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Original Article

New Record of the *Melanopsis buccinoidea* (Olivier, 1801) from two streams of Mersin (Türkiye) with Evaluation Some Morphometric Parameters

Mehmet Kocabaş[1], Filiz Kutluyer Kocabaş[2]✉

[1]Karadeniz Technical University Faculty of Forestry, Department of Wildlife Ecology and Management, Trabzon, Türkiye
[2]Munzur University, Fisheries Faculty, Tunceli, Türkiye

[1] https://orcid.org/0000-0002-7934-6500. [2] https://orcid.org/0000-0001-8334-5802.

✉: filizkutluyer@hotmail.com

ABSTRACT

In this study, some biometric characteristics of the freshwater snail *Melanopsis buccinoidea* (Olivier, 1801) were determined in Koca Stream and Bayat Stream (Mersin, Türkiye). Weight (W) (g), shell length (SL) (mm), shell width (SW) (mm), aperture length (AL) and width (AW) (mm) measurements were made on the samples taken from different stations. Morphological relationships were determined by multivariate statistical evaluation. The highest values in terms of shell length and weight were determined to be 16.53±3.67 mm and 0.47±0.23 g, living in Koca Stream. The largest shell length measured in the samples was 21.93 mm and the aperture width was 10.62 mm. The results were analyzed using Principal Component Analysis (PCA), a versatile statistical technique employed to explore the relationships between variables and account for a significant portion of the dataset. Samples taken from different stations showed a strong relationship between aperture width and spir height.

Key words: *Melanopsis buccinoidea, biometric, freshwater snail.*

Mersin (Türkiye) İki Çayından *Melanopsis buccinoidea* (Olivier, 1801)'nin Bazı Morfometrik Parametrelerin Değerlendirilmesiyle Yeni Kaydı

ÖZ

Bu çalışmada, Koca Deresi and Bayat Dere'sinde (Mersin, Turkiye) yaşayan tatlı su salyangozu *Melanopsis buccinoidea*'nın (Olivier, 1804) bazı biyometrik özelliklerini incelenmiştir. Farklı istasyonlardan alınan örneklerde ağırlık (A) (g), kabuk genişliği (KG) (mm), kabuk yüksekliği (KY) (mm), apertur uzunluğu (AU) ve genişlik (AG) (mm) ölçümleri yapılmıştır. Çok değişkenli istatistiksel değerlendirme ile morfolojik ilişkilerin belirlenmiştir. Kabuk uzunluğu ve apertur ağırlığı açısından en yüksek değerler 16.53±3.67 mm ve 0.47±0.23 g olarak Koca Deresi'nde yaşayanlar olduğu belirlenmiştir. Örneklerde ölçülen en büyük kabuk uzunluğu 21.93 mm ve apertur genişliği 10.62 mm olarak ölçülmüştür. Sonuçlar, değişkenler arasındaki ilişkileri araştırmak ve veri kümesinin önemli bir bölümünü açıklamak için kullanılan çok yönlü bir istatistiksel teknik olan Temel Bileşen Analizi (TBA) kullanılarak analiz edilmiştir. Farklı istasyonlardan alınan örneklerde apertur genişliği ve spir yüksekliği arasında güçlü bir ilişki olduğunu göstermiştir.

Anahtar kelimeler: *Melanopsis buccinoidea, biometrik, tatlısu salyangozu.*

INTRODUCTION

Snails in the Prosobranchia subclass are distributed in various fresh and brackish waters, mostly in the sea. They live depending on aquatic systems and do not tolerate different ecological systems (Yıldırım, 1999). Unlike Pulmonates, they do not prefer stagnant water and are indicators of clean water. Despite this, they have

been observed to live in various habitats such as canals, pools, streams and lakes (Farahnak et al., 2006; Gürlek et al., 2012).

Germain (1921) performed one of the first studies on the *Melanopsis* genus and examined the terrestrial and freshwater molluscs of Syria (Bilgin, 1980). The *Melanopsis* genus is found in large quantities in aquatic ecosystems in the Middle East and is distributed in northern Africa and Europe (Por, 1963; Schütt, 1983). The majority of this genus contains many species and lives in the Mediterranean (Tchernov, 1971; Brown and Wright, 1980). In addition, it has been observed that they have a wide distribution and subspecies because they easily adapt to different ecological regions. In Türkiye, it is distributed in the Aegean, Mediterranean and Southeastern Anatolia regions (Yıldırım, 1999; Gürlek et al., 2019). With their strong radula teeth, they scrape algae and diatoms from all hard surfaces and use them as food. Apart from these, they also feed on animal carcasses, macrophytes and various aquatic plants (Glaubrecht, 1996; Mouahid et al., 1996). They are also intermediate hosts of several trematode species, as well as some other gastropod species (Bilgin, 1967). Faraknak et al. (2006) examined *Melanopsis* species (*M. doriae, M. costata, M. preamorsa* and *M. nodosa*) parasitically and observed that 72 of a total of 2266 samples (3.1%) were infected with parasites belonging to Cercaria.

Nägele (1901) reported the existence of *Melanopsis buccinoidea* species from Seyhan River (Adana, Türkiye). Sturany (1905) identified the *M. buccinoidea* species belonging to the freshwater Molluscs in Kayseri Erciyes Mountain and its surroundings. Kinzelbach (1989) reported the presence of *Melanopsis p. buccinoidea, Melanopsis p. costata* in the Middle East (Türkiye-Syria). Heller et al. (1999) studied the systematics and distribution of *Melanopsis* in the central and northern regions of the Jordan Valley, recognizing *M. buccinoidea* based on shell morphology and biometric measurements. Gürlek et al. (2012) determined morphometric characteristics of *M. buccinoidea buccinoidea* in the Kumaşır lake (Kahramanmaraş, Türkiye) and forms the dominant populations in the lake. Gürlek et al. (2016) reported presence of *M. buccinoidea* from Limonlu (Lamos) Stream (Mersin, Türkiye). Bilgin and Şeşen (1991) studied distribution of some freshwater molluscs in Mersin, Adana and Antakya regions. This study is the first scientific report on the population of *M. buccinoidea* (Olivier, 1801) living in Koca Stream and Bayat Stream (Mersin, Turkey) and some of its biometrics characteristics.

MATERIALS AND METHODS

Samples were collected from Koca Stream (36,726386-34,399936 North/East) and Bayat Stream (36,116333-32 N, 977681 E) between August and September 2024 (Figure 1).

Figure 1. Sampling area.

To collect the samples, metal-framed scoops and shovels, a rake for bottom dredging were used, individuals were collected by hand from sand and areas up to 1 m water depth, and the samples were stored in styrofoam boxes at +4°C. Identification of the collected snails were carried out by comparing them with

descriptions and drawings of different *Melanopsis* species available in the literature (Gürlek et al., 2016) (Figure 2).

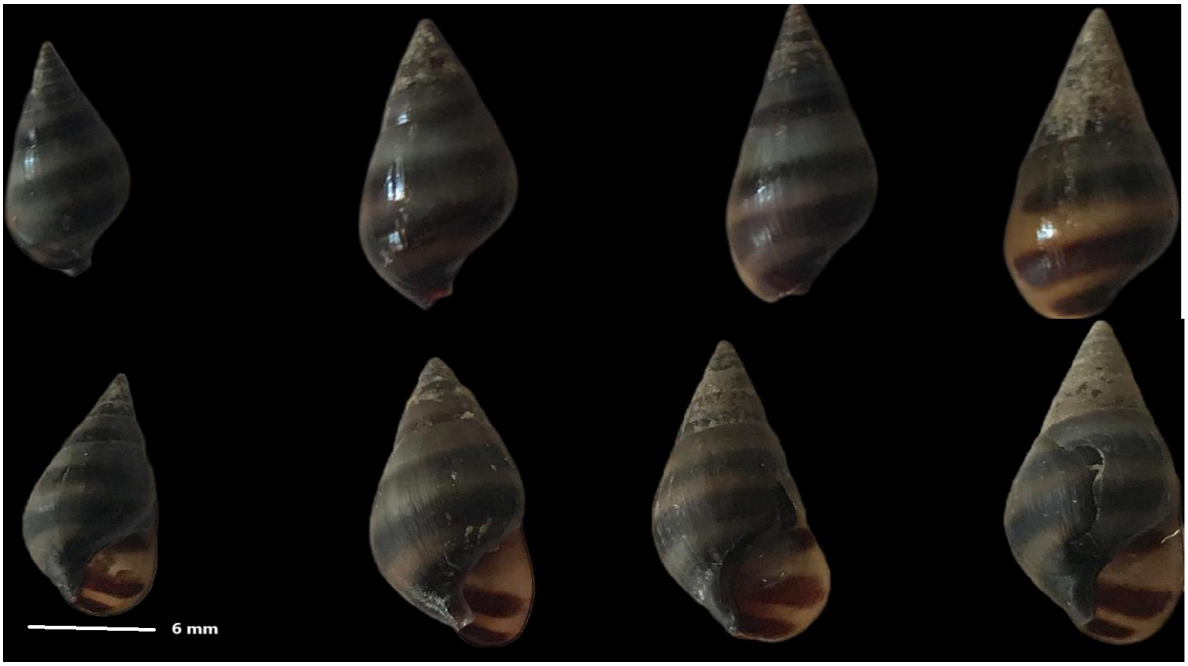

Figure 2. *Melanopsis buccinoidea* collected from Koca Stream and Bayat Stream

Shell measurements (SL, SW, AL, AW, BWH, SpH) were made with a digital caliper (±0.01 mm), and weight measurements were made with a precision scale (±0.001 g) (Figure 3).

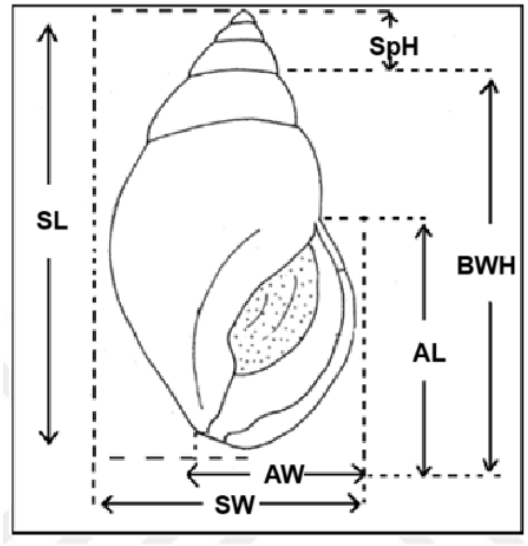

Figure 3. Morphometric measurement of *Melanopsis buccinoidea* (Gürlek et al., 2012). shell length (SW) (mm), shell width (SW) (mm), aperture length (AL) and width (AW) (mm), weight (W) (g), spir height (SpH), body whorl height (BWH)

Correlation analysis was used to determine the relationships between biometric parameters, and Microsoft Excel® was used to analyze and process the data. Principal component analysis (PCA) was applied using the Past 4.03 program to determine the relationships between variables.

RESULTS AND DISCUSSION

In this study, the presence of *M. buccinoidea* in Koca Stream and Bayat Stream was reported for the first time. Phenotypic variations in shell morphology make species identification highly challenging in many taxa, with

similarities in shell characteristics often leading to the oversight of new species in research. Understanding the malacofauna of Koca Stream and Bayat Stream is crucial for gaining insights into Türkiye's freshwater snail fauna and zoogeographic distribution.

Heller et al. (2005) reported the maximum SL and AL of *M. buccinoidea* as 35.1 mm and 17.8 mm in the inland waters of the countries of east coast of the Mediterranean. Gürlek et al. (2012) determined morphometric measurements of *M. buccinoidea buccinoidea* individuals collected from Kumaşır Lake and reported the means of SL, SW, AL, AW, BWH, SpH and W; 25.95 mm, 12.18 mm, 14.13 mm, 8.02 mm, 18.47 mm, 8.01 mm and 2.05 g, respectively. They also reported the maximum shell length and aperture height of *M. buccinoidea* as 36.94 mm and 20.73 mm, respectively. In the current study, the mean of SL, SW, AL, AW, BWH, SpH and W for Koca Stream and Bayat Stream were assessed as 16.53±3.67 and 15.54±2.29 mm; 7.41±1.47 and 6.81±0.87 mm; 8.10±2.11 and 7.36±1.19 mm; 4.86±1.06 and 4.60±0.76 mm; 1.32±0.54 and 1.88±0.57 mm; 15.22±3.35 and 13.66±2.02 mm; 0.47±0.23 and 0.33±0.10 g, respectively. The maximum shell length is 21.93 mm and aperture height is 10.62 mm.

PCA indicated a strong relationship between SL, SW, BWH and W (Figure 4). In gastropods, these morphometric traits may change with potentially highlighting the role of underlying biological and ecological influences on both shell structure and body size (Akça Atıl et al., 2024).

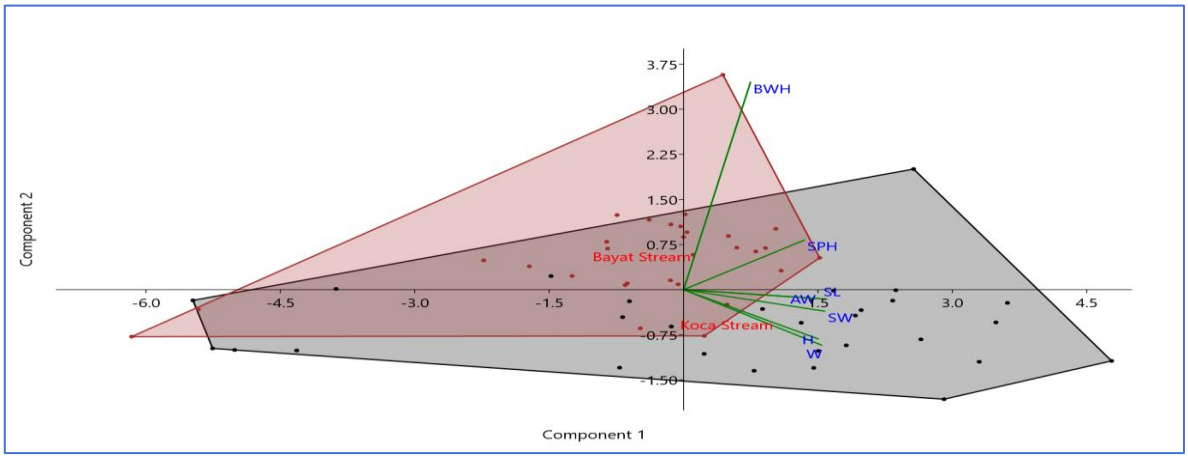

Figure 4. Biplot of Principal Component Analysis (PCA) analysis of the shell characteristics (SL, SW, AL, AW, SPH, BWH) and weight (W) of *M. buccinoidea*.

Gürlek et al. (2012) demonstrated a strong correlation between SL-SW and SW-W of *M. buccinoidea buccinoidea* individuals collected from Kumaşır Lake. In this study, there was a strong correlation between SL-SW, SL-AL, SL-BWH, SL-W, SW-AL, SW-BWH, SW-W, AL-BWH and BWH-W in Koca Stream and Bayat Stream (Figure 5).

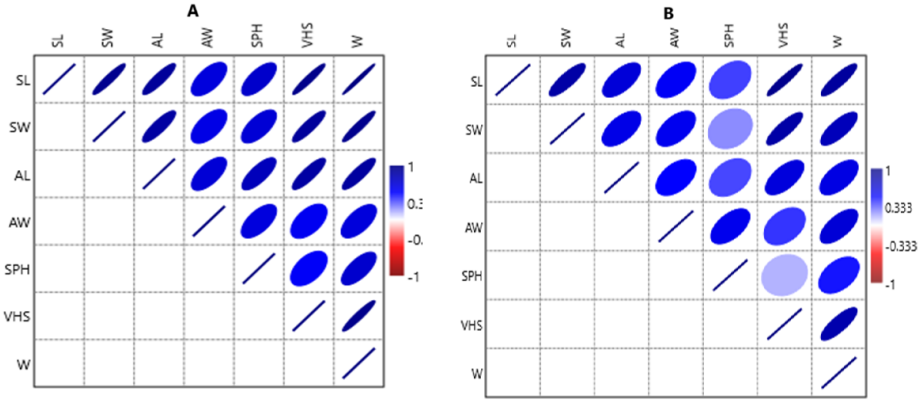

Figure 5. Correlation matrix of the shell characteristics (SL, SW, AL, AW, SPH, BWH) and weight (W) of *M.buccinoidea* in A) Koca Stream, B) Bayat Stream.

CONCLUSIONS

Consequently, Koca Stream and Bayat Stream are new locality records for *M. buccinoidea* in Türkiye. The morphological differences observed across various stations are likely due to factors such as nutrition, water chemistry in the habitats, and water temperature with a high potential for sub speciation or even speciation. Anatolia exhibits high diversity and endemism, especially among mollusks. Therefore, further molecular taxonomy studies on the collected materials will reinforce our findings and help clarify the status of the genus in Türkiye, while also exploring the possible causes of morphological variations.

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Declaration of interests

The authors declare that they have no conflict of interest.

Author Contributions

Mehmet KOCABAŞ: Conceptualization; investigation; methodology; writing—review and editing.
Filiz KUTLUYER KOCABAŞ: Conceptualization; data curation; formal analysis; investigation; methodology; software; writing— original draft; writing—review and editing.

ORCID

Mehmet KOCABAŞ https://orcid.org/0000-0002-7934-6500.
Filiz KUTLUYER KOCABAŞ https://orcid.org/0000-0001-8334-5802.

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