from the posterior end of the dorsal fin base. Total lateral line scales number 47 and those to posterior margin of hypurals 45, scales around caudal peduncle 17, scales above lateral line to dorsal fin origin are 10, scales below lateral line to anal fin origin are 5, scales below lateral line to pelvic fin origin are 5, and midline predorsal scales are 19. Pharyngeal teeth 2.5-4.2. Gill rakers number 8, they are short and stubby, the longest touching the adjacent one when appressed. Total vertebrae are 38, comprising 20 abdominal and 18 caudal vertebrae. Predorsal vertebrae number 12.

The peritoneum is silvery with fine melanophores and some spots. The lateral line is delineated by some darker pigment above and below but not as strongly as in *A. petrubanarescui* holotype and obscured by background pigmentation on the caudal peduncle. Some pigment on the flank scales above and below the lateral line is weak or irregular and an impression of stripes is not very evident. The mid-flank stripe is weak and diffuse, fading anteriorly under the dorsal fin. The back is dark but predorsal and postdorsal stripes are evident. The fins are mostly immaculate, with some melanophores lining rays of the dorsal and pectoral fins in particular. The unbranched pectoral fin ray is lined with melanophores on its inner margin, but not as strongly as in some other samples.

Description of paratypes. The body is moderately compressed, relatively thick. The upper body profile is convex similar to the lower profile. The caudal fin lobes are rounded, the fin is shallowly forked. The ventral keel between the pelvics and anal fin is variably scaled: completely scaleless (9), scaled along about ¼-1/3 of its length (9), scaled along ½ of its length (6), scaled along about 2/3 of its length (4) or completely scaled (2). The anal fin origin is somewhat behind a vertical from the posterior end of the dorsal fin base. The snout is slightly rounded. The mouth is oblique, slightly below rather than terminal; the tip of the mouth cleft is on a level of the lower margin of the pupil or somewhat below it. The junction of the lower jaw and the quadrate is on about a vertical through the middle of the eye.

Males (n = 24): head depth in SL 3.8-4.5 (avg 4.1, std 0.18), body depth in SL 2.9-3.5 (3.2, 0.13), HL in SL 3.3-3.8 (3.6, 0.13), predorsal length in SL 1.7-2.0 (1.8, 0.05), head width in SL 5.6-6.7 (6.2, 0.30), caudal peduncle depth in SL 6.9-8.2 (7.5, 0.35), caudal peduncle length in SL 4.3-5.2 (4.7, 0.25), pectoral fin length in SL 4.5-5.1 (4.9, 0.18), pelvic fin length in SL 5.4-6.6 (5.9, 0.26), pectoral fin origin to pelvic fin origin distance in SL 4.2-5.0 (4.5, 0.22), pelvic fin origin to anal fin origin distance in SL 5.3-6.4 (5.7, 0.32), prepelvic length in SL 1.9-2.2 (2.0, 0.07), preanal length in SL 1.4-1.6 (1.5, 0.03), longest dorsal fin ray in SL 4.5-5.2 (4.9, 0.21), longest anal fin ray in SL 5.9-7.2 (6.6, 0.31), mouth width in HL 3.2-4.2 (3.5, 0.24), snout length in HL 3.3-3.9 (3.6, 0.17), orbit diameter in HL 3.0-3.8 (3.3, 0.19), interorbital distance in HL 2.8-3.3 (3.0, 0.14), postorbital length in HL 1.7-2.1 (2.0, 0.08), caudal peduncle depth in caudal peduncle length 1.4-1.8 (1.6, 0.11), pectoral fin length in pectoral fin origin to pelvic fin origin distance 1.0-1.2 (1.1, 0.06), and pelvic fin length in pelvic fin origin to anal fin origin distance 0.9-1.2 (1.0, 0.06).

Females (n = 35): head depth in standard length (SL) 3.8-4.3 (avg 4.0, std 0.14), body depth in SL 3.0-3.4 (3.2, 0.10), HL in SL 3.4-4.0 (3.7, 0.14), predorsal length in SL 1.8-1.9 (1.8, 0.03), head width in SL 5.3-6.6 (6.0, 0.36), caudal peduncle depth in SL 7.2-8.2 (7.6, 0.24), caudal peduncle length in SL 4.4-5.4 (4.8, 0.22), pectoral fin length in SL 4.8-5.9 (5.3, 0.28), pelvic fin length in SL 5.6-7.1 (6.3, 0.30), pectoral fin origin to pelvic fin origin distance in SL 3.7-4.7 (4.2, 0.25), pelvic fin origin to anal fin origin distance in SL 4.8-5.9 (5.3, 0.29), prepelvic length in SL 1.9-2.2 (2.0, 0.06), preanal length in SL 1.4-1.5 (1.5, 0.03), longest dorsal fin ray in SL 4.5-5.8 (5.1, 0.31), longest anal fin ray in SL 6.2-7.9 (6.9, 0.45), mouth width in HL 2.9-3.7 (3.4, 0.21), snout length in HL 3.4-3.8 (3.6, 0.13), orbit diameter in HL 3.1-3.7 (3.3, 0.12), interorbital distance in HL 2.7-3.4 (3.0, 0.16), postorbital length in HL 1.9-2.2 (2.0, 0.07), caudal peduncle depth in caudal peduncle length 1.4-1.8 (1.6, 0.09), pectoral fin length in pectoral fin origin to pelvic fin origin distance 1.1-1.5 (1.3, 0.11), and pelvic fin length in pelvic fin origin to anal fin origin distance 1.0-1.5 (1.2, 0.10).

The following characters were significantly different between sexes ($p<0.05$). Greater in females: pectoral fin origin to pelvic fin origin distance, pelvic fin origin to anal fin origin distance, prepelvic fin length, mouth width. Greater in males: caudal peduncle length, pectoral fin length, pelvic fin length, longest dorsal fin ray length, longest anal fin ray length, pectoral fin length in pectoral fin origin to pelvic fin origin distance, and pelvic fin length in pelvic fin origin to anal fin origin distance.

Dorsal fin unbranched rays 3, branched dorsal-fin rays 7½ (52) and 8½ (7) (7.1, 0.33). Anal fin unbranched rays 3, branched anal-fin rays 8½ (2), 9½ (13), 10½ (32), 11½ (12) (10.0, 0.68) (see also Tables 1 and 4 for 42 radiographed specimens). The dorsal fin outer margin is commonly truncate, slightly convex or slightly concave, and the anal fin outer margin is truncate or only slightly concave. Pectoral fin branched rays 11(1), 12(30), 13(25), 14(3) (12.5, 0.63), pelvic fin branched rays 6(6), 7(53) (6.9, 0.30).

Pharyngeal tooth counts are 2.5-4.2 (24), 2.4-4.2 (5), 2.4-5.2 (1). The lateral line is complete with none, 1 or 2 unpored scales at the posterior end of the lateral series; total lateral line scales 42(2), 43(11), 44(15), 45(6), 46(13), 47(7), 48(2), 49(2), 50(2) (45.0, 1.82); lateral line scales to the margin of hypurals 41(3), 42(14), 43(11), 44(11), 45(8), 46(9), 47(-), 48(2), 49(1) (43.9, 1.83). Scales around caudal peduncle 13(1), 14(9), 15(30) 16(14), 17(5) (15.2, 0.87); scales between dorsal fin origin and lateral line 8(2), 9(30), 10(25), 11(2) (9.5, 0.62); scales between anal fin origin and lateral line 3(1), 4(27), 5(28), 6(3) (4.6, 0.62); scales between pelvic fin origin and lateral line 4(21), 5(37), 6(1) (4.7, 0.51), and predorsal scales 18(4), 19(13), 20(18), 21(10), 22(8), 23(4), 24(2) (20.4, 1.49). Total gill rakers in the outer row on first left arch number 5(1), 6(1), 7(33), 8(22), 9(2) (7.4, 0.67).

Vertebral counts given below were calculated in 42 specimens. Total vertebrae number 38-40 with a mode of 39 (38.9, 0.58) (Tables 2 and 4). Predorsal vertebrae number 12-13 (12.6, 0.50) (Tables 2 and 5). Abdominal vertebrae number 19-21with a mode of 20 (19.8, 0.53) (Tables 3 and 5). Caudal vertebrae number 18-20 (19.1, 0.68) (Tables 3 and 6). The vertebral formulae are 20+19 (in 18 specimens), 19+20 (9), 20+18 (6), 20+20 (4), 19+19 (3), 21+18 (1), and 21+19 (1). Thus, the mean difference between abdominal and caudal counts varies between +3 and -1 with a mode of 1 (0.6, 1.08) (Tables 3 and 6).

Other characters as in holotype.

Paratypes can bear strong pigmentation above and below the lateral line pores, forming an evident pale line margined with dark, or this pattern may be quite faint. The mid-flank stripe is weak or diffuse and fades anteriorly. A thin line of pigment can be evident separating the hypaxial and epaxial muscle masses, fading anteriorly. The pigment on scales above and below the lateral line (and below the mid-flank stripe) can be obvious and form a series of thin, discontinuous stripes, or it can be absent. Some fish have a series of strong melanophores on the inner margin of the pectoral fin unbranched ray.

Comparative remarks. Alburnoides nicolausi sp. n. differ from all the congeners primarily by having a combination of commonly 7½ branched dorsal-fin rays, 8-11½ branched anal-fin rays, and 38-40, modally 39, total vertebrae. In tree diagrams based on combined data (Figs 3-5) it is clustered together with the other new species from the Tigris drainage, *A. idignensis* sp. n. *Alburnoides nicolausi* is distinguished from the latter by having commonly 7½ branched dorsal-fin rays (vs. commonly 8½), 8-11½, commonly 10½, branched anal-fin rays (vs. commonly 11½), a relatively longer abdominal vertebral region (mean difference between the abdominal and caudal counts 0.6 vs. 0 – statistically reliable difference, see Table 12), and a better developed ventral keel (commonly scaleless at least along 2/3 of its length vs. 1/3 to 2/3 of its length scaled).

Etymology. The species is named after a Latin male name Nicolaus, a derivative of the Greek Nikolaos (victory of the people), a compound name composed of the elements nikē (victory) and laos (the people); a Russian name Nikolay and an English name Nicholas, the names of, respectively, Nina Bogutskaya's elder son and Brian Coad's son, are also derivatives from Nicolaus.

Distribution. The species is only known from its type locality, a stream in the Simareh River drainage at Nurabad. The Simareh [Seymareh] flows into the Karkheh [Qareh Su] River which enters the Hawr al Hawizeh [Hawr al Azim] on the Iran-Iraq border (Tigris R. drainage). Habitat data: 2000 m altitude, 19°C water temperature, clear water, pH 6.8, forested shore, stony river bed, moderate amounts of aquatic plants, no other species taken.

***Alburnoides idignensis* sp. n.**
(Fig. 13)

Holotype. CMNFI 2007-0118, male, 106.8 mm TL, 89.2 mm SL; Iran, Kermanshahan, Bid Sorkh River between Sahneh and Kangavar, Gav Masiab River drainage, ca. 34°23´N, 47°52´E; 1976; Department of Environment, Tehran.

Paratypes. CMNFI 2007-0118A, 13, 33.5-90.0 mm SL, same data as holotype.

Additional material: CMNFI 1979-0278, 5, 43.3-52.8 mm SL, Iran, Lorestan, Sarab Dowrah River in Kashkan River drainage, 30 km from Khorramabad, 33°34´N, 48°01´E; coll. Kelvin Evans and Hamid Assadi. – CMNFI 2007-0075, 36, 38.1-72.1 mm SL, Iran, Hamadan, Karkheh [Qareh Su] R. system, Malayer River at bridge 5 km from Malayer, ca. 34°17´N, 48°47´E; 1 December 1974; coll. R.J. Behnke and N.B. Armantrout. – CMNFI 2007-0115, 8, 43.3-62.7 mm SL, Iran, Kermanshahan, stream in Karkheh system north of Kermanshah, ca. 34°34´N, 46°47´E; 1976; Department of Environment, Tehran.

Diagnosis. The species is distinguished by a combination of characters which includes an unbranched pectoral fin ray strongly lined with melanophores on its inner margin; an eye of an average size, the orbit diameter larger than the snout length and markedly smaller than the interorbital width; caudal fin lobes rounded and fin shallowly forked; a variably scaled ventral keel though most commonly scaled along about 1/3-2/3 of its length; a deep head with a markedly rounded, stout snout; a small mouth which is between terminal and subterminal; a tip of the mouth cleft on a level from the lower margin of the pupil; commonly 8½ branched dorsal-fin rays; 10-12(13-14)½ branched anal-fin rays; 41-49(50-51) total lateral line scales (39-49 scales to posterior margin of hypurals); commonly 2.5-4.2 or 2.4-4.2 pharyngeal teeth; (37)38-40, with a mode of 39, total vertebrae; 11-13(14) predorsal vertebrae, (18)19-20 abdominal vertebrae; (18)19-20 caudal vertebrae; a caudal vertebral region most commonly one vertebra shorter or one vertebra longer than the abdominal region; the most common vertebral formulae are 20+19 and 19+20, and the difference between the abdominal and caudal counts averaging 0.

Description of holotype. A ventral keel between the pelvics and the anal fin is scaleless along about 1/2 of its length. There is a pelvic axillary scale and scales extend over the proximal bases of the anal fin forming a sheath. The upper body profile is convex, similar to the lower profile. The caudal fin lobes are rounded, the fin is shallowly forked. The snout is markedly rounded, stout. The mouth is small, between terminal and subterminal; the tip of the mouth cleft is on a level of the lower margin of the pupil. The body depth enters SL 3.1 times, HL enters 4.4, predorsal length 1.8, caudal peduncle depth 7.6, caudal peduncle length 4.9, length of longest dorsal fin ray 5.2, and length of longest anal fin ray to scale sheath 7.1. Caudal peduncle depth enters caudal peduncle length 1.6 times. The orbit diameter enters HL 3.6 times, snout length enters 4.1, and interorbital width 2.9. The pectoral fin length enters pectoral fin origin to pelvic fin origin distance 1.2 times, and pelvic fin length enters pelvic fin origin to anal fin origin distance 1.1 times.

Dorsal fin rays are 3 unbranched and 8½ branched, anal fin rays are 3 unbranched and 12½ branched, branched pectoral fin rays are 14, pelvic fin branched rays are 7. The anal fin origin is somewhat in front of a vertical from the posterior end of the dorsal fin base. Total lateral line scales number 45 and those to posterior margin of hypurals 44, scales around caudal peduncle 15, scales above lateral line to dorsal fin origin are 9, scales below lateral line to anal fin origin are 5, scales below lateral line to pelvic fin origin are 4, and midline predorsal scales are 19. Pharyngeal teeth 2.5-4.2. Gill rakers number 7, they are short and stubby, the longest touching the adjacent one when appressed. Total vertebrae are 38, comprising 19 abdominal and 19 caudal vertebrae. Predorsal vertebrae number 11.

The peritoneum is silvery with fine melanophores and some spots. The lateral line is delineated by some darker pigment above and below but not as strongly as in *A. petrubanarescui* holotype and obscured by background pigmentation on the caudal peduncle. Some pigment on the flank scales above and below the lateral line give the impression of stripes but is not strongly developed. A mid-flank stripe is not developed. A thin dark stripe separates the epaxial and hypaxial muscle masses. The back is dark and obscures a predorsal and postdorsal stripe. The fins are mostly immaculate, with some melanophores lining the rays of the dorsal and pectoral fins in particular. The unbranched pectoral fin ray is strongly lined with melanophores on its inner margin.

Description of paratypes.

The body is moderately compressed, relatively thick. The caudal fin lobes are rounded, the fin is shallowly forked. The ventral keel between the pelvics and anal fin is variably scaled: completely scaleless (4), scaled along about ¼-1/3 of its length (11), scaled along ½ of its length (7), scaled along about 2/3 of its length (3) or completely scaled (4). The anal fin origin is in front of a vertical from the posterior end of the dorsal fin base. The snout is moderately stout, rounded. The mouth is almost horizontal, its position is between terminal and subterminal; the tip of the mouth cleft is between a level of the lower margin of the pupil and a lower margin of the eye. The junction of the lower jaw and the quadrate is on about a vertical through the anterior margin of the pupil.

Males (n = 4): head depth in SL 3.9-4.4 (avg 4.1, std 0.18), body depth in SL 2.9-3.5 (3.3, 0.27), HL in SL 3.6-3.8 (3.7, 0.11), predorsal length in SL 1.8-1.9 (1.9, 0.04), head width in SL 6.9-7.6 (7.2, 0.39), caudal peduncle depth in SL 7.2-8.0 (7.8, 0.38), caudal peduncle length in SL 4.2-4.8 (4.5, 0.24), pectoral fin length in SL 4.4-4.9 (4.7, 0.19), pelvic fin length in SL 5.8-6.3 (6.1, 0.23), pectoral fin origin to pelvic fin origin distance in SL 4.5-5.0 (4.7, 0.21), pelvic fin origin to anal fin origin distance in SL 5.4-6.7 (5.9, 0.57), prepelvic length in SL 2.1 (2.1, 0.03), preanal length in SL 1.5-1.6 (1.6, 0.02), longest dorsal fin ray in SL 4.7-5.1 (4.8, 0.19), longest anal fin ray in SL 6.3-6.8 (6.6, 0.22), mouth width in HL 3.7-4.8 (4.1, 0.45), snout length in HL 3.4-3.9 (3.6, 0.17), orbit diameter in HL 3.1-3.4 (3.2, 0.13), interorbital distance in HL 2.8-3.0 (2.9, 0.10), postorbital length in HL 2.2-2.3 (2.2, 0.04), caudal peduncle depth in caudal peduncle length 1.6-1.9 (1.7, 0.13), pectoral fin length in pectoral fin origin to pelvic fin origin distance 1.0 (1.0, 0.01), and pelvic fin length in pelvic fin origin to anal fin origin distance 1.0-1.1 (1.0, 0.08).

Females (n = 9): head depth in standard length (SL) 4.0-4.7 (avg 4.3, std 0.20), body depth in SL 3.0-3.6 (3.2, 0.22), HL in SL 3.6-4.1 (3.9, 0.15), predorsal length in SL 1.8-2.0 (1.9, 0.04), head width in SL 6.3-7.4 (6.7, 0.35), caudal peduncle depth in SL 7.3-8.2 (7.8, 0.29), caudal peduncle length in SL 4.2-4.7 (4.4, 0.18), pectoral fin length in SL 4.5-5.3 (4.8, 0.23), pelvic fin length in SL 5.7-6.8 (6.1, 0.35), pectoral fin origin to pelvic fin origin distance in SL 4.2-4.9 (4.5, 0.22), pelvic fin origin to anal fin origin distance in SL 4.6-5.8 (5.2, 0.35), prepelvic length in SL 2.1-2.2 (2.2, 0.06), preanal length in SL 1.5-1.6 (1.5, 0.03), longest dorsal fin ray in SL 4.5-5.4 (4.8, 0.27), longest anal fin ray in SL 6.3-8.0 (6.7, 0.52), mouth width in HL 3.4-4.2 (3.9, 0.30), snout length in HL 3.5-3.9 (3.7, 0.13), orbit diameter in HL 3.0-3.6 (3.4, 0.22), interorbital distance in HL 2.6-3.3 (2.9, 0.22), postorbital length in HL 2.0-2.2 (2.1, 0.09), caudal peduncle depth in caudal peduncle length 1.6-1.9 (1.8, 0.11), pectoral fin length in pectoral fin origin to pelvic fin origin distance 1.0-1.2 (1.1, 0.06), and pelvic fin length in pelvic fin origin to anal fin origin distance 1.0-1.4 (1.2, 0.13).

The following characters were significantly different between sexes ($p<0.05$). Greater in females: head width, postorbital distance, pelvic fin origin to anal fin origin distance. Greater in males: head length, pectoral fin length in pectoral fin origin to pelvic fin origin distance, and pelvic fin length in pelvic fin origin to anal fin origin distance.

Dorsal fin unbranched rays 3, branched dorsal-fin rays 6½ (1), 7½ (2) and 8½ (10)

(7.7, 0.63). Anal fin unbranched rays 3, branched anal-fin rays 10½ (1), 11½ (8) 12½ (4) (11.2, 0.60). The dorsal fin outer margin is truncate to markedly convex and the anal fin outer margin is clearly concave. Pectoral fin branched rays 12(2), 13(5), 14(4), 15(2) (13.5, 0.97), pelvic fin branched rays 6(1), 7(12) (6.9, 0.28).

Pharyngeal tooth counts are 2.5-4.2 (20), 2.4-4.2 (5), 2.5-4.1 (2), 2.5-4.3 (2), 1.5-4.2 (1). The lateral line is complete with none, 1 or 2 unpored scales at the posterior end of the lateral series; total lateral line scales 41(3), 42(2), 43(1), 44(4), 45(1), 46(2) (43.3, 1.80); lateral line scales to the margin of hypurals 39(1), 40(3), 41(2), 42(1), 43(3), 44(3) (41.9, 1.77). Scales around caudal peduncle 12(1), 13(-), 14(3), 15(5), 16(-), 17(4) (15.2, 1.52); scales between dorsal fin origin and lateral line 8(1), 9(11), 10(1) (9.0, 0.41); scales between anal fin origin and lateral line 4(5), 5(7), 6(1) (4.7, 0.63); scales between pelvic fin origin and lateral line 4(10), 5(3) (4.2, 0.44), and predorsal scales 17(1), 18(2), 19(6), 20(1), 21(2), 22(1) (19.3, 1.38). Total gill rakers in the outer row on first left arch number 6(2), 7(3), 8(7), 9(1) (7.5, 0.88). Total vertebrae 38(1), 39(11), 40(1) (39.0, 0.41).

Other characters as in holotype.

Paratypes bear pigmentation above and below the lateral line pores, forming a pale line margined with dark although this is obscured by background pigment on the caudal peduncle. A mid-flank stripe is diffuse posteriorly and fades anteriorly. A thin dark stripe at the junction of the hypaxial and epaxial muscles masses is evident but also fades anteriorly. The pigment on scales above and below the lateral line can be strongly or weakly expressed, forming stripes, but can be absent. The back is dark and obscures a predorsal and postdorsal stripe. A series of strong melanophores is present on the inner margin of the pectoral fin unbranched ray. Most fins lack much pigment, the dorsal fin pigment lining the rays being the strongest apart from that noted on the pectoral fin.

Summarized data for the paratypes and additional material of *A. idignensis* material (excluding holotype).

Dorsal fin unbranched rays 3, branched dorsal-fin rays 6½ (1), 7½ (10), 8½ (50), 9½ (1); among 46 radiographed specimens 6½ (1), 7½ (10), 8½ (35) (7.7, 0.49) (Table 1). Anal fin unbranched rays 3, branched anal-fin rays 9½ (1), 10½ (2), 11½ (29), 12½ (23), 13½ (6), 14½ (1); among 46 radiographed specimens 9½ (1), 10½ (2), 11½ (23), 12½ (16) (11.3, 0.67). The dorsal fin outer margin is truncate to markedly convex and the anal fin outer margin is slightly concave. Pectoral fin branched rays 12(2), 13(20), 14(23), 15(15), 16(2), pelvic fin branched rays 6(3), 7(58), 8(1).

Total lateral line scales 41(4), 42(8), 43(2), 44(10), 45(14), 46(10), 47(7), 48(3), 49(2), 50(1), 51(1); lateral line scales to the margin of hypurals 39(2), 40(7), 41(5), 42(4), 43(13), 44(9), 45(10), 46(7), 47(2), 48(2), 49(1). Scales around caudal peduncle 12(1), 13(-), 14(11), 15(21), 16(14), 17(12), 18(3); scales between dorsal fin origin and lateral line 8(3), 9(33), 10(21), 11(5); scales between anal fin origin and lateral line 4(20), 5(32), 6(8), 7(2); scales between pelvic fin origin and lateral line 3(2), 4(16), 5(29), 6(15), and predorsal scales 17(2), 18(6), 19(19), 20(12), 21(12), 22(7), 23(3), 24(1). Total gill rakers in the outer row on first left arch number 6(7), 7(14), 8(32), 9(8), 10(1).

Vertebral counts given below were calculated in 46 specimens. Total vertebrae number (37)38-40 with a mode of 39 (39.0, 0.65) (Tables 2 and 4). Predorsal vertebrae number 11-13(14) (12.2, 0.4) (Tables 2 and 5). Abdominal vertebrae number (18)19-20 (19.5, 0.55) (Tables 3 and 5). Caudal vertebrae number (18)19-20 (19.5, 0.55) (Tables 3 and 6). The vertebral formulae are 20+19 (16), 19+20 (14), 20+20 (8), 19+19 (6), 19+18 (1), and 18+20 (1). Thus, the mean difference between abdominal and caudal counts varies between +3 and -2 averaging 0 (0.0, 0.88) (Tables 3 and 6).

Males (n = 27): head depth in SL 3.9-4.6 (avg 4.2, std 0.17), body depth in SL 2.9-3.5 (3.2, 0.13), HL in SL 3.5-4.1 (3.8, 0.14), predorsal length in SL 1.8-2.0 (1.9, 0.05), head width in SL 6.5-7.9 (7.0, 0.32), caudal peduncle depth in SL 7.2-8.5 (7.8, 0.34), caudal peduncle length in SL 4.0-5.0 (4.6, 0.23), pectoral fin length in SL 4.0-4.9 (4.5, 0.25), pelvic fin length in SL 5.1-6.8 (5.7, 0.39), pectoral fin origin to pelvic fin origin distance in SL 4.2-5.0 (4.5, 0.18), pelvic fin origin to anal fin origin distance in SL 4.8-6.7 (5.7, 0.40), prepelvic length in SL 2.0-2.1 (2.1, 0.04), preanal length in SL 1.5-1.6 (1.5, 0.03), longest dorsal fin ray in SL 4.1-5.1 (4.5, 0.31), longest anal fin ray in SL 5.6-7.4 (6.3, 0.48), mouth width in HL 3.4-4.8 (3.9, 0.28), snout length in HL 3.4-4.0 (3.6, 0.16), orbit diameter in HL 2.7-3.6 (3.3, 0.19), interorbital distance in HL 2.6-3.3 (2.9, 0.15), postorbital length in HL 2.1-2.3 (2.2, 0.06), caudal peduncle depth in caudal peduncle length 1.5-2.0 (1.7, 0.13), pectoral fin length in pectoral fin origin to pelvic fin origin distance 0.9-1.2 (1.0, 0.06), and pelvic fin length in pelvic fin origin to anal fin origin distance 0.9-1.2 (1.0, 0.08).

Females (n = 35): head depth in SL 3.9-4.7 (mean = 4.2, standard deviation = 0.17), body depth in SL 2.7-3.6 (3.2, 0.20), HL in SL 3.5-4.1 (3.8, 0.16), predorsal length in SL 1.8-2.0 (1.9, 0.05), head width in SL 6.2-7.4 (6.8, 0.28), caudal peduncle depth in SL 6.9-8.5 (8.0, 0.32), caudal peduncle length in SL 3.9-5.2 (4.6, 0.32), pectoral fin length in SL 4.3-5.5 (4.8, 0.32), pelvic fin length in SL 4.6-6.8 (5.9, 0.44), pectoral fin origin to pelvic fin origin distance in SL 4.0-4.9 (4.5, 0.23), pelvic fin origin to anal fin origin distance in SL 4.6-6.1 (5.4, 0.36), prepelvic length in SL 1.9-2.2 (2.1, 0.07), preanal length in SL 1.5-1.6 (1.5, 0.03), longest dorsal fin ray in SL 3.8-5.5 (4.6, 0.37), longest anal fin ray in SL 5.5-8.0 (6.4, 0.53), mouth width in HL 3.4-4.5 (3.9, 0.26), snout length in HL 3.3-4.0 (3.6, 0.17), orbit diameter in HL 2.7-3.6 (3.3, 0.23), interorbital distance in HL 2.6-3.3 (2.9, 0.14), postorbital length in HL 2.0-2.5 (2.2, 0.10), caudal peduncle depth in caudal peduncle length 1.6-1.9 (1.7, 0.11), pectoral fin length in pectoral fin origin to pelvic fin origin distance 0.9-1.3 (1.1, 0.10), and pelvic fin length in pelvic fin origin to anal fin origin distance 0.8-1.4 (1.1, 0.12).

Comparative remarks. Alburnoides idignensis sp. n. differ from all the congeners primarily by having a combination of 9-12½, commonly 11½, branched anal-fin rays 38-40, modally 39, total vertebrae, and a few, modally 12, predorsal vertebrae. In tree diagrams based on combined data (Figs 3-5) it is clustered together with the other new species from the Tigris drainage, *A. nicolausi* sp. n. *Alburnoides idignensis* is distinguished from the latter by having commonly 8½ branched dorsal-fin rays (vs. commonly 7½), commonly 11½ branched anal-fin rays (vs. 8-11½, commonly 10½), a relatively shorter abdominal vertebral region (mean difference between the abdominal and caudal counts 0 vs. 0.6 – statistically reliable difference, see Table 12), and a less developed ventral keel (commonly 1/3 to 2/3 of its length scaled vs. commonly scaleless at least along 2/3 of its length).

Etymology. The species is named for the Tigris River which was called Idigna in Sumerian (Akkadian: Idiklat; biblical: Hiddekel; Arabic: Dijlah; Turkish: Dicle).

Distribution. This species is known from some upper reaches of tributaries of Karkheh [Qareh Su] River in the Zagros Mountains. The Karkheh is falling into the Tigris just below its confluence with the Euphrates. Habitat data (recorded for Sarab Dowrah R. only): altitude 1370 m, clear water, 19°C water temperature, pH 6.8, shore bushy, some plants in water, stone river bed. Other species recorded together with *A. idignensis* are *Barbus lacerta, "Nemacheilus"* sp., *Alburnus mossulensis, Cyprinion macrostomum, Garra rufa, Capoeta aculeata*.

Comparative material

Alburnoides bipunctatus: SMF 20631 (5, Grenzfluss Luxemburg, Rhine drainage).

Danube River drainage: ZISP 23862 (3). – ZISP 35710 (4). – ZISP 35711 (5). – ZISP 35819 (7). – ZISP 36852 (10). – ZISP 37242 (23, Timiş R.). – ZISP 38329 (10, Argeş R.). – ZISP uncat. (25, Sava R. at Dolsko, Slovenja).

Alburnoides oblongus: BMNH 1975.1.17: 249-250 (2, Syr Darya). – ZISP 30696 (1, Badam R.). – ZISP 36725 (3, Angren R.).

Alburnoides ohridanus: ZMH 801 (3, Ohrid L.). – ZMH 1464 (15, Ohrid L.).

Alburnoides taeniatus: ZISP 25575 (53, Syr Darya R.).

Alburnoides sp. (Pulvar R., Iran): CMNFI 1977-0509 (holotype; Fars, at source and along stream of a qanat at Naqsh-e Rostam, Pulvar River system, 29°59´30´´N, 52°54´00´´E). – CMNFI 1977-0510 (30, same data as holotype).

Alburnus akili (all from the Beysehir L., Central Turkey)*:* ZMH 1107 (holotype), ZMH 1110 (1, paratype), ZMH 1116 (6), ZMH 2461-2 (48), 4 C&S.

Alburnus alburnus: ZISP 3931 (5, Volga R.), ZISP 3971 (11, Lower Volga R. at Astrakhan'), ZISP 10573 (2, Kama R.), ZISP 21610 (11, Lower Volga R. at Astrakhan'), ZISP 41407 (10, Ural R.), ZISP uncat. (16, Rybinsk Reservoir), ZMH 14646 (20, Elba R.), 10 C&S.

Alburnus atropatenae (all from Urmia L. basin)*:* BMNH 1905.10.14:58(1); CMNFI 2007-0096 (1), CMNFI 2007-0097 (2), CMNFI 2007-0103 (6), CMNFI 2007-0105 (6), 1 C&S.

Alburnus attalus (all from Bergama): ZMH 3773 (20), ZMH 3896 (4).

Alburnus baliki (all from Manavgat R. drainage, Mediterranean Sea basin in Turkey)*:* DUM 63 (holotype), DUM 64a (4 paratypes), DUM 64b (2 paratypes).

Alburnus belvica: ZMH 8238 (3, Prespa L.).

Alburnus nicaeensis: ZMH 2480-81 (42, Iznik L., Turkey).

Alburnus attalus (all from Bergama): ZMH 3773 (20), ZMH 3896 (4).

Alburnus caeruleus: SMF 100 (4 syntypes, Aleppo), SMF uncat. (12, Ra's-al-fm); ZMH 3604 (1, Gaziantep), 1C&S.

Alburnus doriae: MRSN 720 (1 syntype, Shiraz), MRSN 9102 (2 syntypes, Shiraz).

Alburnus escherichii: NMW 88036 (5, Angora), ZISP 26624 (3, Sakarya R.), ZISP 26626 (2, Sakarya R.), 1 C&S.

Alburnus filippii (all from the Kura-Aras drainage): ZISP 2914 (2 syntypes), ZISP 2925 (13 syntypes), ZISP 2926 (17 syntypes), ZISP 3930 (4), ZISP 5189 (5), ZISP 9100 (21), ZISP 9105 (11), ZISP 10251 (12), ZISP 10482-3 (7), ZISP 14721-6 (19), ZISP 15012 (1), ZISP 20767 (11), ZISP 31101 (3), 8 C&S.

Alburnus heckeli: ZMH 1109 (1, syntype, Hazer-golu, Turkey).

Alburnus hohenackeri (all from Caspian Sea basin from Kuma southwards)*:* ZISP 2839 (holotype, Karabakh), ZISP 9097 (6, Kura R.), ZISP 9112 (5, Terek R.), ZISP 9113 (3, Terek R.), ZISP 9132 (5, Lenkoran'), ZISP 9133 (26, Lenkoran'), ZISP 9148 (6, Lenkoran'), ZISP 14727-8 (53, Terek R.), ZISP 14729 (1, Sunzha), ZISP 15011 (18, Terek R.), ZISP 20865 (2, Baku), ZISP 24393 (1, Sara Island), ZISP 35786 (22, Kura R.), 12 C&S.

Alburnus leobergi: ZISP 31490 (2, Kuban' R.).

Alburnus mossulensis: SMF 402 (2 syntypes, Mossul), ZISP 24354 (10, Iraq, west of Basra); ZISP 3907 (2, western Armenia), ZISP 15254 (5), ZMH 1143 (2, Dicle R.), ZMH 4072 (3, Hakkari, Hamansuyu), ZMH 4342 (2, Tigris-Euphrates delta), ZMH 4816 (3, Kandili, Karasu), ZMH 7360 (4, Dicle R.), 1 C&S.

Alburnus nicaeensis: ZMH 2480-81 (42, Iznik L., Turkey).

Alburnus orontis (all from the Orontes R.)*:* SMF 24402 (4), SMF 24404 (7), SMF 24410 (7).

Alburnus qalilus: SMF 24480 (holotype, Syria, Nahr al-Hawaiz), SMF 24481 (5 paratypes, Syria, Nahr al-Hawaiz).

Alburnus tarichi (all from Van L. basin): CMNFI 19-0382 (4); ZISP 6742(1), 15249 (9), ZMH 3564 (14), 7363 (4), uncat. (6), 3 C&S.

Fig. 7. *Alburnoides maculatus*, ZISP uncat. (Salgir R.), 73.0 mm SL.

Fig. 8. *Alburnoides gmelini* sp. n., holotype, ZISP 14733a, 79.9 mm SL.

Fig. 9. *Alburnoides varentsovi* sp. n., holotype, ZISP 11053a, 67.8 mm SL.

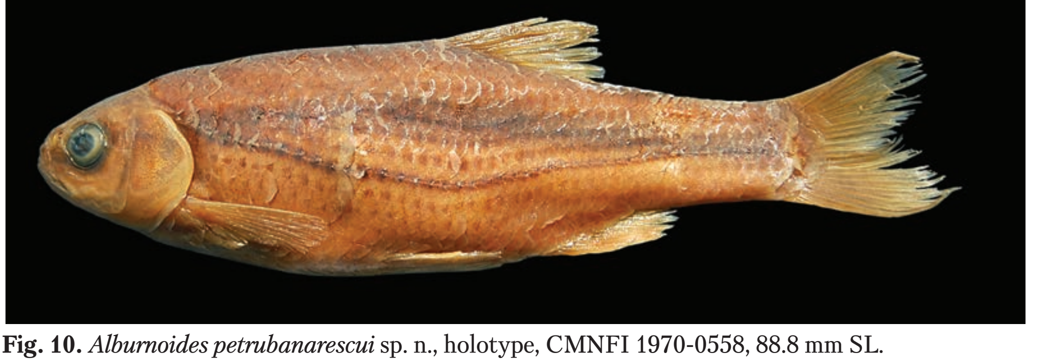

Fig. 10. *Alburnoides petrubanarescui* sp. n., holotype, CMNFI 1970-0558, 88.8 mm SL.

Fig. 11. *Alburnoides namaki* sp. n., holotype, CMNFI 1979-0461, 91.2 mm SL.

Fig. 12. *Alburnoides nicolausi* sp. n., holotype, CMNFI 1979-0281, 75.0 mm SL.

Fig. 13. *Alburnoides idignensis* sp. n., holotype, CMNFI 2007-0118, 89.2 mm SL.

Iberocypris palaciosi (all from Jandula R., Lugar Nuevo, west Spain): ZMH 6450 (2), ZMH 7325 (2).

Leucalburnus satunini (all from upper Kura R.): ZISP 14885-7 (14 syntypes), ZISP 15010 (9 syntypes), ZISP 15260 (2), ZISP 18557 (2 syntypes), ZISP 21331 (3 syntypes), ZISP 50423 (9 syntypes), ZMH 3022 (2), ZMH 3582 (10), ZMH 4181 (2).

Leucaspius delineatus: ZISP 2897 (9, Volga R.), 2898 (16, Volga R.), 30225 (3, Dnieper R.), 33363 (19, Dnieper R.).

Tropidophoxinellus alburnoides: BML uncat. (5, Jaraiz, Caceres; 14, Tajo; 18, Guadiana; 9, Aguede), NMW 49749 (5 syntypes, Guadiana), ZISP 38328 (4, Guadiana), ZMH 7326 (4, Guadajira) (see also Bogutskaya, 2000).

Tropidophoxinellus spartiaticus (all from Eurotas R.): CMNFI 1977-1720 (4), MBL uncat. (3).

"Tropidophoxinellus" hellenicus: MBL uncat. (4, Trichonis L.).

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