Qatar Univ. Sci. J. (1994), 14 (2): 347-350

ON SEXUAL DIMORPHISM IN THE SHRIMP *PALAEMON PACIFICUS* (DECAPODA: PALAEMONIDAE) COLLECTED FROM THE RED SEA

By

A. H. OBUID-ALLAH* and H. M. ABOUL-DAHAB**
* Department of Zoology, Faculty of Science, Assiut, University, Egypt
** Department of Zoology, Faculty of Science (Sohag), Assiut University, Egypt

التمايز الجنسي لنوع *باليمون باسيفيكس* (ذوات العشر أرجل : بالمونيدى) من البحر الأحمر

أحمد حامد عبيد الله و حسني محمد أبو الذهب

باليمون باسيفيكس نوع شائع في منطقة البحر الأحمر ، والجنسان به منفصلان . ولقد قيس ٣٥ صفة مورفولوجية و ٣ صفات عددية للتمايز الجنسي لهذا النوع لعينات جمعت من منطقة البحر الأحمر جنوب مدينة سفاجا .

لقد بينت النتائج إختلاف بين الجنسين في ثمانى صفات مورفولوجية وأما الصفات المورفولوجية الباقية والصفات العددية فلم تظهر أي إختلاف .

Key Words: *Palaemon*, Sexual dimorphism, Prawn, Red Sea.

ABSTRACT

Palaemon pacificus is common in the Red Sea coast and the sexes are separate. Potential sexual dimorphism in 38 morphological parameters was investigated in a population of *Palaemon pacificus* collected from the Red Sea coast. The results indicated that 8 parameters show significant sex related differences while no significant differences were recorded in the rest of characters studied.

INTRODUCTION

Among the characters which are used to delimit prawn genera are the presence or absence of supraorbital and pterygostomian spines, branchial arrangement, extent of eye development, and shape of the distal edge of the carpus of both chelipeds. Within genera, species-defining characters commonly used include rostrum shape and armature, proportions of chelae (dactyli and propodi) and especially of carpi of the first and second pereiopods, and egg size. Unfortunately, some studies have shown that characters used for species diagnosis in certain taxa vary infraspecifically. For example, the studies on *Cardina bervirostris* [1, 2] and *C. togoensis* [2], *Caridina nilotica* [3], *Paratya australiensis* [4], *Paratya australiensis* [5], *Caridina nilotica nilotica* and *C. africana* [6] *Atyaephyra desmaresti desmaresti* and *A. desmaresti orientalis* [7]. Full resolution of the difficulties must involve a study of the extent of variation within a population of a species [5]. The present study was designed as a step toward fulfilling this aim. It attempted to define the extent of sexual variation of 38 taxonomical parameters in a population of *Palaemon pacificus* collected from the Red Sea coast, Egypt.

MATERIAL AND METHODS

Samples of *Palaemon pacificus* were collected from the Red Sea coast from a site at 15 km south of Safaga city (24°06 N/32°52E), (Fig. 1). The collection site is a rocky shore containing many batches of mangrove plants which are suitable for the species to find food and shelter (Pl. 1A). A zooplancton net was used to collect the shrimps by drawing it through roots of the mangrove plants. The shrimps were separated and preserved in 70% ethanol (Pl. 1B). The measurements of the different parts of the body were done by a calibrated eye piece. The student t-test was applied to the proportional characters whereas the Chi-square test was applied to the meristic characters.

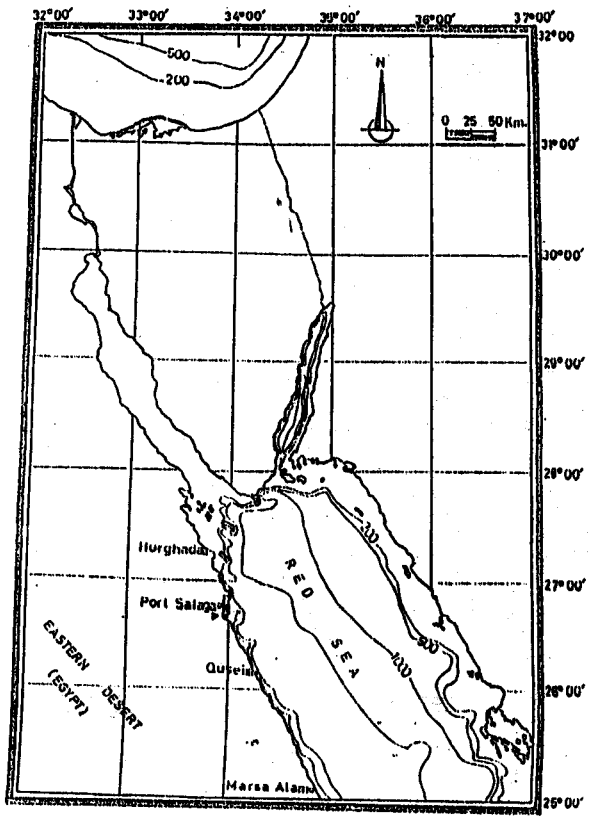

Fig. 1: A map of the Red Sea, showing the collection site.

RESULTS

The marine decapod *Palaemon pacificus* is common in the Red Sea coast. It has separate sexes and 53.16% of the sampled population were females. It is a synchronous brooder and the females brood the young on the ventral surface of the abdomen between the pleopods from I to IV. The length ranged from 20.5 to 42.5 [8].

From Tables (1-4) it is clear that the indices: total length/ 1st abdominal segment length, abdomen length/ last abdominal segment length, 1st pleopod length/ exopodite, 1st pleopod length/ endopodite, 2nd pleopod length/ basipodite, 3rd pleopod length/ basipodite, 5th pleopod length/ basipodite, and 5th pleopod length/ exopodite and significantly differnet in the males and females.

Table 1

Results of t-test on the differences of some morphometric indices between males and females of *Palaemon pacificus.*

No.	Morphometric Index	d. f.	"t"	P	Result
1.	rostrum length/ depth:	46	0.585	0.6-0.5	-
2.	rostrum length/ carapace:	46	1.074	0.3-0.2	-
3.	total length/ rostrum:	46	1.254	0.3-0.2	-
4.	total length/ carapace:	46	0.283	0.8-0.7	-
5.	total length/ abdomen:	46	0.874	0.4-0.3	-
6.	total length/ 1st abdomenal segment:	46	3.107	0.01-0.001	++
7.	total length/ telson:	46	1.627	0.2-0.1	-
8.	abdomen length/ carapace:	46	0.117	0.95-0.9	-
9	abdomen length/ last abdomen segment:	46	2.296	0.05-0.02	+
10.	abdomen length/ telson:	46	0.983	0.4-0.3	-
11.	1st cheliped/ ischium:	46	1.189	0.3-0.2	-
12.	1st cheliped/ merus:	46	1.126	0.3-0.2	-
13.	1st cheliped/ carpus:	46	0.995	0.4-0.3	-
14.	1st cheliped/ propodus:	46	1.240	0.3-0.2	-
15.	1st cheliped/ dactylus:	46	1.913	0.1-0.05	-
16.	2nd cheliped/ ischium:	46	1.770	0.1-0.05	-
17.	2nd cheliped/ merus:	46	1.525	0.2-0.1	-
18.	2nd cheliped/ carpus:	46	0.335	0.8-0.7	-
19.	2nd cheliped/ propodus:	46	0.778	0.5-0.4	-
20.	2nd cheliped/ dactylus:	46	1.570	0.2-0.1	-
21.	1st pleopod length/ basipodite	46	1.061	0.3-0.2	-
22.	1st pleopod length/ expodite:	46	2.338	0.02-0.01	+
23.	1st pleopod length/ endopodite:	46	7.993	<0.001	++
24.	2nd pleopod length/ basipodite:	46	2.569	0.02-0.01	+
25.	2nd pleopod length/ expodite	46	0.824	0.5-0.4	-
26.	2nd pleopod length/ endopodite:	46	0.418	0.7-0.6	-
27.	3rd pleopod length/ basipodite:	46	3.108	0.01-0.001	++
28.	3rd pleopod length/ exopodite:	46	0.436	0.7-0.6	-
29.	3rd pleopod length/ endopodite:	46	1.067	0.3-0.2	-
30.	4th pleopod length/ basipodite:	46	1.005	0.4-0.3	-
31.	4th pleopod length/ exopodite:	46	0.022	>0.95	-
32.	4th pleopod length/ endopodite:	46	0.393	0.7-0.6	-
33.	5th pleopod length/ basipodite:	46	2.112	0.5-0.02	+
34.	5th pleopod length/ exopodite:	46	3.007	0.01-0.001	++
35.	5th pleopod length/ endopodite:	46	1.826	0.1-0.05	-

d.f.: degrees of freedom; + significant. ++: highly significant, -: insignificant.

Pl. 1A: Photograph of the collecting site on the Red Sea coast, showing the mangrove plants from which samples were collected.

Pl. 1B: Photograph of *P. pacificus* showing external features.

Table 2
Chi-square test on the number of dorsal spines of rostrum and their frequencies in *Palaemon pacificus*

	Number Of Dorsal Teeth On Rostrum						
Sex	6	7	8	sum	d.f.	p	result
male	7	14	3	24			
female	4	17	3	24	2	0.7-0.5	-

Table 3
Chi-square test on pre-oribital teeth of rostrum and their frequencies in *Palaemon pacificus*

	Number Of Pre-Oribital Dorsal Teeth On Rostrum							
Sex	4	5	6	7	sum	d.f.	p	result
male	0	7	14	3	24			
female	1	4	16	3	24	3	0.7-0.5	-

Table 4
Chi-square test on the number of ventral teeth of rostrum and their frequencies in *Palaemon pacificus*

	Number Of Ventral Teeth On Rostrum						
Sex	2	3	4	sum	d.f.	p	result
male	1	17	6	24			
female	3	12	9	24	2	0.3-0.2	-

DISCUSSION

The presnet investigation revealed that among the proportional characters examined, eight characters were found to show significant sex-related differences. No significant differences were recorded in the meristic characters studied. One may conclude that the armature of rostrum, inclduing the dorsal teeth, the pre-orbital teeth, and the ventral teeth exhibit no variations in the males and females. Consequently, such characters are good taxonomic ones in the species under investigation. Similar conclusions were noticed by other authors [9]. Working with the prawn *Palaemon elegans we* observed sexual dimorphism in the indices abdomen/ carapace, abdomen/ last abdominal segment, abdomen/ telson, carapace/ rostrum, 1st pereiopod/ ischium, 1st pereiopod/ carpus, 1st pereiopod/ propodus, 1st pereiopod/ dactylus, 2nd pereiopod/ carpus, and 2nd pereiopod length/ dactylus. Also, other studies revealed that such sexual dimorphism existed in populations of other species. *Macrobrachium dyanum*had sexual dimorphism in the size of cheliped, ischium fo 1st cheliped, 2nd cheliped in relation to cephalothorax, the length of ischium, and the diameter of palm of second cheliped [10]. Also in *Atyaephyra desmaresti desmaresti* and *A. desmarti orientalis* the indices: total length/ carapace, rostrum length/ carapace are different in the populations of the two sub-species examined. The total length/ rostum was found to be significant in *A. desmaresti desmaresti,* while the indices: total length/ abdomen, 1st cheliped/ carpus and 1st cheliped/ propodus were significant in *A. desmaresti orientalis.*

REFERENCES

[1] **Bouvier, E.L., 1913.** Les caridines des sychelles. Transaction of the Linnean Society, Zoological series, 2, 15: 447-472, London.

[2] **Schmitt, W.L., 1926.** The macruran, anomuran, and stomatopod crustaceans collected by the American Museum, Congo expedition 1909-1915, Bull. of the American Museum, Natural History, 53: 1-85.

[3] **Gordon, I., 1930.** African freshwater prawns of the species *Cardina nilotica* (Roux) with special reference to the Nile basin, Proceedings of Zoological Society, 1930: 33-50, London.

[4] **Williams, W.D. and M.J. Smith, 1979.** A taxonomic revision of Australian species of Paratya (Crustacea: Atyidae). - Australian Journal of Marine and Freshwater Research, 30: 815-832, Melbourne.

[5] **Smith, M.J. and W.D. Williams, 1980.** Infraspecific variation within the Atyidae: A study of morphological variation with a population of *Paratya australiensis* (Crustacea: Decapoda), Australian J. of Marine and feshwater Research, 31: 397-407.

[6] **Obouid-Allah, A.H., 1987.** Ecological and biological studies in freshwater Crustacea. Ph. D. thesis, Faculty of Science, assiut University, Egypt.

[7] **Obouid-Allah, A.H., 1989.** On sexual dimorphism in the freshwater prawns *Atyaephyra desmaresti desmaresti* and *A. desmaresti orientalis.*, Zoology in the Millde East, 3: 129-133.

[8] **Aboul-Dahab H.M. and A.H. Obouid-Allah, 1995.** Brood capacity and sex ratio of *Palaemon pacificus* (Crustacea: Decapoda) collected from the Red Sea coast, Egypt (in press).

[9] **Hussein, M.A. and A.H. Obouid-Allah, 1981.** A study of *Palaemon elegans* Rathke, 1837 (Crustacea: Decapoda) collected from Lake Quarun, Egypt: I. External morphology, Bulletin of the Faculty of Science, Assiut University, 10 (1): 99-133.

[10] **Koshy, M., 1973.** Studies on the sexual dimorphism in the freshwater *Macrobrachium dayanum* (Handerson 1983) (Decapoda: Caridae). Crustaceana, 24 (1): 110-118.