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TWO NEW SPECIES OF FRESHWATER FISHES OF THE GENUS *ALBURNOIDES*, *A. FANGFANGAE* AND *A. DEVOLLI* (ACTINOPTERYGII: CYPRINIDAE), FROM THE ADRIATIC SEA BASIN IN ALBANIA

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ABSTRACT

Two new species of the genus *Alburnoides* are described from the river Seman drainage in the eastern Adriatic Sea basin in Albania. Both species have a pharyngeal tooth formula of 2.5–4.2. *Alburnoides fangfangae*, which occurs in the upper Osum river system, is distinguished from other members of the genus by a combination of characters including 11½–13½ anal fin branched rays, small scales numbering 46–53 in the total pored lateral line, total vertebrae usually 40 (20+20 and 21+19) or 41 (21+20 and 20+21), caudal peduncle depth 43–48% body depth at dorsal fin origin, usually a mostly or completely scaleless ventral keel, the mouth with a curved and only slightly slanted cleft and a produced fleshy snout, the interorbital width 1.3–1.5 times the eye diameter, a weakly ossified preethmoid, and a depressed and considerably expanded anterior tip of the basihyal (a unique feature among the western European *Alburnoides*). *Alburnoides devolli*, which is described from the upper Devoll river system, differs in having 11½–13½ anal fin branched rays, larger scales numbering 44–48 in the total pored lateral line, total vertebrae usually 40 (20+20), caudal peduncle depth 35–43% body depth at dorsal fin origin, usually a mostly or completely scaled ventral keel, the mouth with a straight and upturned cleft, the interorbital width 1.1–1.4 times the eye diameter, a completely ossified preethmoid, and a narrow, very deeply indented anterior tip of the urohyal (a unique feature among the western European *Alburnoides*). A comparison with *Alburnoides* species from River Danube and Prespa, Ohrid, and Skadar lakes is provided.

Key words: Adriatic Sea basin, Albania, *Alburnoides*, Cyprinidae, freshwater fishes, morphology, new species, taxonomy

ДВА НОВЫХ ВИДА ПРЕСНОВОДНЫХ РЫБ РОДА *ALBURNOIDES*, *A. FANGFANGAE* И *A. DEVOLLI* (ACTINOPTERYGII: CYPRINIDAE), ИЗ БАССЕЙНА АДРИАТИЧЕСКОГО МОРЯ В АЛБАНИИ

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РЕЗЮМЕ

Описаны два новых вида карповых рыб рода *Alburnoides* из системы реки Семан бассейна Адриатического моря в Албании. Оба вида имеют сходную формулу глоточных зубов – 2.5–4.2. Вид *Alburnoides fangfangae* sp. nov., обитающий в верхнем течении реки Осум, отличается от других видов рода следующей комбинацией

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морфологических признаков: 11½–13½ ветвистых лучей в анальном плавнике; чешуя мелкая, 46–53 чешуй в полной боковой линии; общее число позвонков 40 (20+20 и 21+19) или 41 (21+20 и 20+21); высота хвостового стебля 43–48% высоты тела; брюшной киль, как правило, голый или слабо очешуен; ротовая щель изогнута, рот не заворочен, рыло выдается и несколько нависает над верхней губой; межглазничное пространство в 1.3–1.5 раза больше горизонтального диаметра глаза; praeethmoideum слабо окостеневшее; передний конец basihyale уплощен и значительно расширен (уникальный признак среди западноевропейских видов рода *Alburnoides*). Вид *Alburnoides devolli* sp. nov., обитающий в верхнем течении системы реки Девол, отличается от других видов рода следующими морфологическими признаками: 11½–13½ ветвистых лучей в анальном плавнике; чешуя относительно крупная, 44–48 чешуй в полной боковой линии; общее число позвонков обычно 40 (20+20); высота хвостового стебля 35–43% высоты тела; брюшной киль значительно или полностью очешуен; ротовая щель прямая, рот заметно заворочен, рыло не выдается и не нависает над верхней губой; межглазничное пространство в 1.1–1.4 раза больше горизонтального диаметра глаза; praeethmoideum полностью окостеневшее; головка urohyale с очень глубокой и узкой вырезкой (уникальный признак среди западноевропейских видов рода *Alburnoides*). Дано сравнение с видами рода *Alburnoides* из бассейнов Дуная, озер Преспа, Охрид и Скадар.

Ключевые слова: Адриатический бассейн, Албания, *Alburnoides*, Cyprinidae, пресноводные рыбы, морфология, новые виды, таксономия

INTRODUCTION

Cyprinid fishes of the *Alburnoides bipunctatus* species complex are widely distributed in Europe and western Asia in nearly all rivers draining to the North and Black seas and Sea of Azov, in the Caspian Sea basin (in middle Volga and from Kura drainage southwards and eastwards to Atrek), in the Murghab and Tedzhen drainages, in the former Aral Sea basin (Amu Darya drainage), and in the Tigris-Euphrates drainage. In the Mediterranean basin, it occurs in the Rhône and some small coastal drainages from Provence (France) eastwards to Genova (Italy), in the Drin-Skadar-Ohrid drainage, in Albanian and Greek rivers as far south as the Acheloos and Spercheios drainages, and in the Marmara Sea basin, western Anatolia south to Gediz (Izmir) (Berg 1949; Zardoya et al. 1999; Bogutskaya and Naseka 2004; Kottelat and Freyhof 2007; Dhora 2009b; Coad 2009).

Kottelat and Freyhof (2007) recognised three species of *Alburnoides* Jetteles, 1861 in Europe and stated that, although the morphological differences seem slight, there are indications from molecular studies that *Alburnoides* from Montenegro, Greece, Bulgaria and the Caucasus most likely represent distinct species. Since 2007, five nominal taxa (subspecies of *Alburnoides bipunctatus* (Bloch, 1782) by some authors) have been re-elevated to the species level and seven new species described from the eastern part of the range of the former *A. bipunctatus* s.l. based on morphological characters (Coad and Bogutskaya 2009; Bogutskaya and Coad 2009).

Alburnoides south of the Danube – from the Drin–Skadar–Ohrid drainage system and from Prespa Lake and its tributaries – were commonly considered as the subspecies *A. bipunctatus ohridanus* (Karaman, 1924) and *A. bipunctatus prespensis* (Karaman, 1928), respectively (e.g. Poljakov et al. 1958; Ivanović 1973; Šorić 1981, 1990; Marić 1995; Naumovski 1995, Rakaj 1995; Marić and Krivokapić 1997). Following Kottelat and Freyhof (2007), the two subspecies were given the rank of species in the inventories of the Skadar, Ohrid and Prespa lakes (Talevski et al. 2009) and the fish fauna of Albania (Dhora 2009a, 2009b). Zardoya et al. (1999) did not recognise *A. prespensis* (as either a species or a subspecies) and identified the *Alburnoides* from the Prespa Lake as *A. bipunctatus ohridanus*. These authors also identified the fish from the Aoos [Vjosa, Vjosë] River as *A. bipunctatus ohridanus*. Albanian *Alburnoides* from Bovilla Lake (Ishmi [Ishëm] River drainage), Skumbin [Shkumbini] and Vjosa rivers were later identified as *A. bipunctatus bipunctatus* (Cake and Miho 2005). *Alburnoides bipunctatus* is mentioned in lists of species in reviews of the fauna of the Albanian rivers (Dhora 2009a, 2009b; Shumka et al. 2009).

A comparison of recently collected materials from two localities in the Seman River drainage with *Alburnoides* species from the Danube and Skadar [Shkodra], Ohrid and Prespa lakes revealed their difference from each other and from the latter taxa. Therefore, this paper describes two new *Alburnoides* species in Albania.

MATERIAL AND METHODS

Measurements were made point to point to the nearest 0.1 mm. The standard length (SL) is measured from the tip of the snout to the end of the hypural complex. The length of the caudal peduncle is measured from behind the base of the last anal-fin ray to the end of the hypural complex, at the mid-height of the caudal-fin base. Head length (HL) and interorbital width were measured including the skin fold. The last two branched rays articulating on a single pterygiophore in the dorsal and anal fins are noted as "1½". Statistical calculations were done without the "½". Total lateral-line scale count includes all pored scales, from the first one just behind the posttemporal bone to the posteriormost one located on the bases of the caudal-fin rays. Osteological characters are examined from cleared-and-stained with alizarin red S preparations, and from radiographs (numbers of radiographed specimens are given in Table 3). Two openings at the margins of adjacent bones give one pore in the cephalic sensory canal system. The character states of the ventral keel scale cover were estimated by direct measurements as shown in Fig. 1.

Statistical analyses were performed with Microsoft Excel and Statistica 6.0 packages. Means were considered to be significantly different at the $p<0.01$ level.

Abbreviations used. Collections: NMW, Naturhistorisches Museum Wien; MKC, Collection of M. Kottelat, Cornol (Switzerland); SMNH, Slovenian Museum of Natural History (Ljubljana); PZC, Collection of P. Zupančič, Dolsko (Slovenia); SMF, Senckenberg Museum and Institute, Frankfurt-am-Main; ZIN, Zoological Institute, Russian Academy of Sciences, Saint Petersburg. Cephalic sensory canals: CIO, infraorbital canal; CPM, preopercular-mandibular canal; CSO, supraorbital canal; and CST, supratemporal canal.

RESULTS

Alburnoides fangfangae sp. nov.
(Figs 1c, 2, 3)

Holotype. NMW 95276, female, 69.2 mm SL, ALBANIA: Vodica [Pr. i Vodicës] River, tributary of Osum [Osumi] River at Selenica, north from Erseka [Ercege, Ersekë] at road SH3, Korçë County, Kolonja [Kolonjë] District, ca. 40°20´N, 20°41´E, 4 August 2006; coll. P. Zupančič.

Paratypes. NMW 95277, 4, 56.6–65.8 mm SL; PZC 481, 27, 49.7–72.5 mm SL; ZIN 54981, 10, 51.2–64.4 mm SL, all same data as holotype. Two additional specimens (same data) were cleared and stained (62.4 and 56.7 mm SL).

Additional specimens. PZC 482, 2, 55.1 and 55.2 mm SL, ALBANIA: stream flowing into Gjanci Reservoir; other data same as above.

Diagnosis. The species is distinguished from other members of the genus by a combination of characters including 11½–13½ anal fin branched rays, small scales numbering 46–53 in the total pored lateral line, total vertebrae usually 40 (20+20 and 21+19) or 41 (21+20 and 20+21), a deep caudal peduncle (its depth 43–48% body depth at dorsal fin origin), usually a mostly or completely scaleless ventral keel, the mouth with a curved and only slightly slanted cleft and a produced fleshy snout, the interorbital width 1.3–1.5 times the eye diameter, a weakly ossified preethmoid, and a depressed and considerably expanded anterior tip of the basihyal (a unique feature among the western European *Alburnoides*).

Description. See Table 1 for morphometric data of holotype and 19 paratypes. The body is not deep: depth at the dorsal fin origin is 25–29% SL. In most specimens there is a slight hump just behind the head, but in general the upper and lower profiles of the body are almost equally convex. The snout is rounded and somewhat fleshy, so that tissue overlaps the medial part of the upper lip; this feature is most prominent in mature males (Fig. 3). The mouth is subterminal or almost terminal with the uppermost point of the mouth cleft always below the level of the middle of the eye, usually at the lower margin of the pupil. The mouth cleft (in lateral view) is curved in its anterior part and, in general, the cleft is only slightly slanted. The interorbital space is wide, its width 34–38% HL, and the eye horizontal diameter enters interorbital width 1.3–1.5 times. The eye horizontal diameter, 25–28% HL, is greater than the snout length, 28–33% HL. The head is moderately wide, the width of the neurocranium between the lateral margins of pterotics (measured in undissected specimens) is 65–77% cranial roof length.

The dorsal fin has 3 simple and 8½ branched rays in all specimens. Its outer margin is truncate to rounded in the upper part and slightly concave below. The dorsal fin is located somewhat behind the end of the pelvic fin base. The anal fin has 3 simple and 11½ (8), 12½ (23 including holotype), 13½ (12) or

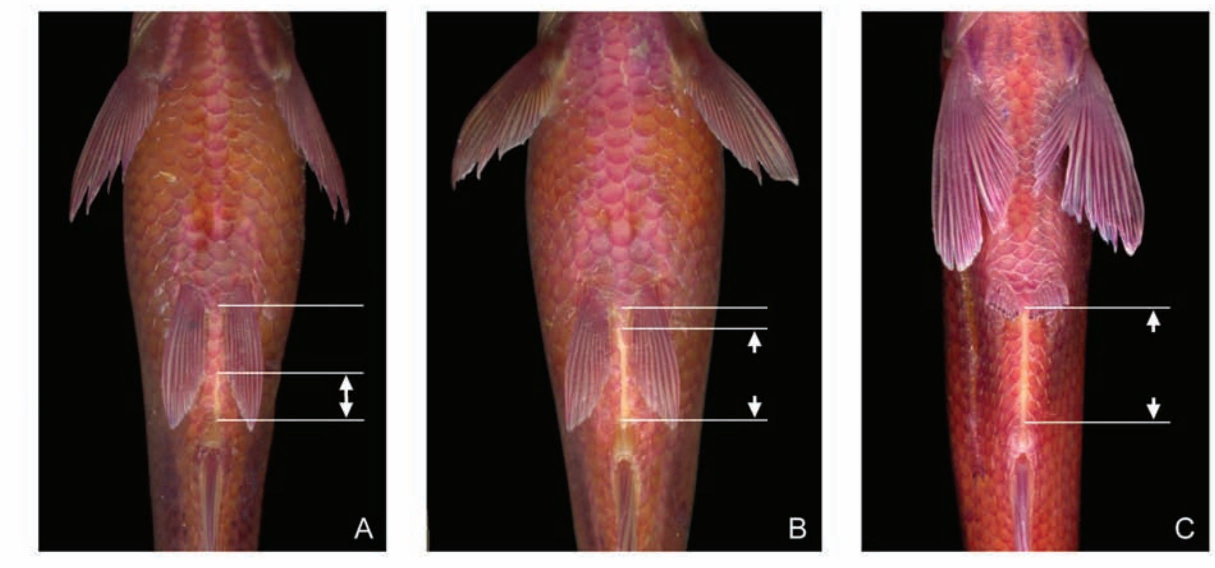

Fig. 1. Ventral keel scale pattern: A – *Alburnoides ohridanus* (2/3 scaled keel); B – *Alburnoides ohridanus* (2/3 scaleless keel); C – *Alburnoides fangfangae* (completely scaleless keel). Length of the ventral keel is measured from a midline point between posterior ends of the pelvic fin bases to the anal papilla base, and its scaleless portion (shown by arrows) is measured to the latter point, respectively.

Fig. 2. *Alburnoides fangfangae* sp. nov., holotype, female, NMW 95276, 69.2 mm SL.

14½ (1) branched rays (Table 3). The anal fin outer margin is moderately to markedly concave with the lower apex of the fin rounded. The anal fin origin is usually somewhat in front of the posterior end of the dorsal fin base. Pelvic – anal fin origin distance is short, 15.5–20% SL, and the end of the pelvic fin almost reaches the origin of the anal fin or reaches it in mature males (Figs. 2, 3). The caudal fin is moderately forked, its lobes slightly pointed (Fig. 2) to rounded (Fig. 3); the latter character is especially pronounced in mature males.

The ventral keel between the pelvic fin insertions and the anal papilla is well developed and commonly scaleless at ⅔ to ¾ of its length or completely scaleless (Table 4, Fig. 1c).

The number of gill rakers (in total on the outer side of the first left gill arch) is 6 (1), 7 (28 including holotype), 8 (11) or 9 (2). The holotype and 5 exam-

Fig. 3. *Alburnoides fangfangae* sp. nov., male paratype, PZC 481, 72.5 mm SL.

ined paratypes have 2.5–4.2 pharyngeal teeth. Teeth are hooked at the tip and not serrated below it.

The lateral line is complete with none up to 3, usually 1, unpored scales at the posterior end of the lateral series. The total number of lateral line scales is 48 in the holotype; 46 (5), 47 (7), 48 (12), 49 (10), 50 (5), 51 (1) or 53 (1) in the paratypes, and 48 and 49 in two cleared and stained specimens. A pelvic axillary scale is present.

The general topography of cephalic sensory canals is typical of *Alburnoides*, as described by Bogutskaya (1988). The CSO is shortened in its posterior section and never approaches the CST; it has 9, rarely 8, pores, with 3 and 6, rarely 5, canal openings on the nasal and frontal bones, respectively. The CIO has 12–15, modally 13, pores with 4 or 5 canal openings on the first infraorbital. The CPM is complete, with 12–15, modally 12–13, pores with 4 or 5 and 7–9 canal openings on the dentary and preoperculum, respectively. The CST is complete, with 5–7 pores.

The total vertebrae including four Weberian vertebrae and the last hypural complex centrum are 40 in the holotype, 40 (9), 41 (10) or 42 (2) in 21 paratypes examined (Table 3). The number of abdominal vertebrae (including intermediate ones; precaudal vertebrae auctorum) is 20 in the holotype, 20 (11) or 21 (10) in the paratypes examined. The number of predorsal abdominal vertebrae (anterior to the first dorsal fin pterygiophore) is 14 in the holotype, 13 (6) or 14 (15) in the paratypes examined. Intermediate vertebrae are 3 or 4. The number of caudal vertebrae is 20 in the holotype, 19 (3), 20 (11) or 21 (7) in the paratypes examined (Table 3). The vertebral formulae are 20+20 (in holotype and 6 paratypes), 20+21 (in 5 paratypes), 21+20 (in 5 paratypes), 21+19 (in 3 paratypes) or 21+21 (in 2 paratypes).

Colouration. Pigmentation of the holotype and paratypes preserved in 4% formalin consists of a dark grey, almost black, lateral stripe which goes from the anterior margin of the operculum to the caudal peduncle, clearly expanding at the end, and terminates at bases of the caudal fin rays. The back above the lateral stripe is much darker than the area below the latter including the belly, which is unpigmented. There are regularly arranged dark spots on the flanks between the lateral stripe and the lateral line and one or two rows of lighter spots below the latter. The lateral line pores are lined by pigment dorsally and ventrally along the entire length of the lateral line. The fins are mostly hyaline with some black pigment lining the fin rays of the dorsal and caudal fins, the dorsal aspects of the rays of the pectoral fins and the anterior rays of the anal fin.

Distribution. *Alburnus fangfangae* sp. nov. is distributed in the Osum [Osumi] River in the upper Seman River drainage of Albania. It is known from the type locality, Vodica River, and from a tributary of the Gjanci Reservoir [Rez. i Gjançit, Ghianci] (Fig. 8). The water source for the reservoir is the Osumi River (Government of Albania, 2004). A specimen just after catching from the tributary of the Gjanci Reservoir collected on the 4th of August, 2006, is given in Fig. 11.

The Osum is the southern main source river of the Seman. Its source is in the southern part of the Korçë District at an elevation of 1,050 m. It flows initially west and then south receiving a number of mountainous tributaries flowing from the Gramos Mountains in the Kolonjë District, then west to Çepan, and northwest through Çorovodë and Berat to join the Devoll on the Adriatic coastal plain to form the Seman.

Habitat and biology. The holotype and the paratypes of the new species were collected from a shallow river section 2 m wide with a stony bottom at an elevation of about 825 m (Fig. 9). No other fishes were caught in the stream together with them. Additional specimens were collected from a tributary of the Gjanci Reservoir together with *Barbus* cf. *rebeli*. Most specimens are adults with fully ripe gonads, both females and males. Among 20 examined specimens (out of 44 collected on the 4th of August, 2007), of 56.7–72.5 mm SL, there were 11 females and 9 males, the smallest mature male was 56.7 mm SL, and the smallest mature female – 57.8 mm SL. Adult males possess nuptial tubercles, which are comparatively large and cover the upper part of the head, predorsal area of the back and flanks, being located on each scale in its centre and along the margin, and along rays of all fins, including the caudal fin. The most prominent are the tubercles on the pectoral and anal fins.

Etymology. The species is named in the memory of Fang Fang Kullander (Swedish Museum of Natural History).

Proposed common name: Osum riffle minnow.

Comparative remarks. The new species belongs to the western group with pharyngeal teeth 2.5–4.2 as defined in Bogutskaya and Coad (2009). This group, besides the two new species, includes *Alburnoides* species from the North and Baltic sea basins, from the Danube River, the Drin–Skadar–Ohrid basin, and Prespa Lake. Here and elsewhere in the text we tentatively consider the Danubian riffle minnow (*A.* cf. *bipunctatus*) as a taxon different from *A. bipunctatus* s.str. from the North and Baltic sea basins because of its less numerous anal fin branched rays (modally 13½ vs. modally 14½–15½); this issue needs further study. Similarly, our data summarised in Tables 3 and 4 support an opinion that *Alburnoides* from Skadar Lake may represent a distinct species referred to here as *A.* cf. *ohridanus*.

Alburnoides fangfangae sp. nov. differs from *A. bipunctatus* s.str. from the North and Baltic basins in having less anal fin branched rays, usually 11½–13½, vs. 13½–17½, usually 14½–15½ (Table 3). The morphometric characters distinguishing *A. fangfangae* sp. nov. from the species distributed in the Danube River, the Drin–Skadar–Ohrid basin, and Prespa Lake are given in Tables 1 and 2, the meristic features are summarised in Table 3, and the frequency of different states of the ventral keel structure is given in Table 4. *Alburnoides fangfangae* sp. nov. can be distinguished from the four other species by a wider cranium and a smaller relative size of the eye in terms of the interorbital width. The maximum cranial width (cranial width between the pterotic margins), 65–77% cranial roof length, is statistically significantly different, especially from that in *A. ohridanus* and *A.* cf. *ohridanus* (59–65% cranial roof length in both latter species). The eye horizontal diameter enters the interorbital width 1.3–1.5 times being 67–78% interorbital width vs. 73–88, 97–108, 76–85, and 73–89% in *A.* cf. *bipunctatus*, *A.* cf. *ohridanus*, *A. ohridanus*, and *A. devolli* sp. nov., respectively (the means are all significantly statistically different). The eye horizontal diameter is usually smaller than the snout length in *A. fangfangae* sp. nov. similarly to *A. devolli* sp. nov. (Fig. 4) and *A.* cf. *bipunctatus* (Fig. 5) in contrast to *A. ohridanus* (Fig. 6) and *A.* cf. *ohridanus* (Fig. 7) with a larger eye whose horizontal diameter is usually greater than the snout length. *Alburnoides fangfangae* sp. nov. further differs from the two latter species and from *A. prespensis* by smaller lateral line scales, 46–53, modally 48–49 (vs. 42–47, modally 44), and from *A. ohridanus* and *A. prespensis* by a higher number of total vertebrae (40–42, modally 40–41 vs. 38–40, modally 39), more numerous predorsal vertebrae (modally 14 vs. 13), and more numerous caudal vertebrae (19–21, modally 20 vs. 18–20, modally 19).

Additionaly, *A. fangfangae* sp. nov. differs statistically from the other species by its smaller body depth and greater caudal peduncle depth. Accordingly, it has the highest value of the caudal peduncle depth in caudal peduncle length, averaging 59.9%, which is statistically different from the values in *A. ohridanus* and *A.* cf. *ohridanus*, 53.8 and 54.8%, respectively. Also, it has the highest value of the caudal peduncle depth in body depth at dorsal fin origin, 43–48%, averaging 44.8%, which is statistically different from the values in all other species under consideration (Tables 1 and 2).

Alburnoides fangfangae sp. nov. further differs from the other new species from the Devoll River described below in having a curved (in lateral view) mouth cleft, which is only slightly slanted (vs. straight and upturned), a fleshy snout (vs. lacking a fleshy

Table 1. Morphometric data for *Alburnoides fangfangae* sp. nov. and *A. devolli* sp. nov. Distinguishing characters discussed in the text are in boldface.

	A. fangfangae sp. nov. holotype and paratypes (n=20)					*A. devolli* sp. nov. holotype and paratypes (n=15)				
	holotype	min	max	M	st.d	holotype	min	max	M	st.d
SL, mm	69.2	56.7	72.5	62.8	4.38	89.1	57.4	92.5	79.3	10.10
Body depth at dorsal fin origin (% SL)	**27.8**	**25.4**	**29.3**	**27.3**	**1.02**	**29.4**	**27.7**	**33.4**	**29.4**	**1.82**
Depth of caudal peduncle (% SL)	**12.1**	**11.6**	**12.8**	**12.2**	**0.39**	**11.2**	**11.0**	**12.2**	**11.5**	**0.43**
Depth of caudal peduncle (% length of caudal peduncle)	**56.4**	**54.3**	**64.3**	**59.9**	**3.17**	**55.7**	**52.3**	**66.0**	**57.5**	**4.83**
Depth of caudal peduncle (% body depth at dorsal fin origin)	**43.5**	**42.6**	**47.6**	**44.8**	**1.31**	**37.4**	**35.4**	**43.1**	**39.0**	**2.38**
Predorsal length (% SL)	54.2	51.8	55.2	54.1	0.92	55.4	52.9	56.9	55.1	1.18
Postdorsal length (% SL)	35.6	34.3	36.2	35.3	0.63	36.3	33.6	38.3	36.0	1.45
Preanal length (% SL)	**61.7**	**62.8**	**67.2**	**64.7**	**1.26**	**67.5**	**63.9**	**70.4**	**67.2**	**1.83**
Pectoral – pelvic fin origin length (% SL)	23.2	19.9	25.2	22.4	1.29	23.7	21.0	24.1	22.8	1.03
Pelvic – anal fin origin length (% SL)	**20.2**	**15.5**	**20.2**	**18.2**	**1.03**	**19.6**	**17.2**	**22.4**	**20.0**	**1.37**
Length of caudal peduncle (% SL)	21.5	19.4	22.0	20.7	0.76	19.8	17.9	22.3	20.0	1.36
Dorsal fin base length (% SL)	13.8	11.9	15.4	13.1	0.96	12.3	12.3	15.3	13.6	0.81
Dorsal fin depth (% SL)	23.6	20.1	23.9	22.4	1.14	22.4	19.5	22.4	21.1	0.85
Anal fin base length (% SL)	16.7	16.7	19.9	18.1	0.92	16.9	15.7	18.6	17.4	0.84
Anal fin depth (% SL)	17.1	14.8	18.4	16.5	0.93	15.3	14.4	16.7	15.4	0.63
Pectoral fin length (% SL)	20.2	18.8	22.6	20.7	1.10	19.9	19.1	20.7	19.8	0.46
Pelvic fin length (% SL)	18.9	16.0	19.1	17.4	0.76	15.8	15.1	17.4	16.1	0.62
Head length (% SL)	26.7	24.6	27.7	26.1	0.80	26.2	24.7	27.4	25.9	0.74
Head length (% body depth)	**95.9**	**87.1**	**104.8**	**95.8**	**4.51**	**88.9**	**77.9**	**96.6**	**88.4**	**5.08**
Head depth at nape (% SL)	18.9	17.3	19.3	18.6	0.55	19.2	17.2	19.6	18.6	0.63

Head depth at nape (% HL)	70.8	65.8	75.9	71.3	2.64	73.4	68.0	74.7	71.8	2.04
Head depth through eye (% HL)	52.4	44.5	55.1	50.5	2.78	51.5	47.3	56.4	51.0	2.13
Maximum head width (% SL)	14.0	12.2	14.3	13.2	0.62	12.8	11.2	13.4	12.5	0.51
Maximum head width (% HL)	52.4	45.8	54.7	50.6	2.13	48.9	44.7	51.7	48.2	1.87
Snout length (% SL)	**8.1**	**7.1**	**8.6**	**7.9**	**0.41**	**7.5**	**6.8**	**8.2**	**7.5**	**0.41**
Snout length (% HL)	**30.3**	**27.8**	**32.6**	**30.1**	**1.37**	**28.8**	**27.3**	**31.7**	**29.0**	**1.34**
Eye horizontal diameter (% SL)	**7.2**	**6.4**	**7.2**	**6.9**	**0.21**	**6.7**	**6.1**	**7.3**	**6.7**	**0.34**
Eye horizontal diameter (% HL)	**27.0**	**24.7**	**28.4**	**26.3**	**0.94**	**25.8**	**23.3**	**28.0**	**25.9**	**1.15**
Eye horizontal diameter (% interorbital width)	**72.5**	**67.2**	**78.0**	**72.7**	**3.44**	**74.1**	**72.9**	**88.9**	**80.0**	**4.67**
Postorbital distance (% HL)	50.3	42.6	50.6	48.0	2.13	50.6	46.2	52.5	49.6	1.94
Interorbital width (% HL)	**37.3**	**34.4**	**38.4**	**36.2**	**1.17**	**34.8**	**29.7**	**34.8**	**32.5**	**1.37**
Length of upper jaw (% HL)	34.6	29.1	34.8	32.1	1.57	31.9	28.7	33.1	30.7	1.44
Length of lower jaw (% HL)	**42.2**	**39.4**	**45.1**	**42.5**	**1.43**	**39.1**	**37.0**	**41.9**	**39.7**	**1.90**
Length of lower jaw (% depth of operculum)	**102.6**	**102.6**	**111.3**	**106.1**	**2.72**	**98.9**	**90.5**	**101.2**	**97.4**	**2.61**
Depth of operculum (% HL)	41.1	37.1	44.2	40.1	1.78	39.5	39.5	42.6	40.7	1.06
Cranial width between pterotic margins (% cranial roof length)	**66.7**	**65.2**	**76.7**	**67.3**	**2.06**	**66.4**	**58.3**	**68.3**	**62.8**	**3.18**
Ratios										
Interorbital width/eye horizontal diameter	**1.4**	**1.3**	**1.5**	**1.4**	**0.07**	**1.35**	**1.1**	**1.4**	**1.3**	**0.07**
Snout length/eye horizontal diameter	**1.1**	**1.0**	**1.3**	**1.1**	**0.06**	**1.1**	**1.0**	**1.2**	**1.1**	**0.06**
Head depth at nape/eye horizontal diameter	2.6	2.4	2.9	2.7	0.10	2.9	2.5	3.0	2.8	0.14
Length of caudal peduncle/depth of caudal peduncle	1.8	1.6	1.8	1.7	0.09	1.8	1.5	2.0	1.8	0.15

Table 2. Morphometric data for species of the genus *Alburnoides* from Danube, Skadar and Ohrid lakes. Distinguishing characters discussed in the text are in boldface.

	A. cf. *bipunctatus*, Danube (PZC 245, 328, 482; n=22)				*A.* cf. *ohridanus*, Skadar L. (NMW 55484-6; n=12)				*A. ohridanus* (PZC 232, 483; n=16)			
	min	max	M	st.d	min	max	M	st.d	min	max	M	st.d
SL, mm	58.20	78.50	72.04	5.14	60.80	76.00	67.24	5.85	50.2	67.4	54.9	6.82
Body depth at dorsal fin origin (% SL)	**26.1**	**31.9**	**28.7**	**1.31**	**28.1**	**30.8**	**29.1**	**0.94**	**27.3**	**30.9**	**29.2**	**1.32**
Depth of caudal peduncle (% SL)	**10.0**	**12.0**	**10.9**	**0.47**	**10.2**	**11.6**	**11.1**	**0.45**	**10.9**	**12.3**	**11.6**	**0.55**
Depth of caudal peduncle (% length of caudal peduncle)	**46.5**	**61.2**	**55.0**	**3.42**	**47.7**	**61.9**	**54.8**	**4.62**	**49.6**	**57.9**	**53.8**	**3.53**
Depth of caudal peduncle (% body depth at dorsal fin origin)	**34.5**	**41.2**	**37.9**	**1.70**	**35.0**	**40.4**	**38.3**	**1.96**	**38.7**	**41.9**	**39.9**	**1.09**
Predorsal length (% SL)	51.5	57.4	54.4	1.59	53.4	58.2	55.9	1.86	53.1	56.3	54.7	1.30
Postdorsal length (% SL)	33.2	37.2	35.2	1.10	32.5	35.8	34.4	1.17	34.1	36.6	35.0	1.06
Preanal length (% SL)	**62.1**	**67.5**	**64.9**	**1.49**	**66.1**	**70.2**	**68.2**	**1.31**	**64.6**	**65.7**	**65.3**	**0.43**
Pectoral – pelvic-fin origin length (% SL)	21.5	27.4	23.5	1.45	22.4	25.1	23.7	0.90	21.5	24.1	23.0	0.99
Pelvic – anal-fin origin length (% SL)	**16.4**	**20.9**	**18.5**	**1.21**	**19.7**	**21.4**	**20.4**	**0.64**	**17.0**	**19.7**	**18.0**	**0.93**
Length of caudal peduncle (% SL)	17.8	21.8	19.8	0.95	18.3	21.5	20.4	1.17	20.8	22.2	21.7	0.55
Dorsal-fin base length (% SL)	12.4	15.5	14.0	0.74	11.3	14.3	13.1	1.03	11.7	13.3	12.8	0.57
Dorsal fin depth (% SL)	20.4	25.2	22.4	1.63	20.7	23.4	22.1	0.93	20.3	24.5	22.0	1.50
Anal-fin base length (% SL)	17.1	20.9	19.3	1.20	17.4	19.4	18.3	0.76	15.7	18.7	17.2	0.99
Anal fin depth (% SL)	14.5	19.6	16.4	1.27	14.5	18.4	16.9	1.26	15.0	17.1	16.3	0.86
Pectoral fin length (% SL)	18.1	22.7	20.1	1.38	20.2	22.5	21.0	0.79	19.7	21.7	20.6	0.77
Pelvic fin length (% SL)	14.2	18.3	16.3	1.06	16.3	18.3	17.1	0.74	15.8	18.9	17.1	1.05
Head length (% SL)	24.3	27.5	26.0	0.84	25.7	28.1	26.4	0.86	26.1	27.8	26.8	0.61

Head length (% body depth)	80.8	100.0	90.8	5.11	83.3	97.8	90.9	4.48	86.1	96.4	91.8	3.77
Head depth at nape (% SL)	18.2	20.8	19.1	0.65	18.4	21.5	19.6	0.97	18.8	20.5	19.9	0.64
Head depth at nape (% HL)	68.4	79.2	73.4	2.60	69.5	76.4	74.2	2.35	70.7	77.9	74.5	2.93
Head depth through eye (% HL)	47.1	56.5	51.7	2.72	47.7	53.7	52.0	2.03	52.1	56.5	54.0	1.68
Maximum head width (% SL)	12.4	13.9	13.2	0.45	7.0	12.8	11.6	2.12	13.1	14.6	14.0	0.60
Maximum head width (% HL)	46.3	57.2	50.8	2.30	44.4	49.7	46.8	1.88	48.9	55.7	52.2	2.79
Snout length (% SL)	**7.5**	**8.6**	**8.0**	**0.31**	**7.0**	**7.9**	**7.5**	**0.37**	**7.3**	**8.1**	**7.8**	**0.37**
Snout length (% HL)	**27.9**	**32.5**	**30.8**	**1.18**	**27.1**	**30.8**	**28.3**	**1.21**	**27.4**	**30.4**	**29.1**	**1.23**
Eye horizontal diameter (% SL)	**6.6**	**8.2**	**7.4**	**0.33**	**7.9**	**8.7**	**8.3**	**0.31**	**8.0**	**8.3**	**8.1**	**0.11**
Eye horizontal diameter (% HL)	**26.1**	**30.4**	**28.6**	**1.19**	**29.9**	**33.3**	**31.6**	**1.25**	**29.3**	**31.3**	**30.3**	**0.72**
Eye horizontal diameter (% interorbital width)	**73.0**	**88.4**	**82.2**	**4.70**	**96.6**	**108.2**	**101.2**	**3.80**	**75.9**	**85.4**	**81.3**	**3.12**
Postorbital distance (% HL)	43.4	50.8	46.1	1.79	42.9	47.2	45.6	1.63	42.7	48.1	44.5	2.13
Interorbital width (% HL)	**30.7**	**38.7**	**34.8**	**2.06**	**29.9**	**33.3**	**31.3**	**1.50**	**35.7**	**40.0**	**37.4**	**1.44**
Length of upper jaw (% HL)	30.0	34.4	32.6	1.17	30.0	35.8	33.4	1.85	30.6	35.6	32.6	1.89
Length of lower jaw (% HL)	**38.9**	**44.8**	**42.2**	**1.56**	**41.7**	**46.0**	**44.4**	**1.44**	**42.7**	**46.6**	**44.4**	**1.49**
Length of lower jaw (% depth of operculum)	**90.8**	**104.3**	**97.8**	**4.02**	**100.0**	**108.9**	**105.6**	**3.13**	**105.2**	**117.3**	**110.8**	**4.28**
Depth of operculum (% HL)	41.0	47.8	42.8	2.26	40.8	43.5	42.1	0.98	38.2	41.4	40.1	1.22
Cranial width between pterotic margins (% cranial roof length)	**60.8**	**69.3**	**63.9**	**2.74**	**59.5**	**64.8**	**61.8**	**1.76**	**58.9**	**64.8**	**61.9**	**2.18**
Ratios												
Interorbital width/eye horizontal diameter	**1.1**	**1.4**	**1.2**	**0.07**	**0.9**	**1.0**	**1.0**	**0.04**	**1.2**	**1.3**	**1.2**	**0.05**
Snout length/eye horizontal diameter	**1.0**	**1.1**	**1.1**	**0.05**	**0.8**	**1.0**	**0.9**	**0.06**	**0.9**	**1.0**	**1.0**	**0.04**
Head depth at nape/eye horizontal diameter	2.4	2.8	2.6	0.11	2.2	2.6	2.3	0.12	2.3	2.5	2.5	0.08
Length of caudal peduncle/depth of caudal peduncle	1.6	2.1	1.8	0.12	1.6	2.1	1.8	0.16	1.7	2.0	1.9	0.12

Table 3. Total lateral line scales, anal fin branched rays, and vertebral counts (range, mode and mean) and most frequent vertebral formulae in species of the genus *Alburnoides* (Rhine, Danube and eastern Adriatic basin down to River Seman in Albania).

	Total lateral line scales	Anal fin branched rays	Total vertebrae	Abdominal vertebrae	Caudal vertebrae	Predorsal abdominal vertebrae	Most frequent vertebral formulae
A. bipunctatus (Rhine drainage; n=22, all from SMF)	45–51; **48–50**; 48.4	13½–17½; **14½–15½**; [14.5]½	40–42; **41**; 41.4	20–21; **20**; 20.2	20–22; **21**; 21.2	13–15; **14**; 14.2	20+21
A. cf. *bipunctatus*, Danube (Sava R. at Dolsko, Moravica R. in Sava R. system) at Grdovići, Lepenica R.; n=50, all from PZC)	45–54; **49–50**; 48.9	12½–15½; **13½**; [13.3]½	40–42; **41**; 41.1	20–21; **20**; 20.3	20–22; **21**; 20.8	13–15; **14**; 13.9	20+21, 21+21
A. cf. *ohridanus* (Skadar L.; n=19, NMW 55484-86, PZC)	42–47; **44**; 44.3	12½–15½; **12½–13½**; [12.8]½	39–41; **40**; 39.9	20–21; **20**; 20.3	19–20; **20**; 19.7	13–14; **14**; 13.8	20+20
A. ohridanus (Ohrid L., n=33, PZC)	42–46; **44**; 43.9	10½–13½; **11½**; [11.4]½	38–40; **39**; 39.0	19–21; **20**; 20.0	18–20; **19**; 18.9	12–14; **13**; 12.8	20+19
A. prespensis (n=3)	42–44; 43.0	10½–11½; **10½;** [10.3]½	**39**; 39.0	**20**; 20.0	**19**; 19.0	**13**; 13.0	20+19
A. fangfangae sp. nov. (n=44 for l.l. and A, n=22 for vertebrae)	46–53; **48–49**; 48.3	11½–14½; **12½;** [12.1]½	40–42; **40–41**; 40.6	20–21; **20**; 20.5	19–21; **20**; 20.1	13–14; **14**; 13.8	20+20, 21+20, 20+21
A. devolli sp. nov. (n=15)	44–48; **47**; 46.2	11½–13½; **12½;** [12.1]½	40–41; **40**; 40.3	20–21; **20**; 20.5	19–20; **20**; 19.8	12–13; **13**; 12.7	20+20

Fig. 4. *Alburnoides devolli* sp. nov., holotype, female, NMW 95278, 89.1 mm SL.

Fig. 5. *Alburnoides* cf. *bipunctatus* (Danube), PZC 482, 77.6 mm SL.

Fig. 6. *Alburnoides ohridanus*, PZC 232, 58.3 mm SL.

Fig. 7. *Alburnoides* cf. *ohridanus* (Skadar Lake), NMW 55486, 59.7 mm SL.

Table 4. Frequency of occurrence of different types of scale development on the ventral keel in species of the genus *Alburnoides* (Rhine, Danube and eastern Adriatic basin down to River Seman in Albania). See also Fig. 1 for explanations of the character states of the ventral keel scale cover.

	completely scaled	3/4 scaled	2/3 scaled	1/2 scaled	2/3 scaleless	3/4 scaleless	completely scaleless
***A. bipunctatus*, Rhine**; SMF	1	**4**	**5**	**6**	2	3	1
***A.* cf. *bipunctatus*, Danube**							
PZC 328 Sava			**6**				
PZC 245 Moravica	3	1	**6**	3			
PZC 482, Lepenica	3		**1**	2			
***A.* cf. *ohridanus*, Skadar**							
PZC 249, 484 Morać a			2		1		
NMW 55486				2	2	**3**	1
NMW 55484			1			**3**	1
NMW 55485			1		1	**1**	
***A. ohridanus*, Ohrid**							
PZC 232	2	**3**	3	4	2	1	1
PZC 483	1	**6**	3	3	2	2	
A. fangfangae							
Holotype and paratypes			4	5	**11**	**14**	**10**
A. devolli							
Holotype and paratypes	**6**	**4**	2	3			

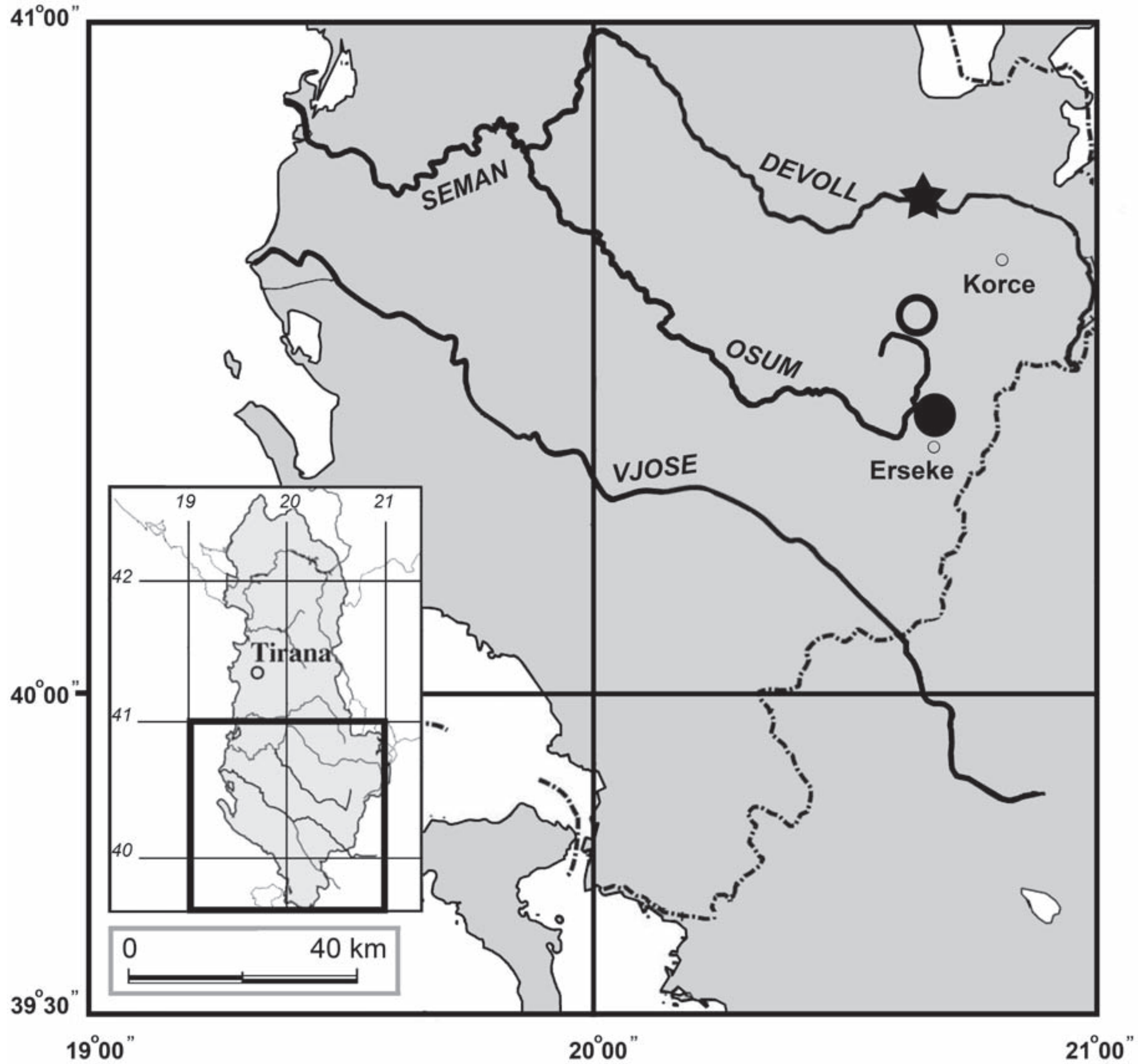

Fig. 8. Map showing the type locality of *Alburnoides fangfangae* sp. nov. (filled circle), the second registered locality of *Alburnoides fangfangae* sp. nov. (tributary of Gianci Reservoir, circle), and the type locality of *Alburnoides devolli* sp. nov. (star).

projection), a longer lower jaw (lower jaw length always greater than the operculum depth,103–111% operculum depth, vs. usually smaller than the operculum depth, 91–101%), the ventral keel commonly scaleless at ½ to ¾ of its length or completely scaleless (vs. scaled along more then ½ of its length, modally completely scaled), a higher number of the predorsal vertebrae, 13–14, modally 14 (vs. 12–13, modally 13) (the means are statistically significantly different), and shorter preanal length and pelvic–anal fin origin length. The latter characters indicate a more anterior position of the anal fin in *A. fangfangae* sp. nov. than that in *A. devolli* sp. nov. though both species have similar numbers of the anal fin branched rays, modally 12½. In these species, the position of the anal fin origin does not correlate with the number of anal fin rays; the preanal length and the pelvic–anal fin origin length are similar in *A. fangfangae* sp. nov., *A.* cf. *bipunctatus* from the Danube and *A. ohridanus* with, modally, 12½, 13½ and 11½ anal fin branched rays, respectively (Figs. 2, 3, 5, 6). In these three species the anal fin origin is usually or always (in *A.* cf.

Fig. 9. The type locality of *Alburnoides fangfangae* sp. nov., a tributary of Osum River at the road SH3 near Selenica.

bipunctatus) located in front of vs. slightly behind the dorsal fin insertion in *A.* cf. *ohridanus* and *A. devolli* sp. nov. with, modally, 12½–13½ and 12½ anal fin branched rays, respectively (Figs. 4, 7).

The shape of the cranium and its elements as well as those of the paired fins show similarity in the species examined but some bones demonstrate clear differences which are summarised in Table 5. *Alburnoides fangfangae* sp. nov. can be distinguished from the three other species under consideration in having a partly ossified preethmoid and a basihyal with a markedly depressed and considerably expanded anterior tip.

***Alburnoides devolli* sp. nov.**
(Fig. 4)

Holotype. NMW 95278, female, 89.1 mm SL, ALBANIA: Devoll [Devol, Devolli] R., at road SH3, near Maliq, Korçë County, Korçë District, ca. 40°42´ N, 20°42´ E, 25 June 2007; coll. P. Zupančič.

Paratypes. NMW 95279, 2, 79.4 and 95.2 mm SL; PZC 480, 6, 57.4–84.5 mm SL; ZIN 54982, 6, 67.8–91.3 mm SL, all same data as holotype. An additional specimen (same data) was cleared and stained (63.3 mm SL).

Additional specimen. PZC 483, 74.4 mm SL, ALBANIA: Devoll [Devol, Devolli] R., Korçë County, Korçë District, 5 August 2006; coll. P. Zupančič.

Diagnosis. The species is distinguished from other members of the genus in having 11½–13½ anal fin branched rays, larger scales numbering 44–48 in the total pored lateral line, total vertebrae usually 40 (20+20), a shallow caudal peduncle (its depth 35–43% body depth at dorsal fin origin), a usually mostly or completely scaled ventral keel, the mouth with a straight and upturned cleft, the interorbital width 1.1–1.4 times the eye diameter, a completely ossified preethmoid, and a narrow, very deeply indented anterior tip of the urohyal (a unique feature among the western European *Alburnoides*).

Fig. 10. The type locality of *Alburnoides devolli* sp. nov., Devoll River at the road SH3.

Description. See Table 1 for morphometric data of holotype and 14 paratypes. The body is deep: depth at the dorsal fin origin is 28–33% SL. In most specimens there is a slight to considerable hump just behind the head and the head dorsal profile is slightly concave, in the largest examined specimens in particular. The upper and lower profiles of the body are almost equally convex. The snout is markedly rounded in front of the nostrils; no fleshy projection is present (Fig. 4). The mouth is almost terminal, and the uppermost point of the mouth cleft is about the level of the pupil. The mouth cleft (in lateral view) is straight and the cleft is considerably slanted. The interorbital space is not wide, its width 30–35% HL, and the eye horizontal diameter enters interorbital width 1.1–1.4 times. The eye horizontal diameter, 23–28% HL, is slightly to markedly smaller than the snout length, 27–32% HL. The head is not wide, the width of the neurocranium between the lateral margins of pterotics (measured in undissected specimens) is 58–68% cranial roof length.

The dorsal fin has 3 simple and 8½ branched rays in all specimens. Its outer margin is slightly concave. The dorsal fin is located slightly behind the end of the pelvic fin base. The anal fin has 3 simple and 11½ (2), 12½ (10 including holotype), 13½ (4) branched rays (Table 3). The anal fin outer margin is moderately to markedly concave with the lower apex of the fin rounded. The anal fin origin is usually somewhat behind the posterior end of the dorsal fin base. Pelvic–anal fin origin distance is 17–22% SL, and the end of the pelvic fin does not reach the origin of the anal fin (Fig. 4). All specimens are females. The caudal fin is moderately forked, its lobes slightly rounded.

Fig. 11. *Alburnoides fangfangae* sp. nov., tributary of Gianci Reservoir, PZC 482, 55.2 mm SL.

The ventral keel between the pelvic fin insertions and the anal papilla is poorly developed and commonly scaled at ½ to ¾ of its length or completely scaled (Table 4).

The number of gill rakers (in total on the outer side of the first left gill arch) is 7 (10 including holotype) or 9 (5). The holotype and 5 examined paratypes have 2.5–4.2 pharyngeal teeth. Teeth are hooked at the tip and not serrated below it.

The lateral line is complete with none to 3, usually 1, unpored scales at the posterior end of the lateral series. The total number of lateral line scales is 46 in the holotype; 44 (1), 45 (3), 46 (3), 47 (6) or 48 (1) in the paratypes. A pelvic axillary scale is present.

The CSO is shortened in its posterior section and never approaches the CST; it has 9, rarely 8, pores, with 3 and 6, rarely 5, canal openings on the nasal and frontal bones, respectively. The CIO has 13–15, modally 14, pores with 4, rarely 5 canal openings on the first infraorbital. The CPM is complete, with 14–16, modally 15, pores with 4 or 5 and 8–10 canal openings on the dentary and preoperculum, respectively. The CST is complete, with 5–7 pores.

The total vertebrae are 40 in the holotype, 40 (9) or 41 (3) in 12 paratypes examined (Table 3). The number of abdominal vertebrae is 20 in the holotype, 20 (6) or 21 (6) in the paratypes examined. The number of predorsal abdominal vertebrae is 12 in the holotype, 12 (3) or 13 (9) in the paratypes examined. Intermediate vertebrae are 3 or 4. The number of caudal vertebrae is 20 in the holotype, 19 (3) or 20 (9) in the paratypes examined (Table 3). The vertebral formulae are 20+20 (in holotype and 5 paratypes), 21+19 (3) or 21+20 (3).

Colouration. Pigmentation of the holotype and paratypes preserved in 4% formalin consists of a dark grey, almost black, lateral stripe, which goes from the anterior margin of the operculum to the caudal peduncle, clearly expanding at the end, and terminates at the bases of the caudal fin rays. The back above the lateral stripe is much darker than the area below the latter including the belly, which is unpigmented. There are regularly arranged dark spots on the flanks between the lateral stripe and the lateral line and one or two rows of lighter spots below the latter. The lateral line pores are lined by pigment dorsally and ventrally along the entire length of the lateral line. The fins have more or less intense black pigment especially prominent in the central part of each fin.

Distribution. *Alburnus devolli* sp. nov. is known only from the Devoll [Devol, Devolli] River in the upper Seman River drainage of Albania. The Devoll is the main northern source river of the Seman. Its source is in the Devoll District at the eastern slope of the Morava Mountain Range. It flows initially east and north, then turns west through a valley south of Prespa Lake and enters the northern Devolli Plain [Plain of Korçë]; further westwards, it goes trough a mountainous area to Gramsh where it turns south. It joins the Osum near Kuçovë on the Adriatic coastal plain to form the Seman.

Habitat and biology. The specimens of the new species were collected from river sections (Fig. 10)

Table 5. Difference in structure of some bones in *Alburnoides* cf. *bipunctatus, A. ohridanus, A. fangfangae* sp. nov., and *A. devolli* sp. nov. Unique character states are given in boldfaces.

	Postcleithrum	Urohyal	Basihyale	Supraorbital	Preeth-moid	Premaxillar ascending process
A. cf. *bipunctatus*, Danube (Sava R. at Dolsko)	Always present, well developed, flattened, plate-like	Elongate, narrowed at moderately indented anterior tip	Rod-like: elongate, equally wide along entire bone	Wide; lateral margin of frontal with deep notch to include supraorbital (length of notch about 2/3 of frontal margin length)	Completely ossified.	Narrow, high, pointed
A. ohridanus (Ohrid L.)	**Absent or present; if present, very small**, **poorly ossified and often located on one side of head only.**	Expanded posteriorly, with lateral margins rounded and shallowly indented anterior tip	Rod-like: elongate, anterior tip slightly depressed and wider than posterior end	**Narrow and elongate; lateral margin of frontal without any notch**	**Entirely cartilaginous**	Narrow, high, pointed
A. fangfangae sp. nov.	Always present, well developed, flattened, plate-like.	Elongate, narrowed at moderately indented anterior tip	**Anterior tip depressed and considerably expanded (about as wide as posterior part of urohyal)**	Wide; lateral margin of frontal with deep notch to include supraorbital (length of notch about 2/3 of frontal margin length)	**Partly ossified**	Narrow, high, pointed
A. devolli sp. nov.	Always present, well developed, rod-like	**Elongate, very narrow, with very deeply indented anterior tip**	Rod-like: elongate, equally wide along entire bone	Wide; lateral margin of frontal with deep notch to include supraorbital (length of notch about 2/3 of frontal margin length)	Completely ossified	**Low, triangular-shaped, with a wide base**

0.5–1 m deep and up to 5 m wide with a moderately fast current at an elevation of about 1,050 m. *Barbus* cf. *rebeli* and a *Squalius* were caught in the stream together with *A. devolli*. The holotype and the paratypes are all adult females with gonads containing a few ripe eggs; this probably indicates that they are post-spawning individuals. No males were collected to compare the pattern of nuptials tubercles with that in *A. fangfangae*.

Etymology. The species is named for its type locality, the Devoll River.

Proposed common name: Devoll riffle minnow.

Comparative remarks. Together with *A. fangfangae* sp. nov., this new species belongs to the western group with pharyngeal teeth 2.5–4.2 as defined in Bogutskaya and Coad (2009). *Alburnoides devolli* sp. nov. differs from *A. bipunctatus* s. str. from the North and Baltic sea basins in having less anal fin branched rays (usually 11½–13½, vs. 13½–17½, usually 14½–15½), fewer caudal vertebrae (19–20 vs. 20–22, usually 21), and fewer predorsal abdominal vertebrae (12–13 vs. 13–15, usually 14).

The morphometric characters distinguishing *A. devolli* sp. nov. from the species distributed in the Danube River, the Drin–Skadar–Ohrid basin and Prespa Lake are given in Tables 1 and 2, the meristic features are summarised in Table 3, and the frequency of different states of the ventral keel structure is given in Table 4. *Alburnoides devolli* sp. nov. differs from the four other species by the number of lateral line scales, 44–48, modally 47, that is less than in *A. fangfangae* sp. nov. and *A.* cf. *bipunctatus* (45–54, modally 48–50) but greater than in *A. ohridanus*, *A.* cf. *ohridanus* and *A. prespensis* (42–47, modally 44). The eye horizontal diameter is usually smaller than the snout length in *A. devolli* sp. nov. similarly to *A. fangfangae* sp. nov. (Figs. 2, 3), *A. prespensis* and *A.* cf. *bipunctatus* (Fig. 5) in contrast to *A. ohridanus* (Fig. 6) and *A.* cf. *ohridanus* (Fig. 7) with a larger eye whose horizontal diameter is usually greater than the snout length. The eye horizontal diameter in *A. devolli* sp. nov. is statistically significantly smaller than in *A.* cf. *ohridanus* and *A. ohridanus* (23–28% HL vs. 30–33% and 29–31%, respectively). *Alburnoides devolli* sp. nov. differs from *A. ohridanus* and *A. prespensis* by having more numerous branched anal fin rays (11½–13½, usually 12½, vs. 10½–13½, commonly 11½, and 10½–11½, commonly 10½, respectively), more numerous total vertebrae (40–41, modally 40, vs. 38–40, modally 39), and more numerous caudal vertebrae (usually 20 vs. 19).

Alburnoides fangfangae sp. nov. is further different from the other new species from the Osum River described above in having a straight (in lateral view) mouth cleft, which is upturned (vs. curved and slightly slanted), the snout lacking a fleshy projection (vs. fleshy snout), a weakly developed ventral keel (usually scaled along more than ½ of its length, modally completely scaled, vs. usually scaleless at ½ to ¾ of its length or completely scaleless), fewer predorsal vertebrae (12–13, modally 13, vs.13–14, modally 14), a shallower caudal peduncle (caudal peduncle depth 35–43% body depth at dorsal fin origin, averaging 39.0, vs. 43–48%, averaging 44.8%), and longer preanal length and pelvic–anal fin origin length (the means are statistically significantly different), though both species have similar numbers of the anal fin branched rays, modally 12½.

Alburnoides devolli sp. nov. can be also distinguished from the three other species under consideration in having an elongate, very narrow urohyal with a very deeply indented anterior tip and a low, triangular-shaped, wide at its base ascending process of the premaxillary (Table 5).

Comments on distribution of *Alburnoides fangfangae* sp. nov. and *Alburnoides devolli* sp. nov.

The two species are described from the same river drainage, the Seman River. However, the morphological differences revealed support a conclusion on their considerable divergence. At present, the ranges of distribution of both species are limited to the upper reaches of the Osum and Devoll rivers, which are isolated by gorges from middle and lower reaches. This is consistent with the palaeogeographical evidence that the tectonic evolution of eastern Albania is characterised by a general uplift that began after the Pliocene and led to the formation of isolated Pliocene and Pliocene to Lower Pleistocene intermontane graben-shaped Quaternary lake basins: Ohrid graben lake Basin, Prespa graben lake Basin, Korça-Devolli half-graben lake Basin and Kolonja half-graben lake Basin among them (Aliaj et al. 2000; Meco et al. 2000; Carcaillet et al. 2009). Throughout the Piocene, the grabens of Ohrid and Korça belonged to the same lake-river system (Fouache et al. 2001). Most workers agree on a time frame for the isolation of Lake Ohrid of 2–5 million years ago, and that there was relatively little faunal exchange and overlap between Lake Ohrid and its sister lake, Lake Prespa, despite the fact that the latter lake is a major water supplier for Lake Ohrid (Albrecht and Wilke 2008). This may also be the case for other Quaternary lake basin and plain hydrographic networks such as the Korça-Devolli half-graben lake Basin and Kolonja half-graben lake Basin. Tectonic activity during the quaternary isolated the Korça-Devolli Basin within its present geological borders (Fouache et al. 2001). Later, the Osum and Devoll rivers independently formed their way westwards crossing the active graben system and the active frontal thrust system of the Albanides, and joined to form the Seman River on the Periadriatic Plain as recently as after the Würm glaciation (Carcaillet et al. 2009). The Korça-Devolli Basin contained Maliq [Maliqe] Lake which dried some 60 years ago (Fouache et al. 2001; Bordon et al. 2009; Markova et al. 2010). At present, the drainages of the Devoll and Osum are interconnected by a network of irrigational canals. Irrigation water is abstracted from the Dunavecit River, a tributary of the Devoll River, and also from the Gjanci Reservoir, which is fed by water from the Osum River. All drainage water goes to the Dunavecit by a series of drains from both left and right banks of the Gjanci Reservoir, and the Dunavecit joins the Devolli near Maliq (Government of Albania 2004).

COMPARATIVE MATERIAL

Alburnoides bipunctatus. SMF 13242, 1, 110.0 mm SL; GERMANY: stream in St. Goar, Rhine; May

1911, coll. Wendt. SMF 15784, 3, 61.5–75.9 mm SL; GERMANY: Pfalz, Sauer; 05 Oct. 1964, coll. Bath. SMF 15789, 1, 72.8 mm SL; GERMANY: Sauer at Schonau; 22 May 1960, coll. Bath. SMF 16966, 3, 84.8–89.2 mm SL; GERMANY: Restrhein, Rhein-Stat. 120, R – 179.8 km, at Jalstein; 1 Oct. 1987, coll. Lelek. SMF 18901, 2, 51.2, 61.6 mm SL; GERMANY: Weingartener, Moor; 28 May 1982, coll. Lelek. SMF 22563, 10, 78.9–98.4 mm SL; GERMANY: Rhine, km 164.5, Birs at Basel; 1988, coll. Morell. SMF 23423, 2, 39.0–106.8 mm SL; GERMANY: Rhine; Jan. 1910, Lauterborn.

Alburnoides cf. *bipunctatus* (Danube). PZC 328, 5, 70.9–76.4 mm SL; SLOVENIA: Sava R. at Dolsko; coll. P. Zupančič. PZC uncat., 27, 50.6–79.4 mm SL, same locality, 17 May 2010, coll. A. Naseka. PZC 245, 11, 70.5–78.5 mm SL; SERBIA: Moravica R. at Grdovići, Sava R. system, 25 July 2004; coll. P. Zupančič. PZC 482, 6, 57.2–77.6 mm SL; BOSNIA and HERZEGOVINA: Lepenica R., tributary of Danube R., 25 June 2004; coll. P. Zupančič. Four cleared-and-stained specimens 67.9–79.0 mm SL.

Alburnoides ohridanus. PZC 232, 16, 38.5–67.4 mm SL, REPUBLIC OF MACEDONIA: Ohrid Lake, at Kališta and Radožda, 26–31 July 2004; coll. P. Zupančič. PZC 483, 17, 44.0–68.3 mm SL; REPUBLIC OF MACEDONIA: Ohrid Lake, at Radožda, Biser, 07 Aug. 2010, coll. P. Zupančič. Three cleared-and-stained specimens 58.3 mm–66.9 mm SL.

Alburnoides cf. *ohridanus* (Skadar Lake). NMW 55484-6, 16, 45.3–76.9 mm SL; Skutari [Skadar] Lake 1894, Steindachner don. PZC 249, 1, 39.3 mm SL; MONTENEGRO: Morača R., tributary of Skadar Lake, at Brnjaci, 17 June 2000; coll. P. Zupančič. PZC 482, 2, 68.8, 75.1 mm SL; MONTENEGRO: Morača R., tributary of Skadar Lake, at Vranje, 4 Aug. 2010; coll. P. Zupančič.

Alburnoides prespensis. MKC 17344, 3, 77.5-93.4 mm; GREECE: Florina District, Megali Prespa Lake at Psarades; 25 Aug. 2002, coll. M. Kottelat and P. Economidis.

Additional comparative material on *A. bipunctatus*, *Alburnoides* cf. *bipunctatus* (Danube), *A. eichwaldii*, *A. fasciatus*, *A. idignensis*, *A. gmelini*, *A. kubanicus*, *A. maculatus*, *A. namaki*, *A. nicolausi*, *A. ohridanus*, *A. oblongus*, *A. petrubanarescui*, *A. qanati*, *A. rossicus*, *A. taeniatis*, and *A. varentsovi* is listed in Bogutskaya and Coad (2009) and Coad and Bogutskaya (2009).

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