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NOTES ON GEOGRAPHIC DISTRIBUTION

New records and range extension of *Alburnus chalcoides* (Güldenstädt, 1772) (Teleostei, Cyprinidae) from the upper Syr Darya River, Uzbekistan

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Abstract. We report new records of *Alburnus chalcoides* (Güldenstädt, 1772) from the upper Syr Darya in Uzbekistan. Previously, this species was only known in Central Asia from the Aral Sea basin, including the Amu Darya, Zeravshan, and lower Syr Darya drainage. Field surveys in 2023–2024 yielded specimens from the Kara Darya, Naryn, and Chirchik rivers, all in the upper Syr Darya. Comparative morphometric analysis with material from the Zeravshan drainage indicates close similarity of *A. chalcoides*. These records expand the known range of *A. chalcoides* in Central Asia.

Key words. Caspian shemaya, distribution, Fergana Valley, morphology, taxonomy

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INTRODUCTION

The leuciscid genus *Alburnus* Rafinesque, 1820 (Cypriniformes, Leuciscidae, Leuciscinae) is characterized by a silvery body, lacking dark markings on the flank or exhibiting only a faint midlateral stripe, and in possessing 13–38 densely set gill rakers, each several times longer than the inter-raker distance (Kottelat and Freyhof 2007). Currently, the genus comprises 48 valid species (with all former *Chalcalburnus* Berg, 1933 species now assigned to *Alburnus*), occurring across the Western Palearctic realm, with the greatest species diversity found in Turkey (Özulug and Freyhof 2007; Freyhof and Turan 2019; Fricke et al. 2025). *Alburnus chalcoides*, one of the most widespread species within the genus, was first described by Güldenstädt (1772) based on specimens collected from rivers such as the Terek, Sulak, and Kura in Transcaucasia. Kessler (1872) later recorded the species for the first time in the Aral Sea basin, specifically from the Ak Darya, the right branch of the Zeravshan River. Subsequently, Berg (1905) reported the species from the Aral Sea itself, as well as from the lower reaches of both the Amu Darya and Syr Darya rivers. In a later work, Berg (1923) described the Aral Sea basin population as a distinct subspecies, *A. chalcoides aralensis*. However, Kottelat (1997) treated this taxon as a synonym of *A. chalcoides*. Over the past 70 years, ichthyological surveys conducted in the Fergana Valley have not recorded the presence of this species in the upper reaches of the Syr Darya (Turdakov 1963; Kamilov and Nuriev 1974; Vundtsettel 2006; Kustareva and Naseka 2015).

Field surveys were conducted in 2023–2024 to investigate the distribution of *Alburnus* species in the upper Syr Darya. During these surveys, specimens of *A. chalcoides* were recorded from the lower reaches of the Naryn and Kara Darya rivers—the main right and left tributaries of the Syr Darya within the Fergana Valley—as well as from the lower reaches of the Chirchik River, a right tributary of the Syr Darya located outside the valley. These findings represent new records of *A. chalcoides* from the upper Syr Darya and are documented in the present study. This record significantly extends the known range of the species and contributes updated data on the fish fauna of this region, which is important for biodiversity assessments and conservation planning.

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METHODS

Specimens of *Alburnus chalcoides* were collected by hand net with fine nylon mesh (1 × 1 mm) from the several tributaries (Chirchik, Kara Darya, and Naryn rivers) of the upper reaches of the Syr Darya and Zeravshan River in April–August 2024. After anesthesia with clove oil, fresh specimens were fixed in 4% formaldehyde and after 5–7 days rinsed and stored in 70% ethanol. Identification and classification of *A. chalcoides* follow Kottelat and Freyhof (2007). Meristic counts were determined under a SZM7045-B9L stereomicroscope (Yuyao Dagong, China), and morphometric characters were measured point to point using digital calipers, following Kottelat and Freyhof (2007). Specimens examined in this study were deposited in the collections of the private Bakhtiyor Sheraliev Fish Collection (BSFC) in Fergana, Uzbekistan.

RESULTS

***Alburnus chalcoides* (Güldenstädt, 1772)**
Figures 1, 2

New records. UZBEKISTAN — Andijan • Baliqchi District, lower reaches of the Kara Darya; 40°54′52″N, 071°53′42″E; 415 m alt.; 27.VII.2023; D. Komilova, O. Azamov, M. Rakhmonov and Sh. Khalimov leg.; 79–109 mm SL; 7 specimens, BSFC 0087 — Namangan • Uychi District, lower reaches of the Naryn; 40°56′22″N, 071°49′07″E; 403 m alt.; 03.IV.2024; F. Umarov obs.; 1 specimens, uncatalogued (photo record) — Tashkent • Yangiyul District, lower reaches of the Chirchik; 41°01′08″N, 069°01′34″E; 313 m alt.; 17.VIII.2024; O. Azamov, M. Rakhmonov and Sh. Khalimov leg.; 106–138 mm SL; 9 specimens, BSFC 0110.

Comparative materials. *Alburnus chalcoides*: UZBEKISTAN — Samarkand • Kattakurgan District, Zeravshan River; 39°57′50.58″N, 066°16′52.6″E; 465 m alt.; 20.VIII.2024; O. Azamov, M. Rakhmonov and Sh. Khalimov leg.; 76–133 mm SL; 21 specimens, BSFC 0111.

Figure 1. *Alburnus chalcoides* collected from (**A**) Chirchik (BSFC 0110, 116 mm SL, Syr Darya drainage), (**B**) Kara Darya (BSFC 0087, 99 mm SL, Syr Darya drainage), (**C**) Ak Darya (BSFC 0111, 98 mm SL, a branch of the Zeravshan River), and (**D**) Kara Darya (BSFC 0111, 119 mm SL, a branch of the Zeravshan River) rivers. Scale bars: 10 mm.

Figure 2. Live *Alburnus chalcoides* from the lower reaches of the Naryn River, ca. 20 cm SL, uncatalogued.

Alburnus oblongus: UZBEKISTAN — Tashkent • Ohangaron District, Ohangaron River; 40°58′02″N, 070° 03′06″E; 821 m alt.; 07.VIII.2023; B.Sheraliev, O.Azamov and M.Rakhmonov leg.; 67–81 mm SL; 5 specimens, BSFC 0091.

Alburnus taeniatus: UZBEKISTAN — Andijan • Paxtaobod District, Tentaksoy River; 40°56′26″N, 072°26′55″E; 494 m alt.; 08.VII.2023; D.Komilova, O.Azamov, M.Rakhmonov and Sh.Khalimov leg.; 47–71 mm SL; 5 specimens, BSFC 0086.

Local name. Moybaliq.

Identification. Photographs of *A. chalcoides* from the Kara Darya, Naryn, Chirchik, and Zeravshan are presented in Figures 1 and 2, and morphometric and meristic data for the Kara Darya, Chirchik, and Zeravshan population in Table 1. Specimens of *Alburnus* from the Kara Darya, Naryn, and Chirchik rivers were identified based on the diagnostic characters of *A. chalcoides* provided by Kottelat and Freyhof (2007) and through direct comparison with specimens collected from the Zeravshan River.

Body compressed; maximum body depth slightly anterior to the origin of the pelvic fins. Body depth at dorsal-fin origin 1.4–2.1× greater than body width. Lateral line with 59–66 + 3–4 scales. Scale rows above and below lateral line 10–11 and 3½–5, respectively. Circumpeduncular scales 18–20. Ventral keel exposed for 9–13 scales in front of anus. Caudal peduncle length 18–22% SL; its length 2.0–2.5× its depth. Dorsal fin rays ii 8–9½ with first branched ray longest, distal margin slightly concave. Anal-fin origin aligned with or slightly anterior to the vertical through last branched dorsal fin, with a difference of 2–2½ scales. Anal-fin rays iii 14–16 with first or second branched ray longest, distal margin truncate or slightly concave. No gap present between anus and anal-fin origin. Pectoral fin rays i 14 or 15, while pelvic-fin rays i 7 or 8 and not reaching anus. A small axillary pelvic lobe present. Caudal fin deeply forked, lower lobe longer; with 17 branched rays. Head dorsally and laterally tapering toward a pointed snout. Mouth superior, lower jaw slightly projecting beyond upper jaw. Mouth corners not reaching vertical through anterior nostrils. Eye diameter 4.9–6.1% SL, 22–28% of head length. Interorbital distance 1.2–1.5× eye diameter. Cephalic sensory canal system ($n = 7$): supratemporal canal with 5 or 6 pores; supraorbital canal 10–13 pores; infraorbital canal 17–23 pores; preoperculo-mandibular canal 20–22 pores. Supraorbital canal not connected to main cephalic canal system. Gill rakers on outer surface of first gill arch 17–21 ($n = 6$). Vertebrae 43 or 44 ($n = 6$). Intestine sigmoid in shape. Swim bladder bipartite, with the posterior chamber 1.7× length of anterior chamber.

Two species of the genus *Alburnus*—*A. oblongus* and *A. taeniatus*—have previously been reported from the upper Syr Darya (Sheraliev and Peng 2021). The *Alburnus chalcoides* specimens recorded in the present study from the upper Syr Darya can be distinguished from these two species by the following combination of characters: higher number of anal-fin branched rays (14–16 vs. 11–13 in *A. oblongus* and *A. taeniatus*); greater number of lateral-line scales (59–66 vs. 52–56 in *A. oblongus* and 39–42 in *A. taeniatus*); more gill rakers on outer surface of first gill arch (17–21 vs. 12–13 in *A. oblongus* and 15–17 in *A. taeniatus*); higher vertebral count (43–44 vs. 39–41 in *A. oblongus* and 35–37 in *A. taeniatus*); shorter caudal peduncle (18.5–21.6% of SL vs. 21.8–22.9% of SL in *A. oblongus*); and a greater ratio of caudal peduncle length to depth (2.0–2.5 vs. 1.5–1.9 in *A. taeniatus*).

DISCUSSION

Alburnus chalcoides has previously been recorded in Uzbekistan from the lower and upper reaches of the Amu Darya River, as well as from the Zeravshan drainage (Amanov 1985; Rozimov et al. 2021; Sheraliev and Peng 2021; Figure 3). The present study provides new records of this species in the upper Syr Darya, based on specimens collected from the Chirchik, Kara Darya, and Naryn rivers. Comparative analyses of morphological, morphometric, and meristic characters revealed that the specimens from the Kara Darya, Naryn, and Chirchik rivers closely resemble *A. chalcoides* specimens collected from the Zeravshan River (Table 1). The Kara Darya specimens had fewer gill rakers (17–18) than those from the Chirchik (21) and Zeravshan rivers (21–23). This type of variation in gill raker counts among populations of the same species has also been reported in other *Alburnus* taxa (Çiçek et al. 2021). Moreover, the observed traits are consistent with those described for *A. chalcoides* populations from the Transcaucasian region (Kottelat and Freyhof 2007).

Table 1. Morphometric and meristic data of *Alburnus chalcoides* from Kara Darya, Chirchik, and Zeravshan rivers, Uzbekistan.

Morphometric characteristics	Kara Darya River (*n* = 7)		Chirchik River (*n* = 9)		Zeravshan River (*n* = 21)	
	min–max	M±SD	min–max	M±SD	min–max	M±SD
Total length (mm)	95.3–131.4	113.3	130.2–169.5	151.2	91.9–160.5	115.4
Standard length (mm)	79.2–109.2	93.6	106.3–138.3	124.1	75.6–132.6	94.3
Head length (mm)	17.3–23.1	19.9	23.2–30.7	27.0	18.0–29.8	21.6
SL %						
Lateral head length (HL)	20.7–21.9	21.3±0.4	20.8–22.8	21.8±0.6	21.7–24.1	23.0±0.6
Body depth at dorsal-fin origin	19.4–21.5	20.8±0.7	21.4–22.6	21.8±0.5	17.3–21.2	19.5±1.2
Body width at dorsal-fin origin	11.4–14.4	12.8±1.1	10.3–12.5	11.3±0.8	8.7–11.5	10.1±0.6
Predorsal length	53.1–54.5	53.7±0.6	53.3–55.2	54.2±0.6	53.6–56.8	55.1±0.9
Postdorsal length	35.7–38.4	36.6±1.0	34.5–37.4	36.3±1.0	34.6–37.2	35.8±0.8
Prepelvic length	42.8–45.4	44.3±1.0	43.8–46.2	44.8±0.8	44.8–47.9	46.7±0.9
Preanal length	61.8–63.7	62.6±0.7	62.4–66.0	63.7±1.3	61.8–66.1	64.3±1.0
Dorsal-fin length	13.3–14.8	14.2±0.5	13.4–15.7	14.7±0.7	12.5–15.8	13.9±0.7
Dorsal-fin base length	11.1–12.5	11.5±0.6	10.7–13.0	11.7±0.9	8.7–11.3	10.5±0.6
Anal-fin length	8.9–10.0	9.5±0.4	9.8–10.9	10.3±0.4	8.9–10.6	9.8±0.5
Anal-fin base length	17.0–17.9	17.5±0.4	15.8–19.2	17.4±1.3	15.5–18.3	16.5±0.7
Pectoral-fin length	13.8–16.8	16.0±1.0	15.6–16.7	16.2±0.4	14.6–17.7	16.5±0.8
Pelvic-fin length	11.9–12.8	12.2±0.3	12.3–13.6	12.7±0.4	11.4–13.4	12.3±0.6
Caudal-fin length	20.5–23.6	21.7±1.0	20.4–23.5	22.0±0.9	20.9–24.3	22.5±1.0
Caudal-peduncle length (CPL)	20.1–21.6	20.8±0.6	18.5–20.4	19.7±0.6	19.3–21.9	20.4±0.8
Caudal-peduncle depth (CPD)	8.6–8.9	8.7±0.1	8.7–9.4	9.1±0.2	7.8–9.1	8.5±0.3
Caudal-peduncle width	6.2–7.0	6.6±0.3	5.5–7.5	6.4±0.6	5.3–6.6	5.9±0.3
Pectoral–pelvic distance	22.2–24.3	23.0±0.9	22.9–24.6	23.9±0.5	21.2–24.5	23.3±0.9
Pelvic–anal distance	18.1–20.9	19.3±1.0	19.0–21.6	19.8±0.9	17.2–20.1	18.7±0.8
CPL/CPD	2.3–2.5	2.4±0.1	2.0–2.3	2.2±0.1	2.1–2.8	2.4±0.1
HL %						
Head depth at nape	66.5–71.9	68.7±2.2	66.1–70.4	68.6±1.6	62.8–69.7	66.1±1.7
Head depth at eye	46.6–52.8	50.0±2.3	45.8–49.4	48.3±1.2	46.9–51.0	49.0±1.2
Head maximum width	48.8–52.0	50.0±1.2	49.1–53.6	51.3±1.5	47.2–50.4	48.9±0.9
Snout length	28.9–31.2	29.8±0.8	29.0–33.0	31.0±1.2	25.1–31.3	28.8±1.3
Eye diameter	24.5–27.8	26.0±1.2	22.1–26.4	24.3±1.4	25.9–30.7	28.0±1.1
Interorbital width	32.1–34.9	33.3±0.9	31.9–36.2	33.7±1.5	29.4–33.4	30.9±1.0
Postorbital head length	45.0–46.7	45.9±0.7	43.5–47.2	45.5±1.4	40.0–45.2	43.3±1.3
Mouth width	21.6–25.8	23.0±1.5	19.8–23.6	21.5±1.2	18.3–22.5	20.3±1.3
Meristic counts						
Dorsal-fin rays	ii 9–9½		ii 8–9½		ii 8–9	
Anal-fin rays	iii 15–16		iii 14–16		iii 15–16	
Pectoral-fin rays	i 14–15		i 15		i 15	
Pelvic-fin rays	i 7–8		i 7–8		i 7–8	
Caudal-fin rays	17		17		17	
Vertebrae	43–44		43–44		43–44	
Gill rakers	17–18		21		21–23	
Lateral-line scales	59–61+3–4		61–66+3–4		58–69+4–5	
Scale rows above lateral line	10½–11		10–11		10½–11	
Scale rows below lateral line	3½–5		3½–4		3½–4	
Circumpeduncular scales	18–19		18–20		19–20	
Supratemporal pores	5–6		5–6		6–7	
Supraorbital pores	10–12		11–13		10–13	
Infraorbital pores	19–23		17–20		19–22	
Preoperculomandibular pores	20–22		20–21		19–22	

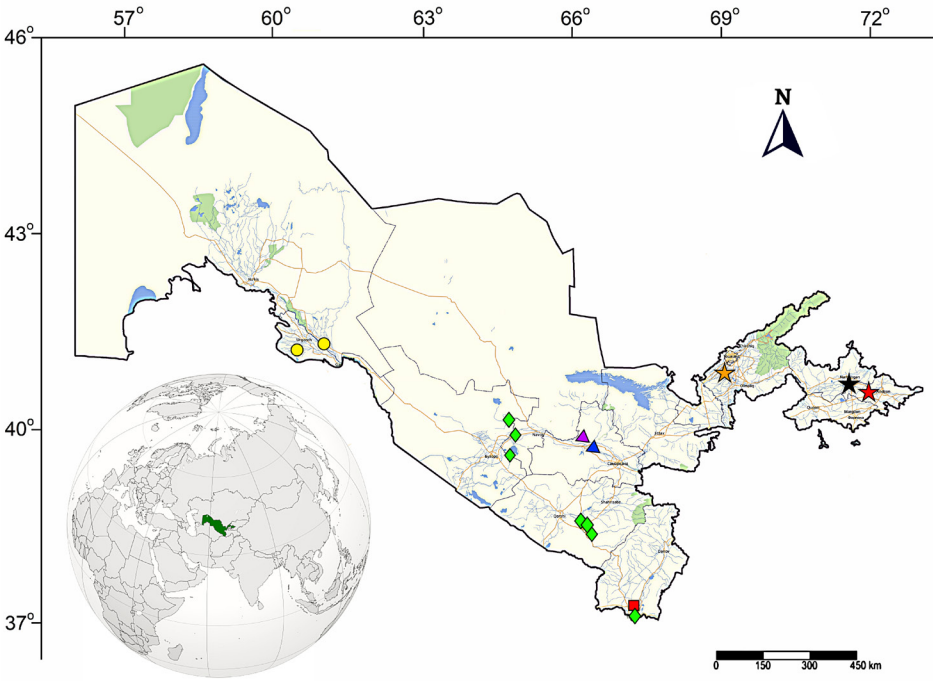

Figure 3. Distributional map of *Alburnus chalcoides* from Uzbekistan. Stars indicate new record (red = Kara Darya, black = Naryn, orange = Chirchik; this study), triangle = Zeravshan (blue = Kara Darya, purple = Ak Darya; this study). Also recorded by Rozimov et al. (2021) from the lower reaches of the Amu Darya (yellow circle), Amanov (1985) from the lower reaches of the Surkhandarya river (red square), and Sheraliev and Peng (2021) from the Surkhandarya, Kashkadarya and lower reaches of the Zeravshan rivers (green diamond).

Salikhov and Kamilov (1995) reported a single specimen of *A. chalcoides* collected in 1993–1994 from the Syr Darya near the city of Bekabad. However, in a comprehensive study of fish distribution in the Syr Darya drainage, Vundtsettel (2006) recorded *A. chalcoides* only from the lower reaches of the river and did not observe the species in the Chirchik River or in its major upper tributaries within the Fergana Valley, including the Kara Darya and Naryn rivers. In more recent surveys, *A. chalcoides* was documented from the lower part of the Kayrakkum Reservoir along the Tajik section of the Syr Darya (Afanasyev et al. 2020; Artaev et al. 2025), although Artaev et al. (2025) referred to the species as *Alburnus* cf. *chalcoides*. The findings of the present study corroborate and expand upon these earlier records, providing clear evidence for the occurrence of *A. chalcoides* in the upper Syr Darya. Notably, the specimen recorded from the Kara Darya represents the easternmost distribution of the species to date. Nevertheless, to further clarify the taxonomic status of *A. chalcoides* populations recorded from the Fergana Valley, additional analyses using molecular approaches would be desirable.

Over the past century, the Syr Darya drainage has undergone significant anthropogenic transformations, including dam construction, water pollution, irrigation infrastructure development, and a decline in water levels (Mamilov et al. 2025). These changes have markedly altered the ichthyofaunal composition of the basin, and several endemic and native species, such as *Acipenser nudiventris*, *Aspiolucius esocinus*, *Capoetobrama kuschakewitschi*, and *Pseudoscaphirhynchus fedtschenkoi*, are now presumed extirpated, as they have not been recorded since the 1980s (Sheraliev and Peng 2021; Mamilov et al. 2025). Conversely, such habitat modifications may have facilitated the upstream expansion of species that were previously absent or limited in distribution. Despite the presence of large dams, such as Shardara Dam in Kazakhstan and Kayrakkum Dam in Tajikistan, which hinder longitudinal fish migration along the Syr Darya, the upstream dispersal of *A. chalcoides* may have been enabled by altered flow regimes and reduced current velocity (Mamilov et al. 2025). Alternatively, Afanasyev et al. (2020) hypothesized that the species may have entered the upper Syr Darya drainage through ameliorative canal systems connected to the Zeravshan River. To elucidate the mechanisms driving the current distribution of *A. chalcoides* in the upper Syr Darya, further studies, particularly involving population genetic analyses, are needed.

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ADDITIONAL INFORMATION

Conflict of interest

The authors declare that no competing interests exist.

Ethical statement

No ethical statement is reported.

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Author contributions

Conceptualization: BS. Project administration: BS. Supervision: BS. Formal analysis: BS, SK. Investigation: SK, MR, DK, MN, FU, OA. Methodology: BS, SK. Software: MR. Visualization: MR. Writing – original draft: BS. Writing – review and editing: BS, SK, MR, DK, MN, FU, OA.

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Data availability

All data that support the findings of this study are available in the main text.

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