

A Study on the Conchological Features of Two Populations of *Bulinus truncatus* (Gastropoda: Pulmonata) in Turkey*

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Abstract: So far *Bulinus truncatus* samples have been found in two localities in Turkey. Habur stream, Ceylanpınar, Şanlıurfa, and water flow at Bolatlar village, Akçakale, Şanlıurfa.

In this study, the conchological features of samples obtained from those two localities were investigated and the results were compared.

In both localities, the shells of the the collected samples are sinistral and have depressed spire regions. From the samples collected in the Akçakale region (Bolatlar village), average shell height, shell width, aperture height and aperture width of the 21 shells and width of shell/height of shell, width of aperture/height of aperture, height of aperture/height of shell and width of aperture/width of shell of these shells were measured. These results were compared with data from Ceylanpınar, where samples were obtained during a previous study. We found there was no important difference between the two localities ($cd < 1.50$).

Key Words: Pulmonata, *Bulinus truncatus*, Shell

Bulinus truncatus (Gastropoda: Pulmonata)'un Yurdumuzda Yaşayan Populasyonlarının Kavkı Özellikleri Üzerine Bir Çalışma

Özet: *Bulinus truncatus* türü, yurdumuzda şimdiye kadar sadece iki lokalitede saptanmıştır. Bu çalışmada, bu lokalitelerden toplanan *Bulinus truncatus* örneklerinin bazı kavkı özellikleri incelenmiş ve sonuçları karşılaştırılmıştır.

Her iki lokaliteden toplanan örneklerin sinistral, spir bölgeleri basık, aperturları yüksek ve geniştir. Örneklerin kavkı yüksekliği (ky), kavkı genişliği (kg), apertür yüksekliği (ap), apertür genişliği (ag) ile bunlardan elde edilen kg/ky, ag/ay, ay/ky ve ag/kg oranları olmak üzere 8 değişken hesaplanmış ve bu değişkenlerin mimimum, maksimum, ortalama ve standart sapma değerleri bir tablo halinde verilmiştir. Diğer bir tabloda ise her iki populasyona ait örneklerin farklılık katsayıları (cd) hesaplanmıştır. Her iki populasyonun kavkı ölçümleri arasında önemli bir farkın olmadığı ($cd < 1.50$) saptanmıştır.

Anahtar Sözcükler: Pulmonata, *Bulinus truncatus*, Kavkı

Introduction

As a result of the Southeastern Anatolia Project (GAP) in Turkey many new irrigation channels are being constructed, some of which have been completed (Özcel, 2000). This will provide good conditions for freshwater life, especially for freshwater animals, such as insects and other invertebrates, including freshwater snails. Freshwater pulmonate snails are of medical and veterinary importance (Malek and Cheng, 1974). Among these snails the most important is *Bulinus truncatus* due to its intermediate hostship of the blood fluke *Schistosoma haematobium*. *B. truncatus* lives near Turkey's border with Syria and Iraq and is well known as a transmitter of schistosomiasis in these countries (Ahmed, 1965; WHO,

1987). Due to the medical importance of *B. truncatus*, a number of studies have been done in this area and this species was found for the first time in Ceylanpınar, a town in the province of Şanlıurfa (Schütt and Şeşen, 1989; Şeşen and Yıldırım, 1993). Later, it was found in Akçakale, another town of Şanlıurfa (Özcel et al., 1996). Şanlıurfa is located in the heart of GAP, which comprises many dams and irrigation systems. Luckily, in both populations, snails infected with trematoda have not yet been found. However, the presence of the snails carries the risk of potential infection. In this study, the populations in Ceylanpınar and Akçakale are compared conchologically. The main aim of this study is to draw attention to the presence of *B. truncatus* in the GAP region.

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Materials and Methods

For this study, all samples were collected by the author. Data for the Akçakale population were obtained from 21 samples collected in the field (Table 1), but data for the Ceylanpınar population were obtained from a previous study done on 80 species (Bilgin and Şeşen, 1992). Samples from Akçakale were collected randomly and brought to the laboratory. Samples over 6.5 mm were separated from smaller ones. Among the samples over 6.5 mm, 21 of them were randomly chosen for comparison studies. Each of the samples was described by eight measurements. Four of these measurements were obtained by a clipper compass, while other data were derived from the first measurements. Shell measurements included height of shell (hs), width of shell (ws), height of aperture (ha), and width of aperture (wa). Derived data are ws/hs, wa/ha, ha/hs and wa/ws. For all data, the minimum (min.), maximum (max.) average and standard deviation (SD) values were calculated (Table 1). Shell features of the two populations are compared in Table 2. The coefficient of difference was calculated with the formula $(CD = (M1 - M2) / (SD1 + SD2))$ and the coefficient variability was calculated with the formula $(cv = SD \times 100) / M$ (in these formulas M shows the average of the data while CD is the coefficient of difference, SD is the standard deviation and cv is the coefficient variability).

Results and Discussion

The conchological features of snails are often used to differentiate populations or species of the same genus. For example, similar studies have been performed on

freshwater snails of the *Bulinus africanus* group (Kristensen and Christensen, 1989), *Bulinus truncatus* Tropicus complex (Mukaratirwa et al., 1998) and on the land snail genus *Assyriella* living in southeastern Anatolia (Akbayın et al., 2001). In these studies hs, ws, ha and wa and derived from ws/hs, wa/ha, ha/hs and wa/ws were used. In this study the above measurements were also taken. In Table 1, the average results of the 21 samples in the Akçakale population are (as an average of the 21 samples): hs: 8.11 mm (min. 6.80 mm – max. 11.00 mm), ws: 5.65 mm (4.70-8.00), ha: 4.54 mm (3.90-7.40) and wa: 3.12 mm (2.50-5.00). Derived data are: ws/ha: 0.70 (0.64-0.74), wa/ha: 0.69 (0.63-0.81), ha/hs: 0.56 (0.48-0.67) and wa/ws: 0.55 (0.50-0.63). The SD of hs, ws, ha, wa, ws/hs, wa/ha, ha/hs and wa/ws are 1.24, 0.87, 0.98, 0.64, 0.02, 0.05, 0.05 and 0.03 respectively.

The data of ws/hs, ha/hs, wa/ws, wa/ha and their SD were obtained from a previous study (Bilgin and Şeşen, 1992). In Table 2, we compare the two populations in Akçakale and Ceylanpınar.

The coefficient of differences between the two populations are calculated for ws/hs, ha/hs, wa/ws and wa/ha. The results are 0.16, 1.02, 0.52 and 1.28 respectively. As for the coefficient of differences it was ≤ 1.28 : there is no significant differences between the two populations. The coefficient of differences ranges from 0.12 to 1.28. The coefficient variability (cv) of the two populations is calculated separately for ws/hs, ha/hs, wa/ws and wa/ha. The results for Ceylanpınar’s population are 5.63, 15.28, 11.67 and 15.38

Table 1. Shell index of *Bulinus truncatus* collected from Bolatlar village, Akçakale.

	N	Min.	Max.	Average	SD
HS	21	6.80 mm	11.00 mm	8.11 mm	1.14
WS	21	4.70 mm	8.00 mm	5.65 mm	0.87
HA	21	3.90 mm	7.40 mm	4.54 mm	0.98
WA	21	2.50 mm	5.00 mm	3.12 mm	0.64
WS/HS	21	0.64	0.74	0.70	0.02
WA/HA	21	0.63	0.81	0.69	0.05
HA/HS	21	0.48	0.67	0.56	0.05
WA/WS	21	0.50	0.63	0.55	0.03

HS: Height of shell, WS: Width of shell, HA: Height of aperture, WA: Width of aperture, N: Number of samples, Min.: Minimum, Max.: Maximum, SD: Standard deviation.

Table 2. Comparison of two populations of *Bulinus truncatus* collected in the Şanlıurfa area.

WS / HS					
	N	Average	sd	cd	cv
Ceylanpınar	80	0.71	0.04	0.16	5.63
Akçakale	21	0.70	0.02		3.10
HA / HS					
	N	Average	sd	Cd	cv
Ceylanpınar	80	0.72	0.11	1.02	15.28
Akçakale	21	0.56	0.05		8.84
WA / WS					
	N	Average	sd	Cd	cv
Ceylanpınar	80	0.60	0.07	0.52	11.67
Akçakale	21	0.55	0.03		5.38
WA / HA					
	N	Average	sd	Cd	cv
Ceylanpınar	80	0.52	0.08	1.28	15.38
Akçakale	21	0.69	0.05		7.50

HS: Height of shell, WS: Width of shell, HA: Height of aperture, WA: Width of aperture, N: Number of samples, sd: Standard deviation, cd: Coefficient of difference, cv: Coefficient of variability.

respectively. The cv results for Akçakale's population are 3.10, 8.84, 5.38 and 7.50 respectively. Those results show that the Akçakale population has more uniformity in shell measurements. Its coefficient of variability ranges between 3.10 and 8.84. However, the Ceylanpınar

population has more variability since its coefficient of variability ranges from 5.63 (for ws/hs) to 15.38 (for wa/ha). The two populations are about 120 km from each other. They live near two river systems that flow toward Syria and then join the Euphrates (Fırat) River.

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