

**The population dynamics of the *Melanopsis costata* Olivier, 1804 (Mollusca:Gastropoda) in the holy Kerbala city**

ديناميكية الكثافة السكانية لقوقع المياه العذبة

***Melanopsis costata* Olivier, 1804**

**(Mollusca:Gastropoda) في مدينة كربلاء المقدسة**

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**Abstract**

The study included the population density of the freshwater *Melanopsis costata* Olivier, 1804

Which was studied during summer season in Iraq; it is a long season in Iraq from the beginning of May 2017 till October 2017. The study included some chemical and physical parameters of the location of Al- Husseiniya River, studying the density and the population structure of the snail, calculating the dry weight of the studied snail; calculating the biomass of the *Melanopsis costata* in addition to measuring the average of the snail shell lengths. Since this type of snails did not attract appropriate attention by researchers in the province of Karbala and its districts and sub-districts, so the idea of the current study arose.

**المستخلص**

تضمن البحث دراسة ديناميكية الكثافة السكانية لقوقع المياه العذبة *Melanopsis costata* Olivier, 1804 خلال موسم الصيف في العراق وهو موسم طويل في العراق من بداية أيار 2017 حتى تشرين الأول 2017. وشملت الدراسة بعض القياسات الكيميائية والفيزيائية لموقع جدول نهر الحسينية في محافظة كربلاء المقدسة ، دراسة الكثافة والبنية السكانية ، حساب الوزن الجاف لقوقع الدراسة ، كما تم حساب الكتلة الحية للـ *Melanopsis costata* بالإضافة إلى قياس متوسط أطوال القواقع. ولأن هذا النوع من القواقع لم يجذب الانتباه المناسب من قبل الباحثين في محافظة كربلاء والمناطق التابعة لها، فقد جاءت فكرة الدراسة الحالية.

**Introduction**

The Mollusca phylum is one of the most diverse animal species in the Kingdom, with more than 130,000 species currently known. This phylum includes a large number of different species of wild animals [1]. In many freshwater ecosystems, the presence of soft deposits in the bottom of the lakes and ponds extends to the rocky bottom of some rivers. Most of the wolves are found in rivers and streams that are characterized by purity. The dissolved oxygen is high and the bottom is composed of rum or gravel [2].

Freshwater aquifers have a long life span of up to a few decades and some species can last more than 100 years [3]. The mollusca exist in a wide range of ecosystems and the presence of some of the nuts in the form of bottom groupings and the density of between 10-100 individual / m<sup>2</sup> and thus the biomass is much higher than the rest of large invertebrates [4]. One of the main reasons for the high proportion of extinct and endangered freshwater species is that they are endemic species that have a limited geographical distribution and this identification is often For an ecosystem as a river or a lake However, most researchers have suggested that water flow velocity and bottom formation are among

the most important factors affecting the presence of nuts, water quality, availability of food, and the availability of appropriate host fish for some [5]; [6]. The temperature is one of the most important environmental factors and their general effects on living organisms are clear and known. They vary according to the nature and type of the aquatic environment. Current water is more homogenous than in static water due to the lack of thermal gradient [7]. The aim of the research is to study the life of the shell in detail and to know the characteristics of its aquatic environment.

## **Materials and methods**

### **Description of study area:**

AL- Husseiniya stream is the main artery in the holy province of Kerbala, where the stream is divided from the right side of the Euphrates River in Kilometer 604, with a length of 30.6 km, a width of 22 m and a depth of 2.5 m, and in turn divided into five sub-streams; Al- Husseiniya stream is surrounded by Palm trees and willow trees and a water stream quickly, hall a few aquatic plants such as *Ceratophyllum demersum* and some algae because of the Cree stream periodically.

### **collected Samples:**

*Melanopsis costata* samples were collected from AL- Husseiniya from May 2017 until October 2017 using a quadrat wooden box (25 x 25 cm<sup>2</sup>). Statistical analysis showed that the best number of replicates can represent the population density of 5 replicates (N = number of replicates to be taken in each month, D = the permissible range of the standard error ratio to the mean, S = variance). Then we started the following procedures:

1. Samples were kept in open glass bottles, each containing the name of the site and the date of collection. The samples were taken to the laboratory where they were washed by water and dried.
2. Measure the total length of the shell using the Vernier caliper.
3. Weight dry Each shell was isolated after measuring its wet weight, wrapping it with aluminum foil, writing all the information on it and putting it inside the oven at a temperature of (60) ° C for 24 hours, then it was placed in a Desiccator dryer and weighing the same sensitive scale until the weight was proven [8] .
4. Biomass estimation of the snail was calculated for each month of the study months by dry weight by applying the following law:  $\bar{B} = \bar{N} \times \bar{W}$

$\bar{N}$  = The average number of individuals in time ,  $\bar{W}$  = the rate of increase in the weight of individuals [8] .

## **Results and Discussion**

The results of the current study showed that the water temperature in Al-Husseiniya stream ranged from (32.2 to 15.8). pH is no less important than other important factors because it affects certain physical and chemical properties of different water bodies and is related to the existence of different species of organisms that affect their life paths in the ecosystem [9]. The pH ranged from 6.8 to 7.6 that means the water was alkaline. The values of electrical conductivity in the aquatic environment are good for estimating the total dissolved water content on the one hand and for the purity of water on the other. Salinity is the expression of all positive and negative ion concentrations in water samples [10] .1119.7-820.8 and Salinity 0.71-0.48 This means that the water of Al- Husseiniya River is brackish water [11]. Water total dissolved solid is obtained due to the presence of positive soluble

ions which are mainly composed of calcium ions [12]. calcium carbonate (113.6 - 55). The dissolved oxygen levels in water were higher than the water quality and the oxygen content was 2.9-2.6. The biochemistry requirement for oxygen reflected levels of water pollution and poor quality [13]. The values in this study ranged between 6.3-4. That high temperatures are working to increase the activity of bacteria, and thus the high requirement of biological oxygen and this was confirmed [14]. **(Table 1)**

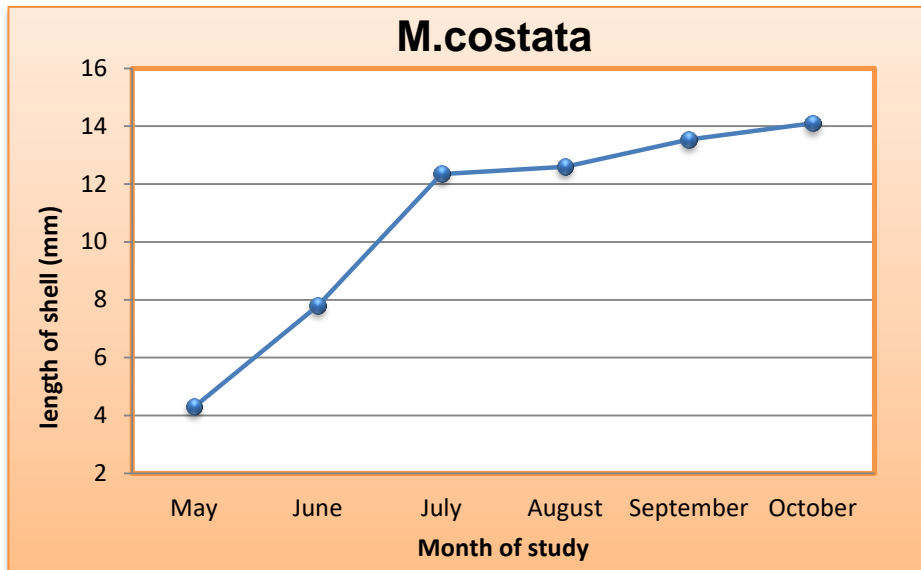
**( Table 1)** Chemical and physical parameters of the water of the study location for the period from May 2017 to October 2017 (average  $\pm$  standard deviation)

Chemical and physical parameters of the water of the study location	
Water Temp. C°	32.2-15.8 (23.9 $\pm$ 5.09)
PH	6.8-7.6 (7.3 $\pm$ 0.2)
EC $\mu$ s/cm	1119.7-820.8(1123.2 $\pm$ 132.1)
Salinity (psu)	0.71-0.48(0.64 $\pm$ 0.09)
T.D.S (mg/L)	815.8-647(776.3 $\pm$ 92.1)
DO (mg/L)	9.2-6 (8.04 $\pm$ 0.9)
BOD <sub>5</sub> (mg/L)	6.3-4(4.5 $\pm$ 07)
Ca (CaCO <sub>3</sub> /L)	113.6- 55(85.3 $\pm$ 11.1)



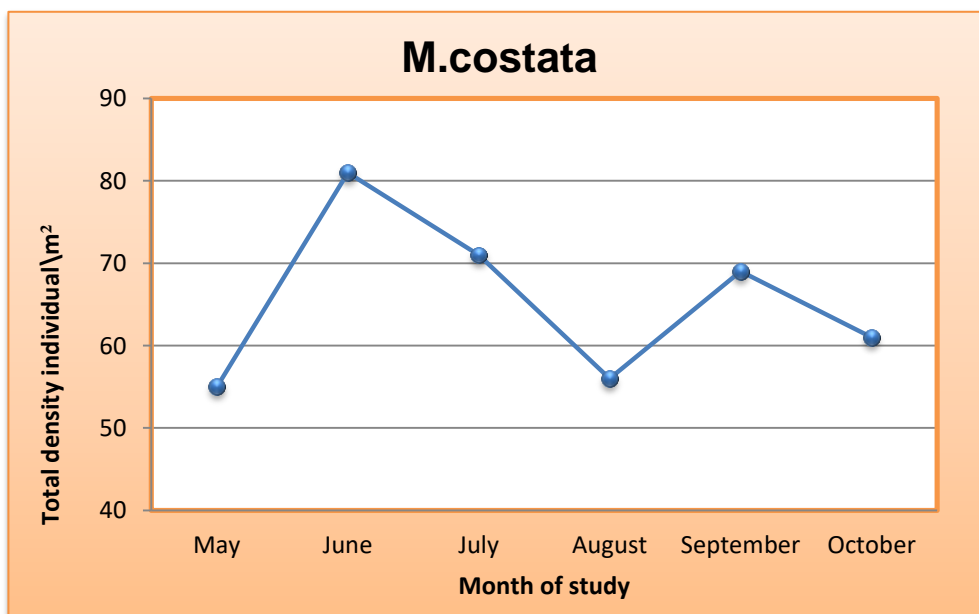
picture of the snail *Melanopsis costata* Olivier, 1804

we can see that average length of the snail shell increases as the months progress; the minimum length of shell was in May (5.54) mm that means the beginning of the new generation while the maximum length of shell was in October 14.1 mm. **(figure 1)**



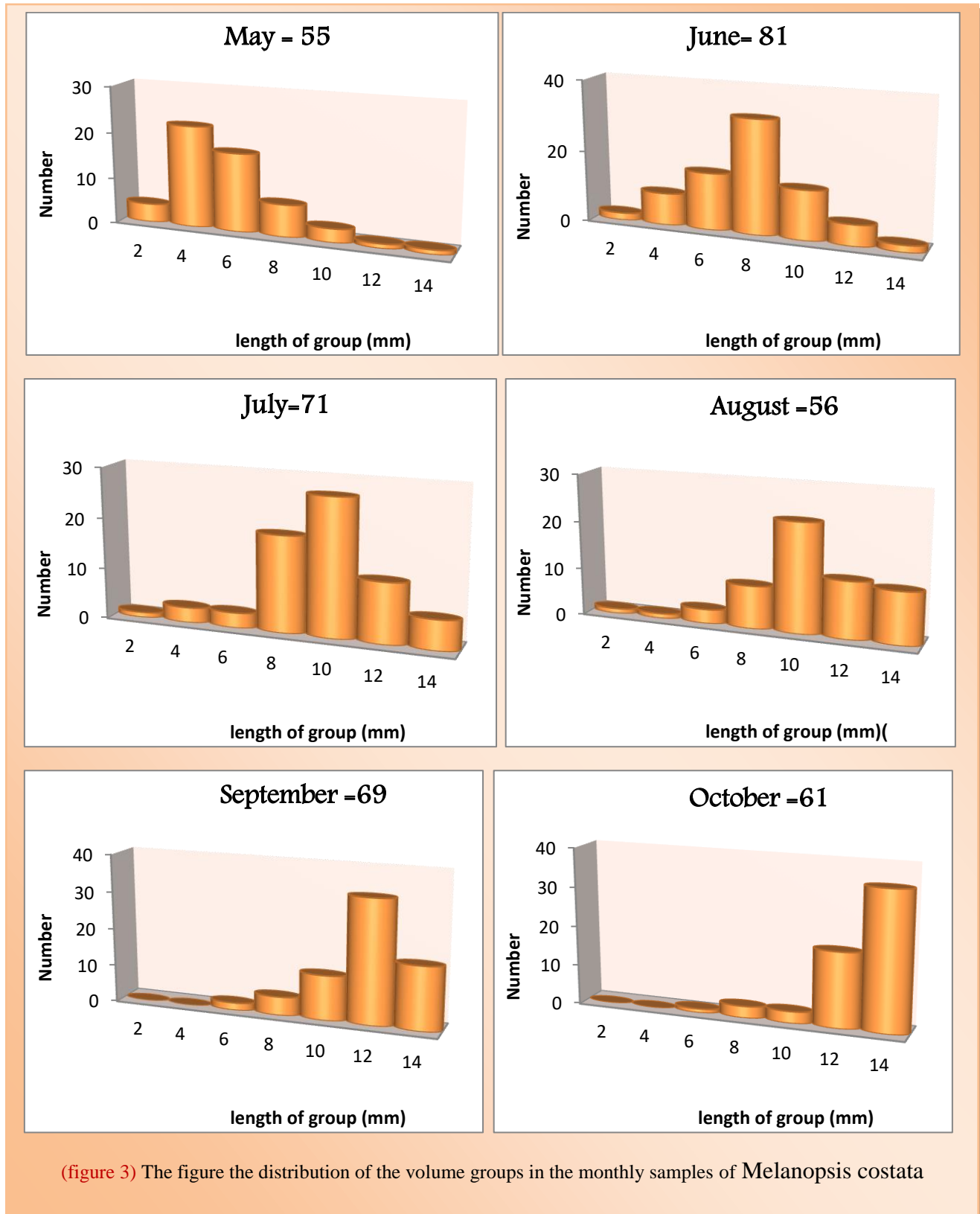
**(figure 1)** Average length of *Melanopsis costata* during months of study

Changes in the population density of the snail were observed during the study period. There was an increase in the density of the snail from May to June and another gradual decrease to the month of August. This is due to the high temperatures and their regulatory effects for both the life cycle and reproduction. [15] Found that they had the least population density of *M. nodosa* in May. The dissolved amount of dissolved oxygen played an important role in determining the density of the cochlea through the results, where the amount of oxygen dissolved at the highest levels during the months from May to October, which enhances the high density of the snail . **(figure 2)**



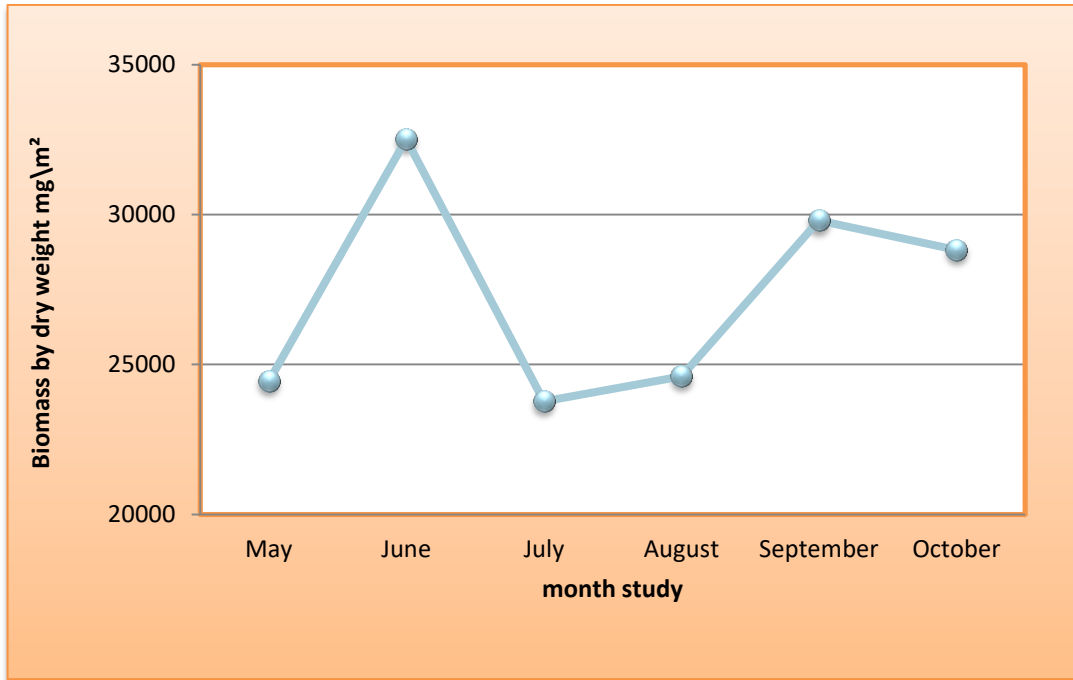
**(figure 2)** Average total density of snails during months of study

(Figure 3) shows the structure of the population of the snail, which was divided into seven size groups ranging from (2-14) mm, and a range of 2 mm for each category. The youngest generation was very clear in May and June, where the smallest size of the 2 mm shell was not found in most months of the study, while the largest size of 14 mm in most months and notes for medium-sized individuals are present in all months of the study as the study flourished in Summer season through the emergence of most of the volumetric and even small groups to suit the temperature of them, which makes the population density high and this came in line with the study [16].



(figure 3) The figure the distribution of the volume groups in the monthly samples of *Melanopsis costata*

The Biomass of the population of the snail species of *Melanopsis costata* for the period from May 2017 to October of the same year was calculated by dry weight. The Biomass increased significantly in June to a maximum of 32517.4 mg / m<sup>2</sup>, then decreased in July. After taken to appreciate the progressive slow to reach in October 28826 mg / m<sup>2</sup> due to the high population density of the snail and this was in line with [17] . **(figure 4)**



**(figure 4)** Biomass in terms by dry weight of *Melanopsis costata*

References:

- 1- Al- Yusuf, M. b. S. and Yasser b. R. (2002). Invertebrate Science - Practical Slit. King Saud University . Saudi .
- 2- Robert, T. and Dillon , R.T.(2003). The Ecology of Freshwater Molluscs . Published By Cambridge . UK.421-432.
- 3- Bauer, G. (1992). Variation in the life span and size of the freshwater pearl mussel. Journal of Animal Ecology. 61: 425– 436.
- 4- Strayer, D. and Dudgeon, D. (2010). Freshwater biodiversity conservation: recent progress and future challenges. Journal of the North American Benthological Society, 29 (1) : 344- 358.
- 5- Arbuckle K. and Downing J. (2008). Freshwater mussel abundance and species richness: GIS relationships with watershed land use and geology. Canadian Journal of Fisheries and Aquatic Sciences, 59(2): 310-316.
- 6- Nedeau, E. ; Smith, A.K and Stone, J. (2005). Freshwater Mussels of the Pacific Northwest. UK.134-144.
- 7- Matlub, S. H. (2004). Environmental study on zooplankton in Mabazal, northern part of the general estuary. Master Thesis, Baghdad University, Faculty of Science: 115 pages.
- 8- Abdul-Sahib I.M.(2006). A new recorder with snail *Monacha obstructa* (Pfeiffer,1842), (Gastropoda: Pulmonata) from the Iraqi marshes. Journal Basrah Researches (Sciences) Vol.32. Part.3. 70 - 73 .
- 9- Ruttner, F. (1973) . Fundamentals Of Limnology . 3rd edn. Univ., Toronto Press , Toronto : 306 pp .
- 10- APHA (American Public Health Association) (1985). Standard methods for the examination of water and waste water . 16 th .ed : 343pp.
- 11- Saadi, H. A. (2002). Ecology and Pollution. National Library . Baghdad Press. Iraq: 615 p.
- 12- Zhang , C. C. (2007). Fundamentals of Environmental Sampling and Analysis John Wiley and Sone , Inc Publication. Canada .112-119.
- 13- Ghulam, I. N. (2015). Ecological, Biological and Histological study of the freshwater snails infected with digenean larvae. PhD thesis: 101 pages.
- 14- Rabee, A.M.; Abdul-K. , B.M. and Al-Dhamin A.S. (2011) Seasonal variations of some ecological region Iraq .Journal of water resource and protection .3:262-266.
- 15- Marina, A.B., Daoud T.y. and Shihab F.A. (1994). Population biology and production of *Melanopsis nodosa* L. (gastropoda) in the shatt Al-Arab river. Marina Mesopotamica , 9(2) : 343-356.
- 16- Hulya, M. Zeki Y.; and Menderes.(2008). The gastropod fauna and their abundance, and some physicochemical parameters of Lake (Hatay, Turkey). Turk J Zool .33 (2009) 287-296.
- 17- Neam N. H and Al-Tae , M.M.(2015). Biodiversity of macro- invertebrates in Al-razza lake at Karbala /IRAQ, International Journal of Advanced Research , Volume 3, Issue 1, 423-427.