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Biomass determination based on the individual volume of the dominant copepod species in the Western Egyptian Mediterranean Coast

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ABSTRACT

The biomass of five copepod species (*Oithona nana*, *Calocalanus pavo*, *Nannocalanus minor*, *Clausocalanus arcuicornis* and *Paracalanus parvus*) that dominate the western part of the Egyptian Mediterranean Coast had been determined using the individual volume. The length-weight relationships and physicochemical influences on the length of species were also investigated. Copepod samples were seasonally collected during the period 2008–2009. All volumes and weights of the randomly selected adult individuals were measured. Ten regression equations confirmed that; the species weights depend on the total lengths of males and females of all species. However, the females of the examined species were always heavier and longer than males. The length and weight of both sexes of all species were higher in winter than in other seasons. Temperature is considered the main factor influencing the sizes of adult copepods. It was also found that the mean length of the examined individuals was inversely proportional to temperature. However, all the investigated organisms had adequate high levels of dissolved oxygen and didn't show any change with pH, salinity and transparency.

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Introduction

Biomass measurement is essential in the studies of zooplankton production and ecology. That is due to their role as prey for fishes at different stages of development. Knowledge of zooplankton abundance and biomass in spatial and temporal scales remains a key element of marine ecosystem approaches (Irigoien et al., 2009). Knowledge of the prey's biomass is necessary in the investigation of the relationship between fish larvae feeding and the natural food supply (Murphy et al., 2013). Zooplankton biomass can be measured using various methods including gravimetric, volumetric and chemical procedures. It can then be expressed practically as in; settling volume, displacement volume, wet weight, dry weight, ash-free dry weight, organic weight and caloric values (Omori and Ikeda, 1984; Harris et al., 2000). Volumetric method, such as the one employed in the present study, is the only choice if samples are also to be used for taxonomic purposes (Postel et al., 2000). The geometric approach is only suitable in the case of small-sized zooplankton (Omori and Ikeda, 1984).

Planktonic copepods are important components in the aquatic communities because of their role in the transfer of energy from primary producers to higher trophic levels and in the export of organic matter from the euphotic to deeper layers of the oceans (Calbet et al., 2000). One approach to assess the energy content of copepods is to determine their biomass or dry weight by some methods (Cohen and Lough, 1981). In the Egyptian Mediterranean water, previous investigations on copepods were mainly concerned with taxonomic and/or ecological studies on zooplankton community (Abdel-Aziz and Aboul-Ezz, 2003; Abdel-Aziz, et al., 2007; Zakaria et al., 2016). Biomass determination had received little attention (Hussein and Abdel-Aziz, 1997). The main objectives of the present work are the determination of biomass of five copepod species (*Oithona nana*, *Calocalanus pavo*, *Nannocalanus minor*, *Clausocalanus arcuicornis* and *Paracalanus parvus*) dominating the western part of the Egyptian Mediterranean Coast. This is done using the individual volume, and investigating the length-weight relationships and physicochemical influences on the length of species.

Materials and methods

The study area extends along the western part of the Egyptian Mediterranean Coast between longitudes 25°30'E and 29°30'E

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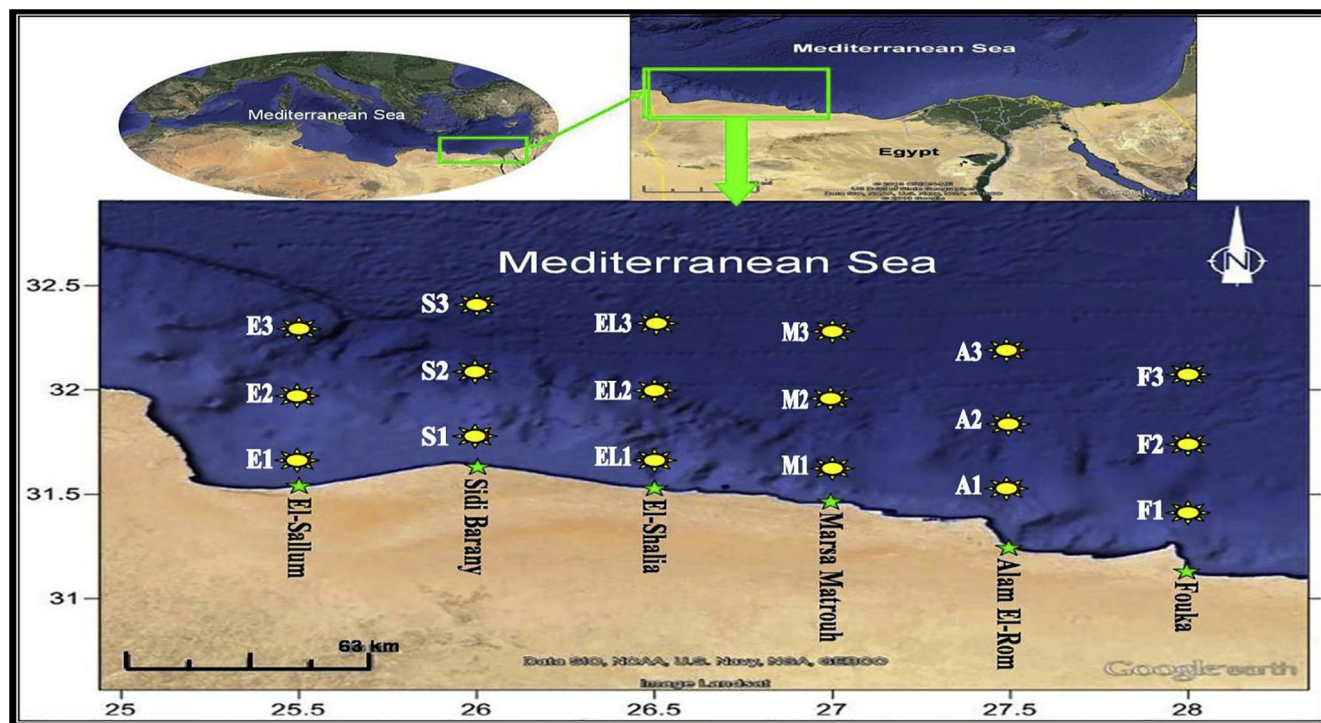


Fig. 1. Area of investigation and the locations of the sampling stations.

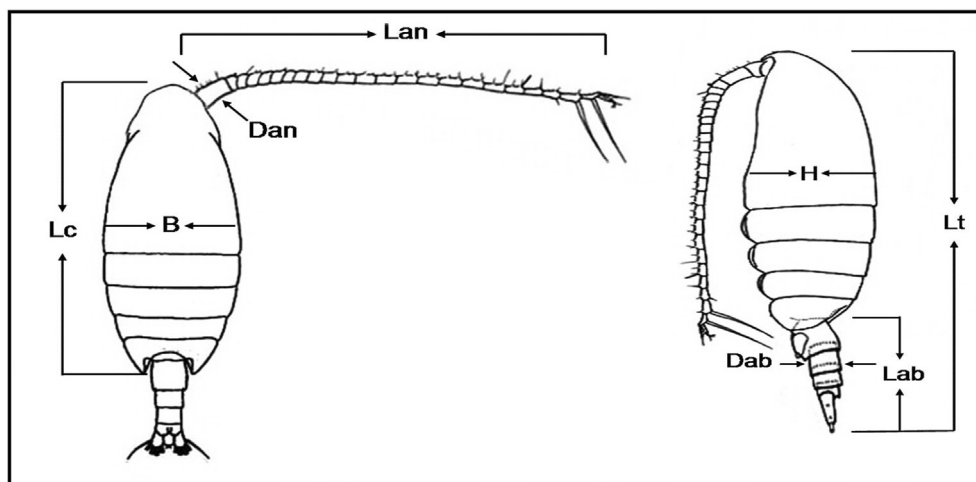


Fig. 2. Diagrammatic representation of measurements of copepods for volume determination after [Chojnacki et al. \(1980\)](#). [Lc = length of cephalothorax, B = width of cephalothorax, H = body depth, Lab = length of abdomen, Dab = diameter of abdomen, Lan = length of the first antenna, Dan = diameter of the first antenna and Lt = total length].

Table 1

Seasonal variations of the mean values of detected physicochemical parameters measured in the study area during 2008–09.

Parameters	Seasons		
	Spring 2008	Summer 2008	Winter 2009
Temperature (°C)	19.17 ± 0.37	27.78 ± 0.37	16.8 ± 0.27
Salinity (‰)	38.665 ± 0.076	38.812 ± 0.188	38.7 ± 0.096
pH	7.9 ± 0.14	7.9 ± 0.18	8.0 ± 0.15
Dissolved oxygen (mgO ₂ /L)	9.5 ± 0.6	7.4 ± 0.42	10.3 ± 0.36
Transparency (cm)	174.02 ± 15.53	195.3 ± 14.75	164.9 ± 6.11

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