Rev. Biol. Trop., 44(3)/45(1): 627-630, 1996-1997

BRIEF ARTICLE

Postlarval morphology of the Western White Shrimp *Penaeus occidentalis* (Crustacea: Pennaeidae)

Hiroshi Kitani M.
JICA/Escuela de Ciencias Biológicas, Universidad Nacional, Heredia, Costa Rica.

(Rec. 15-I-1996. Rev. 20-VI-1996. Acep. 16-VII-1996)

Resumen: Las poslarvas de padres conocidos de *Penaeus occidentalis* criadas en el laboratorio difieren de las silvestres en longitud del caparazón cuando aparecen las primeras espínulas y espinas, número de dientes rostrales, longitud de flagelos antenulares y crecimiento relativo de carpos entre longitud del caparazón. La presencia de espínulas dorsales en el sexto segmento abdominal no es una característica del subgénero.

Key words: Marine shrimp, morphology, postlarvae, Western White Shrimp, Penaeidae, *Penaeus occidentalis*, eastern Pacific coast.

The postlarval morphology of wild *Penaeus occidentalis* was described by Kitani (1994), but a comparison between wild and laboratory postlarvae was not available. This paper presents that comparison.

Several females spawned in a laboratory of the National University, Costa Rica, and the postlarvae (afterwards called simply "larvae") were fed nauplii of *Artemia* sp. The water temperature and the salinity were 26.0-27.0°C and 32.0-33.0 ppt. Sixteen larvaewere examined. Wild larvaewere collected by handnet at Cocoroca Beach in the Gulf of Nicoya, Costa Rica and identified following Kitani (1994); 57 specimens was examined. All specimens were fixed with 5-10% formalin.

Besides terminology and characters described by Kitani (1993a, b, 1994), two additiional characters were examined:

(1) Relative length of the antennal flagellum (b) against the length of scaphocerite (a) (Ante.flagellum: b/a) (Fig. 1, A).

(2) Relative length of the median flagellum (b) against the lateral (a) of antennule (Medi./Late.: b/a) (Fig. 1, B).

The CL of reared larvae was 1.05-4.75 mm (1.51-5.00 mm in wild postlarvae). See Table 1. The CL and the BL of seven specimens of the first larvae(PL-1) were 1.05-1.13 mm and 4.63-4.80 mm, respectively. The length of carpus, 6th abdominal somite, antennal flagellum and antennular flagellum were not measured.

The spinules around the epigastric tooth (Epiga.) were absent in the wild postlarvae, while one pair of those was present in the reared specimens over 4.60 mm CL. Dorsal spinules on the 6th abdominal somite (6th abd.) were present in the reared specimens over 3.38mm CL and absent in those under that CL. Those spinules were absent in the wild larvae-under 3.03 mm CL and present in those over 3.43 mm CL, however that number was one or two pairs.

A pair of antennal spines (Antennal spine) was absent in the wild larvae under 2.13 mm CL, and present in those over 2.28 mm CL. The spines were present in the reared larvaeover 2.33 mm CL, however the smallest specimen of 2.33 mm CL had one minute spine only on the left side.

TABLE 1

Morphological characters of the reared and the wild postlarvae of P. occidentalis *according to the carapace length (CL)*

CL	Characters	Labo.	Wild	CL	Characters	Labo.	Wild
	Epiga./6th abd.	(-)(-)			Epiga./6th abd.		(-)(-)
PL 1	Antennal spine	-		2.81	Antennal spine	+	
(1.05-	Rostral length	5/5		-	Rostral length		4/5
1.13)	Thoracic spines	(+)(+)	n.d.	3.00	Thoracic spines	n.d.	(-/+)(-)
	Rostralteeth	0			Rostral teeth		8-9/3
	Ante.flagellum	n.d.			Ante.flagellum		< 20/10
	Late./Madi.	n.d.			Late./Madi.		14-15/10
	Epiga./6th abd.		(-)(-)		Epiga./6th abd.		(-)(-/+)
1.50	Antennal spine		-	3.01	Antennal spine		+
-	Rostral length		4/5	-	Rostral length		4/5
1.80	Thoracic spines	n.d.	(+)(-/+)	3.20	Thoracic spines	n.d.	(-/+)(-)
	Rostral teeth		3-4/0		Rostral teeth		9/3
	Ante.flagellum		9-12/10		Ante.flagellum		< 20/10
	Late./Madi.		12-13/10		Late./Madi.		15/10
	Epiga./6th abd.		(-)(-)		Epiga./6th abd.	(-)(-/+)	(-)(-/+)
1.81	Antennal spine		-	3.21	Antennal spine	+	+
-	Rostral length		4/5	-	Rostral length	5/5	4/5-5/5
2.00	Thoracic spines	n.d.	(+)(-/+)	3.40	Thoracic spines	(-)(-)	(-/+)(-)
	Rostral teeth		4-5/0		Rostral teeth	8-9/1-3	8/3
	Ante.flagellum		11-12/10		Ante.flagellum	< 20/10	< 20/10
	Late./Madi.		13/10		Late./Madi.	12-13/10	15/10
	Epiga./6th abd.		(-)(-)		Epiga./6th abd.		(-)(+)
2.01	Antennal spine		-	3.41	Antennal spine		+
-	Rostral length		4/5	-	Rostral length		4/5-5/5
2.20	Thoracic spines	n.d.	(+)(-)	3.60	Thoracic spines	n.d.	(-)(-)
	Rostral teeth		5-6/0		Rostralteeth		8-9/3-4
	Ante.flagellum		13/10		Ante.flagellum		< 20/10
	Late./Madi.		13/10		Late./Madi.		15/10
	Epiga./6th abd.	(-)(-)	(-)(-)		Epiga./6th abd.	(-)(+)	(-)(+)
2.21	Antennal spine	-/+	+	3.60	Antennal spine	+	+
-	Rostral length	4/5	4/5	-	Rostral length	5/5-6/5	4/5-5/5
2.40	Thoracic spines	(+)(-)	(+)(-)	3.80	Thoracic spines	(-)(-)	(-)(-)
	Rostral teeth	5/0	6-8/0-2		Rostral teeth	9/3-4	9/4
	Ante.flagellum	14/10	20/10		Ante.flagellum	< 20/10	< 20/10
	Late./Madi.	12/10	13/10		Late./Madi.	13/10	14-15/10
	Epiga./6th abd.	(-)(-)	(-)(-)		Epiga./6th abd.		(-)(+)
2.41	Antennal spine	+	+	3.81	Antennal spine		+
-	Rostral length	4/5-5/5	4/5	-	Rostral length		5/5
2.60	Thoracic spines	(+)(-)	(+)(-)	4.00	Thoracic spines	n.d.	(-)(-)
	Rostral teeth	5/0	7-8/1-2		Rostral teeth		9-10/3-4
	Ante.flagellum	20/10	< 20/10		Ante.flagellum		< 20/10
	Late./Madi.	12/10	13/10		Late./Madi.		15/10
	Epiga./6th abd.		(-)(-)		Epiga./6th abd.	(-/+)(+)	(-)(-/+)
2.61	Antennal spine		+	4.01	Antennal spine	+	+
-	Rostral length		4/5	-	Rostral length	5/5	5/5-6/5
2.80	Thoracic spines	n.d.	(-/+)(-)	5.00	Thoracic spines	(-)(-)	(-)(-)
	Rostral teeth		8-9/1-2		Rostral teeth	8-9/3-4	9-10/4-5
	Ante.flagellum		< 20/10		Ante.flagellum	< 20/10	< 20/10
	Late./Madi.		13-14/10		Late./Madi.	13-15/10	15-16/10

PL: Postlarvae. Labo.: reared postlarvae. Wild: wild postlarvae. n.d.: no data. +: present.
-: absent. -/+: sometimes absent, and somotimes present. Thoracic spines: (7th)/(8th).
Rostral teeth: (dorsal)/(ventral). < 20/10: longer more than two times.

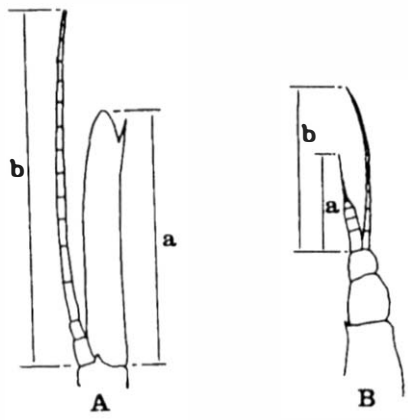

Fig. 1. Lenght of antennal flagellum and escaphocerite (A), and antennulal flagella (B).

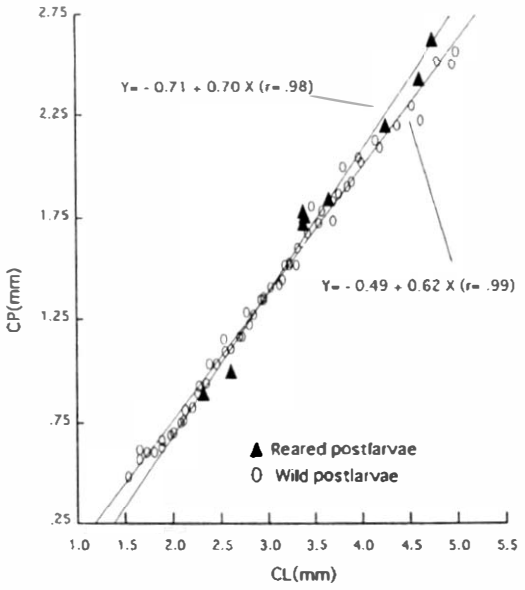

Fig. 2. Relationship between the carapace length (CL) and the length of carpus of the 3rd pereopod (CP) of *P. occidentalis*.

The relative rostral length (Rostral length) ranged 4/5-6/5 in the reared and the wild postlarvae.

The thoracic spines were reduced in size and disappeared along with the growth, showing the spine formula of (+)(+), (+)(-) and (-)(-). The spine on the 7th thoracic sternite remained longer than that of the 8th. The reared specimens over 3.38 mm CL and the wild ones over 3.23 mm CL had no thoracic spines, however a bud-like protuberance on the 7th thoracic sternite was sometimes present on the specimens under 3.65 mm CL and 4.95 mm CL, respectively.

The length of antennal flagellum (Ante.flagellum) in the wild larvaeover 2.28 mm CL and the reared ones over 2.60 mm CL was over two times longer than the length of scaphocerite.

The ratio between the lateral and the median flagella (Medi./Late.) ranged from 12/10 to 16/10 in the wild, and from 12/10 to 15/10 in the reared postlarvae.

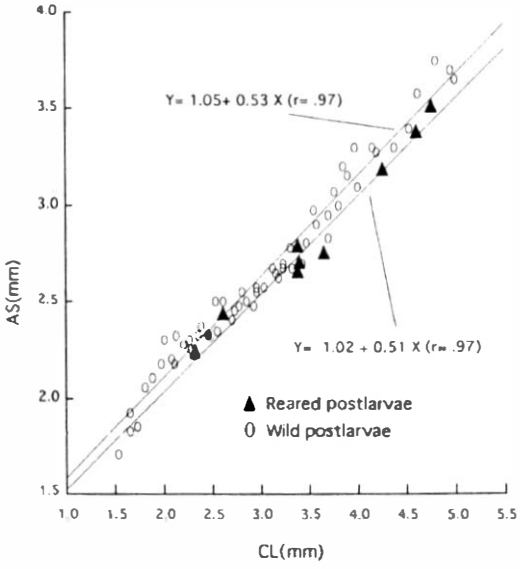

Fig. 3. Relationship between the carapace length (CL) and the length of 6th abdominal somite (AS) of *P. occidentalis*.

The relation between the CL and the CP (Fig. 2), and that between the CL and the AS (Fig. 3) are shown. Those of the reared and the wild larvaeshowed linear relations.

Kitani (1994) reported that the absence of dorsal spinules on the 6th abdominal somite was a subgeneric character of *Litopenaeus*, but the present study on

P. (L.) occidentalis detected the spinules on the reared larvaeover 3.38 mm CL and the wild ones over 3.43 mm CL, which indicates that the presence or absence of dorsal spinules on the 6th abdominal somite is not a subgeneric character.

The relative growth of the 6th abdominal somite showed a slight difference between the wild and the reared postlarvae. The length of

the 6th abdominal somite of the wild larvae was slightly longer than that of the reared ones. Kitani (1993b) reported also this phenomenon in *P. vannamei*, and suggested a possible reason of different living conditions. Meanwhile, the relative growth of carpus showed a similarity between the wild and reared postlarvae, but the length of carpus of the reared larvaechanged to be longer than that of the wild ones. Kitani (1993a, b) reported that changing tendency, hut carpus of wild specimens became longer.

This study was conducted in conjunction with the technical cooperation of JICA (Japan International Cooperation Agency) to National University in Costa Rica.

REFERENCES

Kitani H. 1993a: Morphology of postlarvaeof the Yellowleg shrimp *Penaeus californiensis*. Nippon Suisan Gakkaishi 59:217-221.

Kitani H. 1993b: Morphology of postlarvae of the Whiteleg shrimp *Penaeus vannamei*. Nippon Suisan Gakkaishi 59:223-227.

Kitani H. 1994. Identification of wild postlarvae of the Penaeid shrimps, genus *Penaeus*, in the Pacific coast of Central America. Fish. Sci. 0:243-247.