A recent record of *Romanogobio antipai* (Actinopterygii, Cyprinidae, Gobioninae) from the Danube River in Bulgaria

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Abstract

The Danube delta gudgeon, *Romanogobio antipai*, has been considered to be extinct because there were no reliable recent observations. The latest record confirmed by a voucher specimen dating from 1992. We report here on a specimen of *R. antipai* collected in 2016 in the Bulgarian sector of the Danube main stream using a bottom drift net at a depth of 8 m. The species determination is supported by morphological examination including discriminant and cluster analyses in comparison with three syntypes and five non-type specimens of *R. antipai*, samples of the *R. kesslerii* species complex and *R. vladykovi*. *Romanogobio antipai* most clearly differs from both *R. kesslerii* and *R. vladykovi* by proportional measurements (caudal peduncle depth, head width, eye horizontal diameter, and interorbital width), from *R. kesslerii* also by the number of scales above and below the lateral line (6 and 4, respectively, (vs. commonly 5 and 3), and from *R. vladykovi*, also by 8½ branched dorsal-fin rays (vs. 7½) and the vertebral caudal region longer than the abdominal vertebral region (abdominal+caudal vertebrae 19+21 or 20+21, vs. commonly 20+20 or variants with a caudal region shorter than the abdominal one). The possibility that *R. antipai* represents a deep-water cophenotype of either *R. kesslerii* or *R. vladykovi*, cannot be excluded. The new record demonstrates that *R. antipai* is still extant in the lower Danube but may be restricted to greater depths in the main channel and the deltaic branches.
Keywords
Danube delta gudgeon, morphology, meristics, distribution, conservation status

Introduction

Romanogobio Bănărescu, 1961 is a genus of bottom-dwelling, rheophilic gudgeons with a wide distribution in temperate Eurasia. Six species were reported from the Danube basin (Kottelat and Freyhof 2007, Friedrich et al. 2018). Among them, Romanogobio antipai was described, as Gobio kessleri antipai, by Bănărescu (1953: 300, 318) based on a series of syntypes from the Danube delta at Sulina (12 specimens collected by Grigore Antipa before 1909) and the lower reaches of the Danubian tributary Argeș (one specimen collected by Băcescu). In the same paper, representing a study of morphometric features within the “Gobio kessleri” group of populations distributed in Romania, Bănărescu also recognized a new form, Gobio kessleri kessleri natio banaticus (the name is not available from this publication, but available as Gobio kessleri banaticus from Bănărescu 1960: 121) and compared both new forms with the nominotypical subspecies. As the correct original spelling of the specific name is kesslerii (Kottelat 1997), we use it hereafter.

Bănărescu (1953) distinguished Romanogobio antipai from R. kesslerii and R. k. banaticus on average values of the postorbital distance (10.5% of body length vs 8.5–10%), barbel length (10.5–13% of body length vs 8–11.5%), eye diameter (5.5% of body length vs 5.6–6.4% R. excluding kesslerii (Dybowsky, 1862) from Bulgaria with 4.8–5.6%, and 75.2% of interorbital distance vs 81.9–98.5%), snout length (9.4% of body length vs 9.4–11.7%), and maximum body depth (18.4% of body length vs 1.8–17.7% excluding R. kessleri from the Dniester with an average of 18.5%). Consequently, no clear differences between the three taxa were presented, and later Bănărescu (1960, 1961) reported the occurrence of specimens morphologically intermediate between R. antipai and R. kesslerii in the Danube tributaries Ialomița, Argeș (Dâmbovița) and Siret (Bizau and Milcov Rivers), recognized as such also by Bănărescu and Nalbant (1973). Bănărescu (1961, 1999: 151) repeated the most typical features of R. antipai from the Danube delta (smaller eye and deeper body), adding smaller body length in adults (“apparently not exceeding 6 cm”), commonly 4 scales (vs commonly 3) between the lateral line and the pelvic-fin origin, caudal-peduncle width at the anal-fin origin commonly about equal to caudal-peduncle depth (vs larger in kesslerii), and short lateral blotches (vs commonly elongated in banaticus). The distribution range was widened (Bănărescu 1961: 344) to include the lower reaches of the Siret River and its tributaries, the Milcov, Putna, and Birlad Rivers, and the lowest reaches of the Argeș and Ialomița Rivers. Similar data were later published in the book on the fishes of Romania (Bănărescu 1964: 454–455, fig. 195).

Bănărescu (1992, 1994a, 1999: 150, fig. 21) again restricted the range of R. antipai to the lowest reaches of the Danube, mentioning that before 1959, it was distributed upstream to the Argeș River mouth (some 430 river kilometres). He emphasized that it
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markedly differed from other members of the *R. kesslerii* complex by its morphological features, which were related to dwelling in deep water of the main stream of the river.

Bănărescu (1992, 1994a, 1999) treated the Danube delta gudgeon as a subspecies (*Gobio kesslerii antipai*) but mentioned that it deserved the rank of species. Kottelat and Freyhof (2007) considered it as a valid species and Friedrich et al. (2018) found no arguments to reject this status.

The sample of *Romanogobio antipai* from the Danube delta at Sulina, described by Bănărescu based on G. Antipa’s collections (before 1909) was not the only one from the Danube delta. Smirnov (1971) provided meristic and morphometric data on a sample of 24 specimens collected by him in April 1961 in the Ukrainian part of the delta (Chilia Arm) near Izmail and identified it as *R. kesslerii*. This sample was later included in the book on Ukrainian fishes by Movchan and Smirnov (1981: 344, tab. 181). Bănărescu (1999: 158) suggested that Smirnov’s (1971) specimens from Izmail belonged to *R. antipai* because they had a deeper body and a smaller eye.

The most recent published record of *R. antipai* from the lower section of the Danube may be that of Marinov (1978) who reported *Gobio kesslerii* from the main course of the Danube in Bulgaria. The true *R. kesslerii* only occurs in middle reaches of tributaries and has not been recorded from the deep main stream of the Danube (e.g., Chichkoff 1937, Mihailova 1970, Dikov et al. 1994).

The absence of recent records of *R. antipai* lead some authors to the conclusion that the species might be extinct (Bănărescu 1994b, Kottelat 1997). Its conservation status was later evaluated as extinct (Kottelat and Freyhof 2007, Freyhof and Kottelat 2008) because it was supposed that all known ichthyological surveys conducted since the 1960s to 2003 in suitable habitats in the Danube delta had failed to find it; however, this statement is not entirely correct as there is a specimen in Natural History Museum ‘Grigore Antipa’ collected in 1992 (described below).

In 2016, TS collected a gudgeon specimen in the Bulgarian sector of the Danube main stream using a bottom drift net at a depth of 8 m, near the village of Vetren (river kilometer 395). This specimen (Figs 1–2) was preliminarily identified by AN as *Romanogobio antipai* because of its small eye and 8½ branched dorsal-fin rays distinguishing it from both *R. kesslerii* and *R. vladykovi* (Fang, 1943). The present note is devoted to a comparative description of the specimen to test this hypothesis.

**Material and methods**

Methods for counting fin rays and scales, and for measurements, follow Kottelat and Freyhof (2007) except that head length, postorbital length, and interorbital width include the skin fold. In the examined samples, standard length is used for some relative measurements. Body length, which is the length to the posterior margin of the posterior-most scale on the base of the caudal fin (called standard length II by Holčík et al. (1989: fig. 12), is also measured and the data are compared for diagnostic charac-
Figures 1. Lateral view of *Romanogobio antipai* NMNHS specimen 68.7 mm SL, Danube at Vetren (a) MGAB/BN760 specimen 64.9 mm SL, lower Argeș R. (b) ANSP syntype 47.8 mm SL, Sulina (c) and *R. kesslerii* NMNHS, 65.7 mm SL, Tsibritsa River (d).

Ters taken from the literature. All measurements were made point-to-point with a dial caliper and recorded to the nearest 0.1 mm. Vertebral counts taken from radiographs follow the scheme by Naseka (1996). To avoid probable discrepancy in lateral-line count, we provide not only the number of lateral-line scales to the posterior margin of the hypurals but also numbers of total lateral scales and total lateral-line scales. Statistical analyses were done using Microsoft Excel, Statistica 6.0 (Statistic for Windows. Statsoft; Discriminant Functional Analysis, DFA), and SPSS Statistics V23.0 (IBM SPSS; Cluster Analysis, CA).
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Figure 2. Dorsal view of the head of Romanogobio antipai, NMNHS specimen 68.7 mm SL, Danube at Vetren (a) MGAB/BN759, SL 47.7 mm, Sulina (b) ANSP syntype 47.8 mm SL, Sulina (c) and R. kesslerii NMNHS, 65.7 mm SL, Tisbirtsa River (d).
Abbreviations

ANSP, Academy of Natural Sciences, Philadelphia, USA; NB, Bănărescu Nalbant Ichthyology Collection (now in Muzeul de istorie naturala ‘Grigore Antipa’); ICBB, Institutul de Stiinte Biologice, Bucharest, Romania; IUCN, International Union for Conservation of Nature; MGAB, Muzeul de istorie naturala ‘Grigore Antipa’, Bucharest, Romania; NMNHS, National Museum of Natural History, Sofia, Bulgaria; NMW, Naturhistorisches Museum Wien, Vienna, Austria. BL, body length; HL, lateral head length; rkm, river kilometer; SD, standard deviation; SL, standard length.

Material examined

We specifically selected for comparison mostly those specimens of *R. kesslerii* that were donated and/or identified by Petru Bănărescu and followed his original description of the forms within the *R. kesslerii* species complex. Specimens of *Romanogobio vladykovi* were selected from localities geographically close to Bulgaria and of a comparable length range.

NMNHS [no number], SL 68.7 mm, Bulgaria: Danube near Vetren, 395 rkm, 44.142637N, 27.029662E, 8 July 2016, coll. T. Stefanov.

*Romanogobio antipai*. All from Romania. Type material: MGAB 49908 (as *Gobio kesslerii antipai*), 1, SL 46.2 mm, labelled as holotype, Romania: [Danube at] Sulina, before 1909, leg. G. Antipa; MGAB (ISBB 0519), 1, SL 50.8 mm, labelled as paratype, same data as MGAB 49908; ANSP 98961 (as *Gobio kesslerii antipai*), 1, SL ca. 47.8 mm, labelled as paralectotype (misspelled as lectoparatype), same data as MGAB 49908, don. P. Bănărescu as paratype; non-type: MGAB (ISBB 0714, BN760, as *Gobio kesslerii antipai*), 3, SL 64.9, 28.6 and 26.2 mm, Romania: lower Argeş River at Olteniţa, 26 July 1961, coll. and det. P. Bănărescu; MGAB (BN759, as *Gobio kesslerii antipai*), 1, SL 47.7 mm, Romania: Sulina Branch, ”27–28th miles”, Danube delta, Oct. 1992; MGAB (ISBB 3567, BN758, as *Gobio kesslerii antipai*), 1, SL 30.1 mm, Romania: Saint Gheorghe Branch, Danube delta, no date, coll. V. Leonte. ANSP 98961 was examined on photos (lateral, dorsal, and ventral aspects) and an X-radiograph.

*Romanogobio banaticus* (but see Friedrich et al. 2018: 346 on *R. carpathorossicus* (Vladykov, 1931) as senior synonym of this species). NMW 65539, 30, SL 31.1–7.9 mm, Romania: Timiş at Urseni, Timişoara, 6 Sept. 1962, don. and det. P. Bănărescu as *Gobio kesslerii banaticus*.

*Romanogobio kesslerii* s.l.. NMW65532, 12, SL 33.3–57.9 mm, Romania: Tur at Turu-lung, northeast of Satu-Mare, 5 Sept. 1963, don. and det. P. Bănărescu, as intermediate between *Gobio kesslerii kesslerii* and *Gobio kesslerii banaticus*; NMW 65538, 9, SL 39.4–74.7 mm; Romania: Milcov at Focsani, Moldau, 14 Sept. 1963, don.
and det. P. Bănărescu as *Gobio kessleri antipai* with a comment: “not very typical”, as *Gobio kessleri kessleri* in Bănărescu (1999: 146); NMNHS [no number], 10, SL 55.1–66.5 mm; Bulgaria: Tsibritsa River [right tributary to Danube, NW Bulgaria] near Yakimovo, 43.62245N, 23.33022E, 18 July 2012, coll. T. Stefanov. *Romanogobio kesslerii kesslerii*. NMW 60250, 6, SL 50.1–61.2 mm; Romania: Areș River at mouth of Mureș, Transylvania, 2 Oct. 1949, don. and det. P. Bănărescu (in *Gobio*); NMW 65535, 4, SL 50.6–61.5 mm; Romania: Bereteu at Roșiori-Bihor, north of Oradea, 4 Sept. 1963, don. and det. P. Bănărescu (in *Gobio*); NMW 90883, 2, SL 85.3–91.2 mm; Ukraine: Smotrich River at Kamenetz Podol’ski [Dniester drainage], 7 May 1921, det. P. Bănărescu, 1991 (in *Gobio*).

**Results**

General appearance of the NMNHS presumed *R. antipai* specimen from the Danube at Vetren is shown in Figs 1–2 together with a syntype and a non-type *R. antipai* specimen in comparison to *R. kesslerii* and *R. vladykovi*. Counts, descriptive states of the pectoral-fin length, and measurements are presented in Tables 1, 2. Examined character states in this specimen coincide considerably with those in the three type specimens of *R. antipai* and five non-type specimens, and demonstrate its differences from the samples of both the *R. kesslerii* species complex and *R. vladykovi*. As the standard length averages 96.8% of the BL (calculated in the *Romanogobio* material examined in this study), the difference between relative measurements (in % SL and in % BL) is slight and the morphometric character states that have been considered as diagnostic for *R. antipai* vs. *R. kesslerii* are confirmed. They include maximum body depth, 19–25% SL (17–25.5% of BL; in parentheses, data from Bănărescu (1953, 1961, 1999) and Movchan and Smirnov (1981) are summarized); caudal peduncle depth, 8–9% SL (7–9% of BL) and 35–38.5% of caudal peduncle length; eye diameter, 5–6% SL (5–6% of BL), 20–23% HL (18–24% HL), and 59–68.5% of interorbital width (61–81% of interorbital width). The NMNHS specimen has 6 and 4 scales, respectively, above (to the dorsal-fin origin) and below (to the pelvic-fin origin) the lateral line similar to the three type specimens of *R. antipai* and the topotypical specimen from Sulina thus confirming the opinion (Kottelat and Freyhof 2007, Friedrich et al. 2018) that this character is one of the most dependable diagnostic characters for the species. All other counts are identical or very close in the NMNHS specimen and *R. antipai* examined in this study (Table 1). None of the *R. antipai* specimens had 7½ branched dorsal-fin rays thus confirming its main difference from *R. vladykovi* characterized by 7½ branched dorsal-fin rays (Naseka et al. 1999; Naseka 2001).
### Table 1.
Meristic data for examined specimens of *Romanogobio antipai* and *R. kesslerii* species complex.

| Species | Dorsal-fin branched rays | Anal-fin branched rays | Pectoral fin relative to pelvic-fin origin | Scales between lateral line and dorsal-fin origin | Scales between lateral line and pelvic-fin origin |
|---------|-----------------|-----------------|----------------------------------|----------------------------------|----------------------------------|
|         | 7½  | 8½  | 9½  | 6½  | 7½  | not reaching | almost reaching | reaching | behind | 5   | 6   | 2  | 3   | 4   |
| *R. antipai* MGAB 49908 syntype | 1   | 1   | 1   | 1   | 1   | 1            | 1             | 1        | 5    | 6   | 2  | 3   | 4   |
| *R. antipai* MGAB/ISBB 0519 syntype | 1   | 1   | 1   | 1   | 1   | 1            | 1             | 1        | 5    | 6   | 2  | 3   | 4   |
| *R. antipai* ANSP 98961 syntype | 1   | 1   | 1   | 1   | 1   | 1            | 1             | 1        | 5    | 6   | 2  | 3   | 4   |
| Non-type MGAB *R. antipai*, n=5 | 5   | 1   | 4   | 1   | 5   | 1            | 1             | 1        | 5    | 6   | 2  | 3   | 4   |
| Presumed *R. antipai* NMNHS specimen | 1   | 1   | 1   | 1   | 1   | 1            | 1             | 1        | 5    | 6   | 2  | 3   | 4   |
| *R. k. kesslerii*. NMW 60250, 65535, Danube drainage, n=10 | 10  | 10  | 7   | 1   | 2   | 10           | 10            | 10       |       |       |   |     |     |
| *R. k. kesslerii*. NMW 908803, Dniester drainage, n=2 | 2   | 2   | 2   | 2   | 2   | 2            | 2             | 2        | 2    | 2   | 2  | 2   | 2   |
| *R. banaticus*. NMW 65539, Danube drainage, n=30 | 27  | 30  | 26  | 3   | 1   | 29           | 1             | 30       |       |       |   |     |     |
| *R. kesslerii* s.l. NMW 65532, NW Romania, n=12 | 12  | 12  | 6   | 1   | 5   | 12           | 1             | 11       |       |       |   |     |     |
| *R. kesslerii* s.l. NMW 65538, NE Romania, n=9 | 8   | 1   | 6   | 3   | 5   | 3           | 1             | 9        | 9    | 9   | 9  | 9   | 9   |
| *R. kesslerii* s.l. NMNHS, NW Bulgaria, n=10 | 10  | 10  | 6   | 2   | 1   | 10           | 1             | 10       |       |       |   |     |     |
| *R. vladykovi* NMW 53356, 60234, 65537, Danube drainage, n=24 | 24  | 24  | 24  | 24  | 24  | 24           | 2             | 24       |       |       |   |     |     |

### Table 1. Continued.

| Predorsal abdominal vertebrae | Abdominal vertebrae | Pre-anal caudal vertebrae | Caudal vertebrae | Total vertebrae |
|-------------------------------|---------------------|---------------------------|-----------------|-----------------|
|                               | 10 | 11 | 18 | 19 | 20 | 21 | 2 | 3 | 4 | 19 | 20 | 21 | 38 | 39 | 40 | 41 | 42 |
| *R. antipai* ANSP 98961 syntype | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Non-type MGAB *R. antipai*, n=5 | 2  | 3  | 4  | 1  | 3  | 2  | 5  | 4  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Presumed *R. antipai* NMNHS, n=1 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| *R. k. kesslerii* NMW 60250, 65535, Danube drainage, n=10 | 2  | 8  | 1  | 8  | 1  | 7  | 3  | 5  | 2  | 2  | 7  | 1  | 1  | 1  | 1  | 1  | 1  |
| *R. k. kesslerii* NMW 908803, Dniester drainage, n=2 | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  |
| *R. banaticus*. NMW 65539, Danube drainage, n=30 | 9  | 21 | 26 | 4  | 4  | 21 | 5  | 2  | 19 | 8  | 18 | 10 | 2  | 2  | 2  | 2  | 2  |
| *R. kesslerii* s.l. NMW 65532, NW Romania, n=12 | 1  | 11 | 7  | 5  | 5  | 7  | 1  | 7  | 4  | 8  | 4  | 8  | 4  | 8  | 4  | 8  | 4  | 8  |
| *R. kesslerii* s.l. NMW 65538, NE Romania, n=9 | 1  | 8  | 3  | 6  | 4  | 5  | 1  | 5  | 3  | 1  | 8  | 1  | 8  | 1  | 8  | 1  | 8  | 1  |
| *R. kesslerii* s.l. NMNHS, NW Bulgaria, n=10 | 10 | 2  | 8  | 2  | 8  | 2  | 8  | 4  | 6  | 4  | 6  | 4  | 6  | 4  | 6  | 4  | 6  | 4  |
| *R. vladykovi* Danube drainage, Romania and Ukraine, n=46 (from Naseka 2001) | 9  | 37 | 4  | 38 | 4  | 12 | 46 | 8  | 4  | 29 | 12 | 3  | 31 | 11 | 1  | 11 | 1  |
| *R. vladykovi* NMW 53356, 60234, 65537, Danube drainage, Romania and Serbia, n=24 | 3  | 21 | 19 | 5  | 12 | 12 | 5  | 15 | 4  | 2  | 16 | 6  | 2  | 16 | 6  | 2  | 16 | 6  |
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| Specimen Description | Total lateral-series scales | Total lateral-line scales | Lateral-line scales to posterior hypural margin |
|----------------------|-----------------------------|---------------------------|-----------------------------------------------|
|                      | 39 | 40 | 41 | 42 | 43 | 44 | 39 | 40 | 41 | 42 | 43 | 37 | 38 | 39 | 40 | 41 | 42 | 43 |
| R. antipai MGAB 49908 syntype | 39 | 40 | 41 | 42 | 43 | 44 | 39 | 40 | 41 | 42 | 43 | 37 | 38 | 39 | 40 | 41 | 42 | 43 |
| R. antipai MGAB/ISBB 0519 syntype | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| R. antipai ANSP 98961 syntype | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Non-type MGAB R. antipai, n=5 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Presumed R. antipai NMNHS, n=1 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| R. kesslerii NMW 60250, 65535, Danube drainage, n=10 | 3  | 4  | 3  | 1  | 2  | 5  | 2  | 2  | 2  | 5  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| R. kesslerii NMW 908803, Dniester drainage, n=2 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| R. banaticus NMW 65539, Danube drainage, n=30 | 8  | 9  | 3  | 1  | 8  | 9  | 2  | 4  | 6  | 9  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| R. kesslerii s.l. NMW 65532, NW Romania, n=12 | 2  | 4  | 6  | 4  | 3  | 5  | 2  | 2  | 2  | 6  | 2  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| R. kesslerii s.l. NMW 65538, NE Romania, n=9 | 7  | 2  | 3  | 4  | 2  | 3  | 4  | 2  | 3  | 4  | 2  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| R. kesslerii s.l. NMNHS, NW Bulgaria, n=10 | 6  | 3  | 1  | 2  | 5  | 2  | 1  | 6  | 4  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| R. vladykovi NMW 53356, 60234, 65537, Danube drainage, Romania and Serbia, n=24 | 1  | 7  | 5  | 1  | 1  | 8  | 6  | 8  | 1  | 1  | 9  | 8  | 6  | 1  | 1  | 9  | 8  | 6  | 1  |
Table 2. Measurements and counts for examined specimens of *R. antipai*, *R. kesslerii* and *R. vladkyovi*. Gap between ranges or ranges only slightly overlapping: * between *R. antipai* and *R. kesslerii*, ** between *R. antipai* and both *R. kesslerii* and *R. vladkyovi*, *** between *R. antipai* and *R. vladkyovi*; **** no statistical difference; remaining characters display statistically significant differences (Kruskal-Wallis test, p<0.01) but ranges overlapping.

| Characters | *R. antipai* n=6 | *R. antipai* n=26 | *R. kesslerii* n=22 |
|------------|------------------|------------------|---------------------|
| SL, mm | 68.67 | 46.20 | 68.67 | 54.44 | 7.943 | 45.11 | 74.69 | 59.53 | 5.776 | 46.39 | 81.42 | 60.21 | 10.310 |
| Body depth at dorsal-fin origin (% SL)* | 25.43 | 18.56 | 25.43 | 20.37 | 2.671 | 15.59 | 18.63 | 16.88 | 0.834 | 17.50 | 23.00 | 19.20 | 1.277 |
| Depth of caudal peduncle (% SL)* | 9.20 | 8.13 | 9.20 | 8.49 | 0.388 | 6.33 | 7.67 | 7.04 | 0.358 | 8.30 | 10.15 | 9.06 | 0.416 |
| Depth of caudal peduncle (% length of caudal peduncle)** | 38.47 | 34.80 | 38.47 | 36.72 | 1.416 | 24.90 | 35.44 | 30.23 | 2.599 | 39.32 | 49.69 | 44.12 | 3.117 |
| Predorsal length (% SL) | 46.56 | 44.43 | 46.56 | 45.57 | 0.832 | 43.41 | 49.32 | 46.73 | 1.145 | 46.29 | 49.40 | 47.57 | 0.949 |
| Postdorsal length (% SL) | 41.90 | 37.29 | 41.90 | 39.89 | 1.945 | 39.56 | 47.49 | 43.91 | 1.884 | 39.48 | 43.83 | 41.56 | 1.432 |
| Prepelvic length (% SL) | 48.89 | 47.76 | 50.60 | 48.79 | 0.989 | 44.79 | 49.78 | 47.45 | 1.218 | 48.41 | 52.79 | 50.65 | 1.423 |
| Preanal length (% SL) | 70.21 | 69.60 | 72.20 | 70.74 | 0.875 | 67.12 | 73.01 | 69.91 | 1.653 | 69.90 | 76.28 | 73.23 | 1.181 |
| Pectoral – pelvic-fin origin length (% SL) | 23.92 | 22.95 | 24.60 | 23.88 | 0.650 | 21.15 | 25.42 | 23.51 | 0.865 | 23.29 | 27.32 | 25.58 | 1.423 |
| Pelvic – anal-fin origin length (% SL) | 23.13 | 21.70 | 23.13 | 22.17 | 0.535 | 18.66 | 24.84 | 21.55 | 1.374 | 20.12 | 24.59 | 22.86 | 1.080 |
| Caudal peduncle length (% SL) | 23.93 | 22.61 | 24.00 | 23.15 | 0.632 | 20.21 | 29.11 | 23.80 | 2.502 | 18.68 | 22.98 | 20.63 | 1.440 |
| Pectoral-fin length (% SL) | 23.18 | 22.05 | 23.18 | 22.55 | 0.440 | 19.69 | 24.00 | 22.20 | 1.320 | 18.49 | 22.89 | 20.75 | 1.162 |
| Pelvic-fin length (% SL) | 19.67 | 17.52 | 19.67 | 18.54 | 0.732 | 16.13 | 19.10 | 17.94 | 0.743 | 14.22 | 18.69 | 16.35 | 1.266 |
| Head length (% SL)**** | 25.99 | 24.80 | 25.99 | 25.34 | 0.499 | 23.35 | 27.20 | 25.75 | 0.986 | 24.05 | 27.60 | 26.21 | 0.794 |
| Head length (% body depth) | 102.23 | 102.23 | 132.63 | 121.08 | 10.537 | 127.58 | 186.49 | 153.40 | 11.409 | 111.64 | 156.60 | 137.16 | 11.096 |
| Head depth at nape (% SL)* | 17.21 | 14.90 | 17.21 | 16.10 | 0.791 | 13.06 | 15.84 | 14.38 | 0.734 | 14.60 | 16.57 | 15.79 | 0.531 |
| Head depth at nape (% HL) | 66.22 | 59.30 | 68.70 | 64.48 | 3.209 | 52.81 | 59.43 | 55.82 | 1.971 | 57.09 | 64.32 | 60.27 | 1.975 |
| Barbel length (% HL) | 34.29 | 34.29 | 47.90 | 41.41 | 5.128 | 26.90 | 50.00 | 39.45 | 5.569 | 25.42 | 40.21 | 31.97 | 4.092 |
| Maximum head width (% SL)** | 15.42 | 14.61 | 16.20 | 15.38 | 0.653 | 13.13 | 15.19 | 13.83 | 0.547 | 12.90 | 15.77 | 14.70 | 0.767 |
| Maximum head width (% HL) | 59.33 | 58.20 | 64.00 | 61.25 | 2.719 | 50.03 | 56.98 | 53.64 | 2.192 | 49.83 | 59.08 | 55.98 | 2.024 |
| Snout length (% SL)**** | 11.33 | 8.40 | 11.33 | 9.75 | 0.997 | 8.94 | 11.98 | 10.57 | 0.625 | 9.07 | 11.74 | 10.16 | 0.696 |
| Snout length (% HL) | 43.59 | 36.00 | 43.60 | 39.40 | 2.654 | 37.86 | 46.38 | 41.04 | 2.337 | 35.93 | 42.79 | 38.75 | 1.903 |
| Eye horizontal diameter (% SL)** | 5.24 | 5.20 | 5.94 | 5.49 | 0.285 | 5.78 | 8.15 | 6.63 | 0.642 | 6.36 | 8.28 | 7.48 | 0.463 |
### Characters

| Character                                    | R. antipai n=6 | R. kesslerii n=26 | R. vladykovi n=22 |
|----------------------------------------------|----------------|-------------------|-------------------|
| Eye horizontal diameter (% HL)**            | 20.17          | 20.17             | 22.72             |
| Eye horizontal diameter (% interorbital width)** | 58.73          | 58.73             | 63.35             |
| Postorbital distance (% HL)****             | 44.15          | 43.20             | 45.89             |
| Interorbital width (% SL)*                  | 8.93           | 8.15              | 8.93              |
| Interorbital width (% HL)**                 | 34.34          | 32.48             | 35.78             |
| Number of predorsal vertebrae****          | 11             | 11.00             | 11.00             |
| Number of abdominal vertebrae***           | 19             | 19.00             | 19.00             |
| Number of caudal vertebrae                 | 21             | 20.00             | 20.83             |
| Number of preanal caudal vertebrae         | 4              | 3.00              | 3.50              |
| Total vertebrae****                        | 40             | 39.00             | 39.83             |
| Difference between abdominal and caudal numbers*** | -2             | -2.00             | -1.00             |
| Dorsal-fin branched rays (without ½)**      | 8              | 8.00              | 8.00              |
| Scales in lateral row                       | 44             | 41.00             | 42.67             |
| Lateral-line scales (total)***             | 43             | 41.00             | 42.00             |
| Lateral-line scales (to posterior margin of hypurals)*** | 42             | 39.00             | 40.33             |
| Scales above lateral line*                 | 6              | 6.00              | 6.00              |
| Scales below lateral line*                 | 4              | 4.00              | 4.00              |

### NMNHS

| Character                                    | min | max  | Mean | SD  | min | max  | Mean | SD  | min | max  | Mean | SD |
|----------------------------------------------|-----|------|------|-----|-----|------|------|-----|-----|------|------|----|
| Eye horizontal diameter (% HL)***            | 20.17 | 23.97 | 22.06 | 1.301 | 22.72 | 29.97 | 26.25 | 1.809 | 24.69 | 32.29 | 28.54 | 1.874 |
| Eye horizontal diameter (% interorbital width)** | 58.73 | 67.50 | 63.35 | 4.101 | 75.25 | 130.37 | 103.18 | 14.774 | 86.33 | 121.43 | 103.22 | 7.479 |
| Postorbital distance (% HL)****             | 44.15 | 48.76 | 45.89 | 2.111 | 37.27 | 48.97 | 42.38 | 2.756 | 37.93 | 45.81 | 41.91 | 2.408 |
| Interorbital width (% SL)*                  | 8.93  | 8.93  | 8.56  | 0.375 | 5.23  | 8.33  | 6.56  | 0.811 | 6.74  | 7.96  | 7.26  | 0.368 |
| Interorbital width (% HL)**                 | 34.34 | 35.78 | 34.25 | 1.316 | 19.46 | 31.26 | 25.45 | 2.970 | 25.12 | 30.25 | 27.70 | 1.384 |
| Number of predorsal vertebrae****          | 11   | 11.00 | 10.67 | 0.516 | 10.00 | 11.00 | 10.50 | 0.510 | 10.00 | 11.00 | 10.82 | 0.395 |
| Number of abdominal vertebrae***           | 19   | 19.00 | 19.00 | 0.000 | 18.00 | 21.00 | 19.42 | 0.703 | 20.00 | 21.00 | 20.18 | 0.395 |
| Number of caudal vertebrae                 | 21   | 21.00 | 20.83 | 0.408 | 19.00 | 21.00 | 20.00 | 0.632 | 19.00 | 21.00 | 19.91 | 0.610 |
| Number of preanal caudal vertebrae         | 4    | 4.00  | 3.50  | 0.548 | 2.00  | 3.00  | 2.58  | 0.504 | 2.00  | 3.00  | 2.45  | 0.510 |
| Total vertebrae****                        | 40   | 40.00 | 39.83 | 0.408 | 38.00 | 41.00 | 39.42 | 0.809 | 39.00 | 41.00 | 40.09 | 0.610 |
| Difference between abdominal and caudal numbers*** | -2   | -2.00 | -1.00 | -1.83 | 0.408 | -2.00 | -0.58 | 1.065 | -1.00 | 2.00  | 0.27  | 0.827 |
| Dorsal-fin branched rays (without ½)**      | 8    | 8.00  | 8.00  | 0.000 | 8.00  | 8.00  | 8.00  | 0.000 | 7.00  | 7.00  | 7.00  | 0.000 |
| Scales in lateral row                       | 44   | 44.00 | 42.67 | 1.033 | 40.00 | 42.00 | 41.08 | 0.744 | 39.00 | 43.00 | 41.14 | 1.037 |
| Lateral-line scales (total)***             | 43   | 43.00 | 42.00 | 0.894 | 39.00 | 42.00 | 40.73 | 1.002 | 39.00 | 43.00 | 41.00 | 1.024 |
| Lateral-line scales (to posterior margin of hypurals)*** | 42   | 42.00 | 40.33 | 1.366 | 38.00 | 40.00 | 38.88 | 0.766 | 37.00 | 40.00 | 38.77 | 0.869 |
| Scales above lateral line*                 | 6    | 6.00  | 6.00  | 0.000 | 4.00  | 5.00  | 4.96  | 0.196 | 5.00  | 6.00  | 5.59  | 0.503 |
| Scales below lateral line*                 | 4    | 4.00  | 4.00  | 0.000 | 3.00  | 3.00  | 3.00  | 0.000 | 3.00  | 4.00  | 3.32  | 0.477 |
Note on syntypes of R. antipai

As already clarified (Kottelat 1997), the species group name antipai is based on 13 syntypes (Bănărescu 1953: 300) without any catalogue numbers. Soon after, Bănărescu (1961: 344) designated a holotype (“Mus. Gr. Antipa Bukarest, Col. Ichth. Nr. 4) but this action is not valid (Art. 74.5 of the International Code of Zoological Nomenclature; International Commission on Zoological Nomenclature 1999). The referred article of the Code says that a subsequent use of the term “holotype” does not constitute a valid lectotype designation unless (italics ours) the author, when wrongly using that term, explicitly indicated that he or she was selecting from the type series that particular specimen to serve as the name-bearing type. We do not know a publication by Petru Bănărescu where he used the term holotype for that specimen explicitly indicating its name-bearing role. However, it cannot be excluded that a valid lectotype designation has been already undertaken by someone because the ANSP syntype is labelled as a paralectotype.

Comparisons

The three examined samples of Romanogobio kesslerii s.l. demonstrate a statistically significant difference in ten morphometric and five meristic characters (Table 3) but the ranges of character values overlap considerably and the number of specimens is small. We combined all specimens in a single sample in order to estimate general ranges of character values without a special analysis of variation within the R. kesslerii complex.

As can be seen from Table 2, examined specimens of R. antipai including the NMNHS specimen from the Danube at Vetren, most clearly (with a gap or ranges only slightly overlapping) differ from both R. kesslerii and R. vladykovi by the caudal peduncle depth (35–38.5% caudal peduncle length vs 25–33 and 39–50, respectively), a wider head (58–64% HL vs 50–59), a smaller eye (5–6% SL and 59–67.5% interorbital width vs 6–8 and 75–130), and a wider interorbital space (32.5–36% HL vs 19.5–31; 8–9% SL vs 5–8) with shallow orbital notches (Fig. 2a–c). Romanogobio antipai can be further distinguished from R. kesslerii, besides the number of scales above and below the lateral line (6 and 4, respectively, in all examined R. antipai vs commonly 5 and 3 in R. kesslerii s.l.), by a deeper body (19–25% SL vs 16–19), a deeper caudal peduncle (8–9% SL vs 6–8), and a deeper head (59–69% HL vs 53–59).

Besides morphometric characters mentioned above, all examined specimens of R. antipai including the NMNHS specimen can be clearly distinguished from R. vladykovi by the number of branched dorsal-fin rays, 8½, in contrast to 7½ found in all specimens of R. vladykovi examined in this study. Naseka (2001: 111) mentioned that 8½ rays can be rarely found in R. vladykovi; a revision of his primary data (radiographs) revealed a single specimen with 8½ branched dorsal-fin rays out of 46 examined. Romanogobio antipai further differs from R. vladykovi by the vertebral structure (Table 1, 2) having abdominal+caudal counts 19+21 or 20+21, which means that the caudal region is longer than the abdominal region vs. commonly (in 52 out of 70 specimens) 20+20 or 21+21 or variants with a caudal region shorter than the abdominal one.
A DFA (Fig. 3) showed differentiation of the three groups of samples identified as *R. antipai*, *R. kesslerii* and *R. vladykovi* (the number of unbranched dorsal-fin rays was excluded from the analysis as demonstrating zero variability within the groups) and the groups were 100% classified as predicted (Table 4). A CA (Fig. 4) supported the grouping.

To conclude, the analysis confirmed previously reported discriminating character states (number of branched dorsal-fin rays, relative size of the eye and the interorbital space, relative depth of the caudal peduncle) and introduces a new character (vertebral counts) for discriminating *Romanogobio antipai* from *R. kesslerii* and *R. vladykovi*. However, relative taxonomic status of these three species still waits for a phylogenetic analysis based on molecular data. It cannot be excluded that *R. antipai* is a deep-water ecophenotype of either *R. kesslerii* or *R. vladykovi*. The new record demonstrates that *R. antipai* is still extant in the lower Danube but at present can only be found at a greater depth in the main channel and the deltaic branches. Currently classified as Extinct using IUCN criteria, the conservation status of *Romanogobio antipai* needs revision, in light of the new record from 2016.
Table 3. Measurements and counts for examined specimens of *Romanogobio kesslerii* species complex. * refers to characters demonstrating statistically significant differences (Kruskal-Wallis test, p<0.01).

| Characters                                      | *R. kesslerii* Danube n=10 |         |         | *R. kesslerii* Romania n=6 |         |         | *R. kesslerii* Bulgaria n=10 |         |         |
|------------------------------------------------|----------------------------|---------|---------|----------------------------|---------|---------|----------------------------|---------|---------|
|                                                 | min | max   | Mean   | SD  | min | max   | Mean   | SD  | min | max   | Mean   | SD  |
| SL, mm                                          | 50.10 | 63.42 | 59.06 | 3.952 | 45.11 | 74.69 | 57.37 | 10.157 | 55.06 | 66.51 | 61.31 | 3.584 |
| Body depth at dorsal-fin origin (% SL)          | 15.59 | 17.93 | 16.81 | 0.916 | 16.54 | 18.30 | 17.39 | 0.649 | 15.73 | 18.63 | 16.65 | 0.787 |
| Depth of caudal peduncle (% SL)*                | 7.08 | 7.67 | 7.37 | 0.195 | 6.79 | 7.34 | 7.04 | 0.211 | 6.33 | 7.08 | 6.70 | 0.214 |
| Depth of caudal peduncle (% length of caudal peduncle) | 24.90 | 33.24 | 28.84 | 3.215 | 28.24 | 32.85 | 31.17 | 1.629 | 27.17 | 33.44 | 31.05 | 1.865 |
| Predorsal length (% SL)                         | 46.10 | 48.81 | 47.39 | 0.874 | 44.23 | 46.70 | 45.90 | 0.934 | 43.41 | 49.32 | 46.56 | 1.826 |
| Postdorsal length (% SL)*                       | 44.25 | 47.49 | 45.58 | 1.260 | 41.26 | 44.25 | 43.27 | 1.133 | 39.56 | 44.64 | 42.63 | 1.537 |
| Prepelvic length (% SL)                         | 46.33 | 49.78 | 47.84 | 1.324 | 46.27 | 48.69 | 47.32 | 0.976 | 44.79 | 49.33 | 47.15 | 1.250 |
| Preanal length (% SL)                           | 67.12 | 73.01 | 70.44 | 2.227 | 68.81 | 71.04 | 69.90 | 0.842 | 67.14 | 71.01 | 69.39 | 1.274 |
| Pectoral – pelvic-fin origin length (% SL)      | 22.95 | 23.89 | 23.27 | 0.335 | 23.18 | 24.43 | 23.92 | 0.705 | 22.82 | 25.42 | 23.51 | 1.230 |
| Pelvic – anal-fin origin length (% SL)          | 18.66 | 22.29 | 20.06 | 1.307 | 20.72 | 22.16 | 21.34 | 0.467 | 18.91 | 24.84 | 22.16 | 1.644 |
| Caudal peduncle length (% SL)*                  | 24.49 | 29.11 | 26.35 | 1.642 | 21.15 | 24.14 | 23.18 | 1.139 | 20.21 | 23.70 | 21.62 | 1.099 |
| Pectoral-fin length (% SL)*                     | 22.82 | 24.00 | 23.24 | 0.362 | 20.43 | 23.99 | 22.47 | 1.167 | 19.69 | 24.09 | 21.01 | 1.063 |
| Pelvic-fin length (% SL)                        | 17.69 | 19.10 | 18.36 | 0.451 | 17.19 | 18.71 | 18.09 | 0.508 | 16.13 | 18.74 | 17.44 | 0.832 |
| Head length (% SL)                               | 25.54 | 27.20 | 26.40 | 0.458 | 23.35 | 26.66 | 25.47 | 1.181 | 24.25 | 26.86 | 25.28 | 0.977 |
| Head length (% body depth)                      | 144.23 | 186.49 | 158.35 | 12.847 | 127.58 | 159.58 | 147.35 | 11.663 | 139.47 | 170.77 | 152.09 | 8.209 |
| Head depth at nape (% SL)*                      | 13.97 | 15.84 | 14.91 | 0.697 | 13.83 | 14.97 | 14.49 | 0.410 | 13.06 | 14.56 | 13.79 | 0.454 |
| Head depth at nape (% HL)                       | 53.04 | 59.43 | 56.36 | 2.349 | 54.72 | 59.23 | 57.01 | 1.428 | 52.81 | 56.20 | 54.56 | 1.058 |
| Barbel length (% HL)                            | 32.95 | 47.64 | 39.49 | 5.449 | 37.63 | 50.00 | 43.50 | 4.540 | 26.90 | 43.61 | 36.99 | 5.233 |
| Maximum head width (% SL)                       | 13.18 | 14.30 | 13.61 | 0.404 | 13.13 | 15.19 | 14.08 | 0.657 | 13.21 | 14.73 | 13.91 | 0.571 |
| Maximum head width (% HL)*                      | 50.03 | 52.57 | 51.25 | 0.976 | 53.24 | 56.98 | 55.35 | 1.504 | 53.15 | 56.43 | 55.01 | 0.861 |
| Snout length (% SL)*                            | 10.37 | 11.20 | 10.69 | 0.264 | 8.94 | 10.41 | 9.85 | 0.534 | 10.21 | 11.98 | 10.89 | 0.616 |
| Snout length (% HL)*                            | 39.37 | 42.13 | 40.40 | 0.869 | 37.86 | 39.61 | 38.66 | 0.687 | 38.32 | 46.38 | 43.12 | 2.260 |
| Eye horizontal diameter (% SL)                  | 6.20 | 8.15 | 7.03 | 0.772 | 5.78 | 7.26 | 6.47 | 0.570 | 5.92 | 6.77 | 6.31 | 0.244 |
| Eye horizontal diameter (% HL)                  | 25.14 | 29.97 | 27.47 | 1.896 | 25.31 | 27.57 | 26.29 | 0.802 | 22.72 | 27.36 | 25.00 | 1.321 |
| Eye horizontal diameter (% interorbital width)  | 78.47 | 130.37 | 103.10 | 18.289 | 75.25 | 112.80 | 93.59 | 14.198 | 97.90 | 122.36 | 109.01 | 7.799 |
A recent record of Romanogobio antipai, from the Danube River in Bulgaria

| Characters                     | R. kesslerii Danube n=10 | R. kesslerii Romania n=6 | R. kesslerii Bulgaria n=10 |
|-------------------------------|--------------------------|--------------------------|-----------------------------|
|                               | min  | max  | Mean | SD  | min  | max  | Mean | SD  | min  | max  | Mean | SD  |
| Postorbital distance (% HL)   | 39.71| 48.97| 43.11| 3.323| 42.00| 45.47| 43.86| 1.350| 37.27| 43.56| 40.75| 2.001|
| Interorbital width (% SL)*    | 6.04 | 7.90 | 7.00 | 0.635| 6.39 | 8.33 | 7.06 | 0.709| 5.23 | 6.24 | 5.81 | 0.367|
| Interorbital width (% HL)*    | 22.93| 30.92| 26.52| 2.674| 25.06| 31.26| 27.71| 2.241| 19.46| 25.43| 23.03| 1.827|
| Number of predorsal vertebrae*| 10   | 11   | 10.80| 0.422| 10   | 11   | 10.83| 0.408| 10   | 10   | 10.00| 0.000|
| Number of abdominal vertebrae*| 19   | 21   | 20.00| 0.471| 19   | 20   | 19.50| 0.548| 18   | 19   | 18.80| 0.422|
| Number of caudal vertebrae    | 19   | 21   | 19.90| 0.738| 20   | 21   | 20.50| 0.548| 19   | 20   | 19.80| 0.422|
| Number of preanal caudal vertebrae | 2   | 3   | 2.30 | 0.483| 2   | 3   | 2.67 | 0.516| 2   | 3   | 2.80 | 0.422|
| Total vertebrae*              | 39   | 41   | 39.90| 0.568| 40   | 40   | 40.00| 0.000| 38   | 39   | 38.60| 0.516|
| Difference between abdominal and caudal numbers | -2 | 2 | 0.10 | 1.101| -2 | 0 | -1.00 | 1.095| -2 | 0 | -1.00 | 0.667|
| Dorsal-fin branched rays (without ½) | 8 | 8 | 8.00 | 0.000| 8 | 8 | 8.00 | 0.000| 8 | 8 | 8.00 | 0.000|
| Scales in lateral row*        | 41   | 42   | 41.50| 0.527| 41   | 42   | 41.33| 0.516| 40   | 42   | 40.50| 0.707|
| Lateral-line scales (total)   | 40   | 42   | 41.10| 0.994| 40   | 42   | 41.00| 0.894| 39   | 42   | 40.20| 0.919|
| Lateral-line scales (to posterior margin of hypurals)* | 39 | 40 | 39.50 | 0.527| 38 | 40 | 38.67 | 0.816| 38 | 39 | 38.40 | 0.516|
| Scales above lateral line     | 4    | 5    | 4.90 | 0.316| 5    | 5    | 5.00 | 0.000| 5    | 5    | 5.00 | 0.000|
| Scales below lateral line     | 3    | 3    | 3.00 | 0.000| 3    | 3    | 3.00 | 0.000| 3    | 3    | 3.00 | 0.000|
Figure 4. CA (SPSS, k-means) for three groups of samples (R. antipai, R. kesslerii and R. vladykovi). No 1 refers to NMNHS specimen identified as Romanogobio antipai.
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Table 4. Results of DFA classification for three groups of samples (R. antipai, R. kesslerii and R. vladykovii).

| Group          | Classification matrix (Romanogobio 3 species) |  |  |  |
|----------------|-----------------------------------------------|---|---|---|
|                | Rows: Observed classifications                |  |  |  |
|                | Columns: Predicted classifications             |  |  |  |
|                | Percent correct | R. antipai | R. kesslerii | R. vladykovii |
| R. antipai     | 100.0 | 6 | 0 | 0 |
| R. kesslerii   | 100.0 | 0 | 26 | 0 |
| R. vladykovii  | 100.0 | 0 | 0 | 22 |
| Total          | 100.0 | 6 | 26 | 22 |

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References

Bănărescu P (1953) Variatia geografica, filogenia si ecologia Cyprinidului *Gobio kessleri*. Studii si cercetari stiintifice. Academia Republicii Populare Romîne 4(1–2): 297–337.

Bănărescu P (1960) Einige Fragen zur Herkunft und Verbreitung der Süßwasserfischfauna der europäisch-mediterranen Unterregion. Archiv für Hydrobiologie 57(1/2): 16–134.

Bănărescu P (1961) Weitere systematische Studien über die Gattung *Gobio* (Pisces, Cyprinidae), insbesondere im Donaubecken. Věstník Československé společnosti zoologické 25(4): 318–346.

Bănărescu P (1964) Fauna Republicii Populare Romîne. Volumul XIII. Pisces – Osteichthyes (pești ganoizi și osisi). Editura Academiei Republicii Populare Romîne, București, 962 pp.

Bănărescu P (1992) A critical updated checklist of Gobioninae (Pisces, Cyprinidae). Travaux du Muséum d’Histoire Naturelle Grigore Antipa 32: 303–330.

Bănărescu P (1994a) On the presumed origin of *Gobio albipinnatus* Lukasch in the upper Danube by sympatric speciation. Senckenbergiana biologica 73(1–2): 49–55.

Bănărescu P (1994b) The present-day conservation status of the fresh water fish fauna of Romania. Ocrotirea Naturii și a Mediului Înconjurător 38(1): 5–20.

Bănărescu P (1999) *Gobio kessleri*. In: Bănărescu P (Ed.) The freshwater fishes of Europe. Vol 5/1, Cyprinidae 2/I. AULA-Verlag, Wiebelsheim, 135–162.

Bănărescu P, Nalbant T (1973) Pisces, Teleostei. Cyprinidae (Gobioninae). Das Tierreich 93: 1–304.

Chichkoff G (1937) Sur les goujons habitant les eaux douces de la Bulgarie. Annulaire de l’Université de Sofia, Faculte de Sciences 33(3): 227–289. [In Bulgarian]
Dikov T, Jankov S, Jocev S (1994) Fish stocks in rivers of Bulgaria. Polskie Archiwum Hydrobiologii 41(3): 377–391.

Dybowskí B (1862) Versuch einer Monographie der Cyprinoiden Livlands, nebst einer synoptischen Aufführung der europäischen Arten dieser Familie. Archiv für die Naturkunde Liv-, Ehst- und Kurlands. Zweiter Serie. Biologische Naturkunde. Vol. 3. Heinrich Laakmann, Dorpat, 133–362. https://doi.org/10.5962/bhl.title.14430

Fang P-W (1943) Sur certains types peu connus de cyprinidés des collections du muséum de Paris (III). Bulletin du Muséum National d’Histoire Naturelle (Série 2) 15(6): 399–405.

Freyhof J, Kottelat M (2008) Romanogobio antipai. The IUCN Red List of Threatened Species 2008: e.T135636A4167651. https://doi.org/10.2305/IUCN.UK.2008.2.107.7

Friedrich T, Wiesner C, Zangl L, Daill D, Freyhof J, Koblmüller S (2018) Romanogobio skywalkeri, a new gudgeon (Teleostei: Gobionidae) from the upper Mur River, Austria. Zootaxa 4403(2): 336–350. https://doi.org/10.11646/zootaxa.4403.2.6

Holčík J, Bănărescu P, Evans D (1989) General introduction to fishes. In: Holčík J (Ed.) The freshwater fishes of Europe. Vol 1/II, General introduction to fishes. Acipenseriformes. AULA-Verlag, Wiesbaden, 18–147.

ICZN (1999) International Code of Zoological Nomenclature (4th edn). International Trust of Zoological Nomenclature, London, 306 pp.

Kottelat M (1997) European freshwater fishes. Biologia (Bratislava) 52(suppl. 5): 1–271.

Kottelat M, Freyhof J (2007) Handbook of European Freshwater Fishes. Kottelat, Cornol and Freyhof, Berlin, 646 pp.

Marinov B (1978) Die Fischfauna im bulgarischen Donauabschnitt und ihre Bedeutung für die Wirtschaft. In: Rusev B, Naidenow W (Eds) Limnologie des bulgarischen Donauabschnitts. Bulgarische Akademie der Wissenschaften, Sofia, 201–228. [In Bulgarian]

Mihailova L (1970) Die Fische im Westlichen Balkangebirge. Bulletin de l’Institut de Zoologie et Musee 31: 19–43. [In Bulgarian]

Movchan YV, Smirnov AI (1981) Fauna Ukrainy. Tom. 8, Ryby. Vypusk 2. Koropovi. Chastina 1 [Fishes of Ukraine. Vol. 8, 2, cyprinids. Part 1], Naukova Dumka, Kyiv, 424 pp. [In Ukrainian]

Naseka AM (1996) Comparative study on the vertebral column in the Gobioninae (Pisces, Cyprinidae) with special reference to its systematics. Publicaciones Especiales, Instituto Español de Oceanografía 21: 149–167.

Naseka AM (2001) Contribution to the knowledge of infraspecific structure of whitefin gudgeon, Romanogobio albipinnatus (Lukasch, 1933) (Cyprinidae: Gobioninae), with a description of a new subspecies, R. albipinnatus tanaiticus, from the Don drainage. Proceedings of the Zoological Institute, Russian Academy of Sciences 287: 99–119.

Naseka AM, Bogutskaya NG, Bănărescu P (1999) Gobio albipinnatus. In: Bănărescu P (Ed.) The freshwater fishes of Europe. Vol. 5/1. Cyprinidae 2/1. AULA-Verlag, Wiebelsheim, 37–68.

Smirnov AI (1971) K izucheniyyu peskarey (Gobio Cuvier) Ukrainy [Studies of gudgeons (Gobio Cuvier) of Ukraine]. Vestnik zoologii 6: 55–61. [In Russian]

Vladykov VD (1931) Poissons de la Russie sous-carpathique (Tchécoslovaquie). Mémoires de la Société Zoologique de France 29(4): 217–374.