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A REVIEW OF LENGTH-WEIGHT RELATIONSHIPS OF PENAEID SHRIMPS FROM EGYPTIAN MARINE WATERS

By

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ABSTRACT

*The parameters **a** and **b** of the length-weight relationship of the form $W= aL^b$ have been computed for 8 species belonging to 4 genera of marine penaeid shrimp obtained from the literature which were taken by other trawl fishing from Egyptian Mediterranean water of Alexandria, Suez Gulf-Red Sea and from lakes. Sample sizes **n** for different species ranged from 47 to 22613 specimens collected from commercial landings and research surveys.*

*The fit of the equations $W= aL^b$ with **a** and **b** parameters estimated from regular and functional regression (of log-transformed weight and length data).*

INTRODUCTION

Length-weight relationships are very useful for fisheries research and are considered as an important piece of information in studying the natural history of penaeid shrimps. Effective management of any fishery requires considerable knowledge regarding population parameters such as length-weight, age and growth, mortality and recruitment pattern of the exploited stock. For instance, length-weight relationship **LWR** allows predictions of weight from length in yield assessments (Pauly, 1993) and can also be indicative of the condition factor, i-e the general well-being of shrimp populations. Also are useful for

between-region comparisons of life histories of certain species (Moutopoulos and stergion 2000).

This review is one of the documenting the length-weight relationship **LWR** parameters of the most abundant penaeid shrimp species caught during the period from 1974 to the year 2000 from different localities of Egyptian marine waters.

MATERIALS AND METHODS

Fig. (1) shows 72 length-weight relationships presented here are the product of field studies conducted which during 1974-2000 in Egyptian marine waters (Mediterranean coast of Alexandria, Suez Gulf, Red Sea and lakes) Fig (1), and are consistent with the format suitable for inclusion in fish Base.

For the majority of the original length-weight relationships $W= aL^b$ length was in **cm** and weight in **gram**. The parameters of the length-weight equation $W= aL^b$ were calculated from log^{10}-transformed weight and length with **a** and **b** estimated by ordinary least squares linear regression (Zar 1984).

Lengths were measured from the tip of rostrum to the end of telson (total length or T:L) or to the end of the carapace (carapace length or C.L). Total weight **w** was recorded to the nearest 0.1g, [sample size **n** depended on species size ranges and availability].

RESULTS

The values of the parameters of the length-weight relationships of a total of eight penaeid marine shrimp species which belong to four genera, collected from different Egyptian water areas (table 1). The sample size of *P. Japonicus* ranged from 652 to 2145 and the values of **b** lied from 2.8000 to 3.2474. Females weighed more the males in case of samples collected from Suez-Gulf in comparison to with other localities.

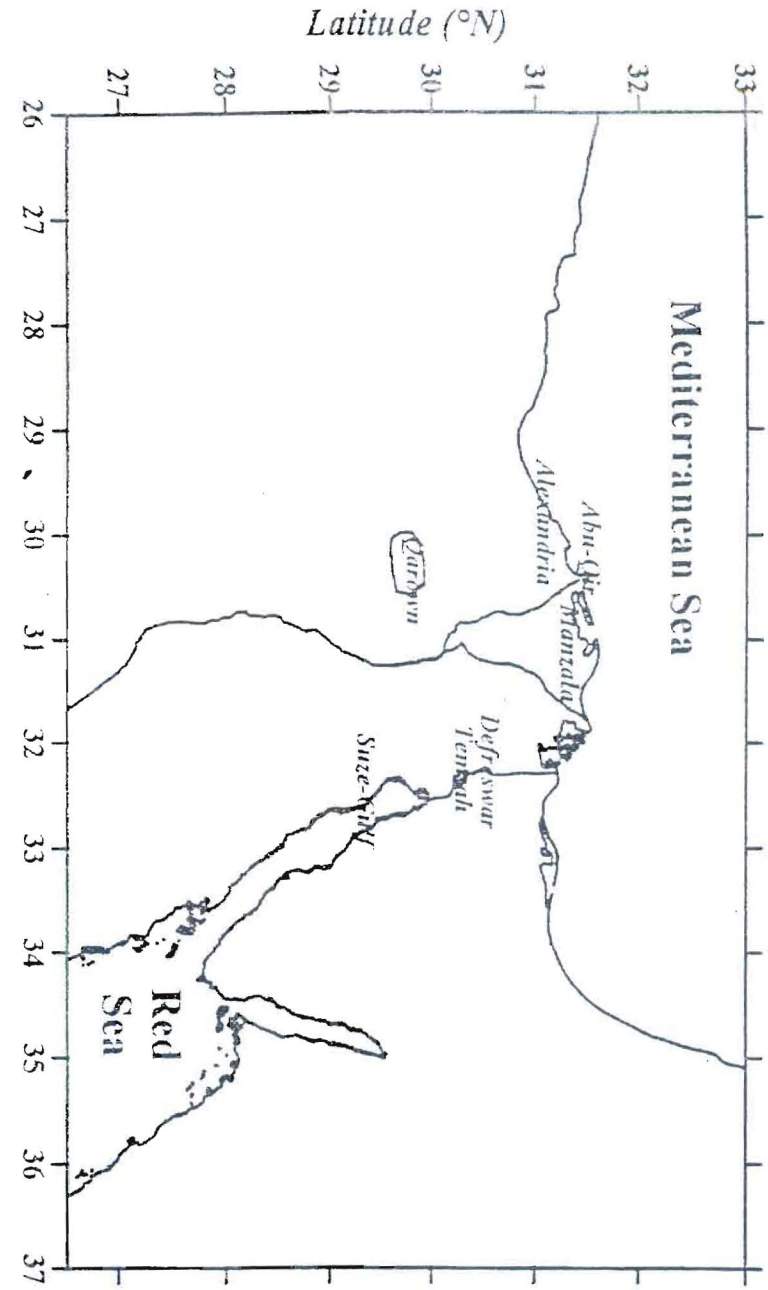

Fig. (1): Location of Fishing sites in Egyptian water

Table (1) : Parameters of the relationships ($W=a\ L^b$) between weight (in g) and length (in cm) of eight Egyptian marine species from Mediterranean Sea, Red Sea and lakes, collected from the literature. F= frequency of sampling (M= monthly; W = winter, A= Autumn, S= summer, O= one single sampling); Sex (M= male; F= female; C= sexes combined); weight (total, T.W) length (total T.L, carapace C.L); N= sample size; size range (cm or g); r= correlation coefficient.

Species	Local name (Arabic)	F	Sex	Length (cm)	N	Size-range		a	B	r2	Area	Reference
Penaeus japonicus	Al yabani	M	F	T.L	1145	5.0-23.00	cm	0.010770	2.8464		Mediterranean coast near Alexandria	Abdel Razek F.A., (1974)
Penaeus japonicus	Al yabani	M	M	T.L	1000	7.0-21.00	cm	0.010890	2.8288		Mediterranean coast near Alexandria	Abdel Razek F.A., (1974)
Penaeus japonicus	Al yabani	M	C	T.L	2145	5.0-23.00	cm	0.009370	2.9051		Mediterranean coast near Alexandria	Abdel Razek F.A., (1974)
Penaeus japonicus	Al yabani	M	F	T.L	355	9.0-22.00	cm	0.003637	3.2474	0.99948	Suez Gulf - Red Sea	Zaghlol S.S., (1996)
Penaeus japonicus	Al yabani	M	M	T.L	402	9.0-19.00	cm	0.008228	2.9148	0.99721	Suez Gulf - Red Sea	Zaghlol S.S., (1996)
Penaeus japonicus	Al yabani	M	C	T.L	757	9.0-22.90	cm	0.004532	3.1658	0.99916	Suez Gulf - Red Sea	Zaghlol S.S., (1996)
Penaeus japonicus	Al yabani	M	F	T.L	378	11.9-23.0	cm	0.010700	2.8000	0.89000	Mediterranean coast near Alexandria	Waleed N.A. El hawary, (2001)
Penaeus japonicus	Al yabani	M	M	T.L	274	11.0-20.5	cm	0.004200	3.1000	0.93000	Mediterranean coast near Alexandria	Waleed N.A. El hawary, (2001)
Penaeus kerathurus	Al kazazi	W	F	T.L		5.0-12.50	cm	0.004830	3.0687		Lake Manzalah	Bishara N.F., (1976)
Penaeus kerathurus	Al kazazi		M	T.L		5.0-12.50	cm	0.008330	2.8442		Lake Manzalah	Bishara N.F., (1976)
Penaeus kerathurus	Al kazazi	S	F	T.L		5.0-12.50	cm	0.003490	3.2128		Lake Manzalah	Bishara N.F., (1976)
Penaeus kerathurus	Al kazazi		M	T.L		5.0-12.50	cm	0.147000	2.0762		Lake Manzalah	Bishara N.F., (1976)
Penaeus kerathurus	Al kazazi	A	F	T.L		5.0-12.50	cm	0.002960	3.3049		Lake Manzalah	Bishara N.F., (1976)
Penaeus kerathurus	Al kazazi		M	T.L		5.0-12.50	cm	0.006390	2.9817		Lake Manzalah	Bishara N.F., (1976)
Penaeus kerathurus	Al kazazi	M	F	T.L		9.5-17.50	cm	0.007980	3.0072		Mediterranean coast near Alexandria	Ishake et al., (1980)
Penaeus kerathurus	Al kazazi	M	M	T.L		9.5-17.50	cm	0.039790	2.3840		Mediterranean coast near Alexandria	Ishake et al., (1980)
Penaeus kerathurus	Al kazazi	M	F	T.L		9.5-17.50	cm	0.016720	2.6226		Lake Quarun	Ishake et al., (1980)
Penaeus kerathurus	Al kazazi	M	M	T.L		9.5-17.50	cm	0.001670	3.4881		Lake Quarun	Ishake et al., (1980)
Penaeus kerathurus	Al kazazi	M	C	T.L		9.0-17.50	cm	0.011950	2.8472	0.98550	Mediterranean coast near Alexandria	Abdel Razek F.A., (1992)
Penaeus kerathurus	Al kazazi	M	C	T.L		9.0-17.50	cm	0.010290	2.8017	0.98453	Lake Quarun	Abdel Razek F.A., (1992)
Penaeus kerathurus	Al kazazi	M	F	T.L	47	13.5-21.5	cm	0.011110	2.9031	0.96495	Mediterranean coast near Alexandria	Present data
Penaeus kerathurus	Al kazazi	M	M	T.L	92	11.5-17.5	cm	0.011140	2.8655	0.99461	Mediterranean coast near Alexandria	Present data
Penaeus semisulcatus	El Naylon	M	F	T.L	787	8.0-25.00	cm	0.005810	3.1441	0.99974	Suez Gulf - Red Sea	Yassin M.H., (1992) M.Sc. Thesis
Penaeus semisulcatus	El Naylon	M	M	T.L	750	9.0-21.00	cm	0.008380	2.9743	0.99864	Suez Gulf - Red Sea	Yassin M.H., (1992) M.Sc. Thesis
Penaeus semisulcatus	El Naylon	M	C	T.L	1537	8.0-25.00	cm	0.004920	3.1869	0.99620	Suez Gulf - Red Sea	Yassin M.H., (1992) M.Sc. Thesis
Penaeus semisulcatus	El Naylon	M	F	T.L		9.0-25.50	cm	0.005120	3.1870	0.96040	Mediterranean coast near Alexandria	Ezzat A. et al., (1993)
Penaeus semisulcatus	El Naylon	M	M	T.L		9.0-21.50	cm	0.043620	2.4047	0.74650	Mediterranean coast near Alexandria	Ezzat A. et al., (1993)
Penaeus semisulcatus	El Naylon	M	C	T.L		9.0-25.50	cm	0.004670	3.1999	0.93120	Mediterranean coast near Alexandria	Ezzat A. et al., (1993)
Penaeus latisulcatus	El laty	M	F	T.L	10967	8.0-21.00	cm	0.003750	3.2748	0.99980	Suez Gulf - Red Sea	Bebars M.I. et al., (1993)
Penaeus latisulcatus	El laty	M	M	T.L	11646	8.0-21.00	cm	0.004490	3.1930	0.99954	Suez Gulf - Red Sea	Bebars M.I. et al., (1993)
Penaeus latisulcatus	El laty	M	C	T.L	22613	8.0-21.00	cm	0.003450	3.2998	0.99980	Suez Gulf - Red Sea	Bebars M.I. et al., (1993)
Penaeus latisulcatus	El laty	M	F	T.L	376	8.0-19.00	cm	0.003120	3.3665	0.99415	Suez Gulf - Red Sea	Zaghlol S.S., (1996)
Penaeus latisulcatus	El laty	M	M	T.L	350	9.0-18.00	cm	0.003626	3.1699	0.99370	Suez Gulf - Red Sea	Zaghlol S.S., (1996)
Metapenaeus monoceros	Ahmer	M	C	T.L		11.0-15.5	cm	0.009540	2.9007	0.99000	Mediterranean coast near Alexandria	Abdel Razek F.A., (1992)
Metapenaeus monoceros	Ahmer	M	C	T.L		11.0-15.5	cm	0.005100	3.1060	0.99243	Lake Quarun	Abdel Razek F.A., (1992)

The observed variations of more-phological parameters according to localities is in agreement with general biological principles that morphological features differs from population as well as from one locality to another (Kadiyama 1935 and Hall 1962).

Ivanov and Krylov (1980) studied this relationship for *P latisulcatu* collected from the western Indian ocean and obtained the following relations

$W = 1\text{-}0296 \times 10^{-4} L^{2\text{-}5259}$ for females and
$W = 1\text{-}0130 \times 10^{-5} L^{2.9596}$ for males and
$W = 1\text{-}8990 \times 10^{-5} L^{2.8471}$ for combined sexes

Hall (1962 found three different relationships between body-weight and carapace length for *P. Japonicus* at different areas as follows:

$W = 0.013\ C^{3.000}$
$W = 0.0071\ C^{3.0093}$
$W = 1.0304\ C^{2.429}$

He reported also that although the relationship between weight and carapace length between species of the same genus may be similar, even between closely similar species of a genus, the relationship differs.

Takeo Imai (1977) showed that the value of exponent **b** usually differs from a species to species and lies in the range of 2.4 to 3.1.

Such changes in the values of **b** may be attributed either to difference in methodology, or to factors like overfishing, food competition, influence of changing environmental conditions on the general well-being of the shrimp stock or trophic potential of the lakes.

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