

Morphological and biometric characterisation of rare males and sexual dimorphism in parthenogenetic *Artemia* (Crustacea: Anostraca)

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The genus *Artemia* Leach, 1819 is a complex taxon with both sexual species and asexual populations. The asexual populations are considered as biological species "*Artemia parthenogenetica* Barigozzi, 1974" (BROWNE & BOWEN 1991). Since the reproductive mechanism of parthenogenetic *Artemia* is via parthenogenesis, males are rarely produced among these individuals. Therefore, they are introduced nowadays as "parthenogenetic *Artemia* populations" (ABATZOPOULOS et al. 2002), but sexual populations of *Artemia* have sexual reproduction and their offspring have an equal frequency of males and females.

We studied the morphological and biometric features of males and the sexual dimorphism in parthenogenetic populations of *Artemia* at Urmia Lake, Iran. The lake basin contains bisexual *Artemia* species: *A. urmiana* Günther, 1899, and parthenogenetic *Artemia* populations within Urmia Lake and other, parthenogenetic population from lagoons around Urmia Lake (ABATZOPOULOS et al. 2006; ASEM et al. 2009). Morphological studies show that two parthenogenetic *Artemia* from the Urmia Lake basin (coastal lagoon and within the lake) can be attributed to two populations (ASEM et al. 2009).

For our study, the cyst samples of the parthenogenetic population of Urmia Lake have been taken from the Artemia and Aquatic Animal Institute, Urmia University, Iran. After hatching, nauplii were cultured at 80 ppt salinity under standard conditions in the laboratory (AMAT et al. 2005). 30 males were collected over five months, with less than 0.4% frequency, and were compared with 30 females.

Generally, there are two main shapes for the frontal knob in bisexual species of *Artemia*: while *A. salina* (Linnaeus, 1758) is characterised by having a subconical frontal knob, the other species belonging to the genus *Artemia* have a subspherical frontal knob (MURA & BRECCIAROLI 2004). The morphological structure of the frontal knob in the males of the parthenogenetic population

Table 1. Morphometric and meristic characters for males and females of *Artemia*. The table gives mean (mm) and Standard Deviation (S.D.).

	males	females	significance
Total length	8.01(0.58)	9.09(0.63)	p<0.01
Abdominal length	3.88 (0.36)	4.68 (0.28)	p<0.01
Head width	0.69 (0.05)	0.64 (0.07)	p<0.01
Distance between compound eyes	1.69 (0.12)	1.36 (0.06)	p<0.01
Diameter of right eye	0.39 (0.03)	0.24 (0.02)	p<0.01
Diameter of left eye	0.38 (0.03)	0.24 (0.02)	p<0.01
Length of right antenna	1.19 (0.09)	0.89 (0.07)	p<0.01
Length of left antenna	1.18 (0.10)	0.91 (0.06)	p<0.01
Length of furca (right)	0.34 (0.06)	0.27 (0.05)	p<0.01
Length of furca (left)	0.34 (0.06)	0.26 (0.05)	p<0.01
Length of telson	0.95 (0.07)	1.21 (0.19)	p<0.01
Number of setae per furca (right)	11.73 (1.91)	8.57 (1.61)	p<0.01
Number of setae per furca (left)	11.47 (2.11)	8.70 (1.34)	p<0.01