Bull. Korean Fish. Soc. 4(2) ; 1971 韓水誌 4(2) . 1971

Effects of Feeding and Bottom Conditions on the Carapace Growth of *Penaeus orientalis*

by

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*Penaeus orientalis*의 두흉갑 성장에 미치는 투이와 저질 조건의 영향

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요 약

1. 상이한 투이와 저질 조건들이 *Penaeus orientalis*의 성장률에 미치는 영향에 관하여 연구하였다.
2. 부화 후 일수 (*D*)와 *P. orientalis*의 두흉갑장(*L*) 간의 관계는 아래의 식으로 표시된다.
   투이 및 이질 저토구 : $L=0.3939D+6.8965$
   투이 및 사질 저토구 : $L=0.2652D+12.2620$
   무투이 및 사질 저토구 : $L=0.0713D+16.0655$
   무투이 및 이질 저토구 : $L=0.2852D+7,8620$
3. 이질 저토구 내의 *P. orientalis*의 두흉갑 성장률은 투이 여부와는 관계없이 사질 저토구의 그것보다 높다.

INTRODUCTION

Penaeus orientalis, 10 *mm* in body length, has planktonic or swimming habits (Hudinaga, 1942). Young *P. japonicus,* which is approximately 2 *mm* in carapace length and 10 *mm* in body length, begins its bottom life on the tidal zone of Japan (Yasuda et al., 1957). The relationship between the carapace length and the body length of *P. japonicus* (Yatsuyanagi and Maekawa, 1955) and that of *P. semisulcatus* (Ikematsu, 1963) were studied. The relationship between the carapace length and the body length of *P. japonicus* and that between the carapace length and the body weight of it were studied (Pyen and Rho, 1970).

There are a few papers on the growth, artificial fertilization, and development (Kim, 1967) and on the ecology (Yoshida, 1949; Ikeda, 1962) of *P. orientalis.*

In this study it has been investigated that the effects of several different bottom stata and feedings on the growth rates of *P. orientalis*.

MATERIAL and METHODS

Penaeus orientalis, found only in the Yellow Sea, the South Sea of Korea and the coastal waters of China, was used as the material for this experiment. Young prawns, 9.2+0.04 *mm* in body length, were collected from the commercial producer in Ahsan-gun, Choongnam, Korea. The prawns of 1,200 per 180 cubic meter of sea water were reared in each experimental region of the breeding pond filled with sea water in Inchon Bay. The experimental area was divided into 4 regions: A,B,C, and D. All the regions were enclosed by a nylon net of 2 *mm* mesh. The prawns in regions A and B were fed on marine bivalves (*Tapes* sp., *Mactra* sp., *Macoma* sp., etc.) and/or fishes, and no food was given to the prawns in regions C and D. The bottom of regions A and D was covered with mud, and that of B and C was covered with sand to a depth of 10 *cm*. The first estimation of the growth rate was started on 30 days after hatching. The carapace length and the body length of 5 individuals from each region were estimated at intervals of 10 days.

RESULTS and DISCUSSION

In the region A the regression equation of the relationship between the days (D) after hatching and the carapace length (L) of *P. orientalis* is L=0.03939D+6.8965 (Fig.1).

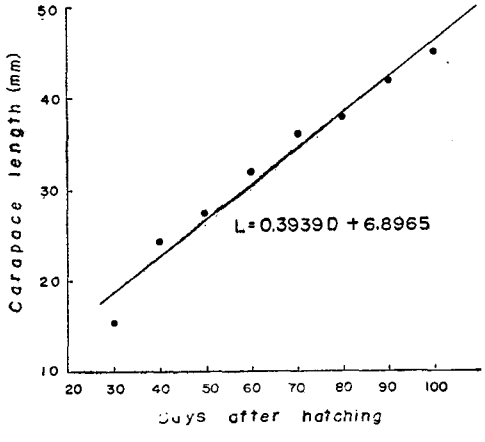

Fig. 1. Relationship between the days (D) after hatching and the carapace length (L) of *P. orientalis* in region A.

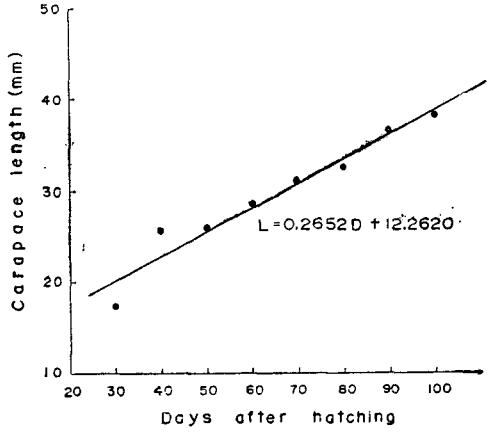

Fig. 2. Relationship between the days (D) after hatching and the carapace length (L) of *P. orientalis* in region B.

In the region B the regression equation of the relationship is L=0.2652D+12.2620 (Fig. 2). In comparing Figs. 1 and 2, the growth rate of *P. orientalis* in the region A is higher than that of the region B. In the same feeding condition, the muddy bottom is more favorable for

the growth of *P. orientalis* than that of sandy bottom. This result is related to the simil reports that the main habitat of *P. semisulcatus* is the muddy bottom region and the *Metapen aeopsis barbata* is abundant on the tidelands covered with mud under the natural environmen (Ikematsu, 1963).

In the region C the regression equation of the relationship between the days (D) after hatching and the carapace length (L) is $L=0.0713D+16.0655$ ($r=1.79<2.45=t_{0.05}$) (Fig. 3).

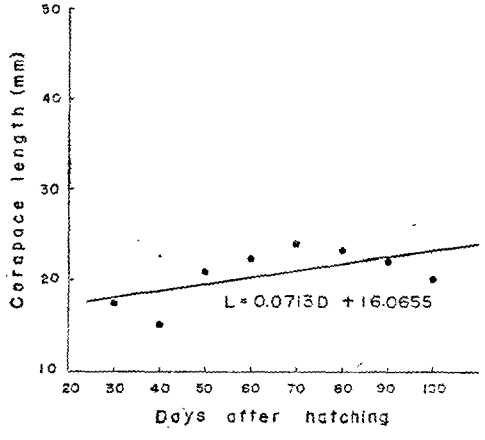

Fig. 3. Relationship between the days (D) after hatching and the carapace length (L) of *P. orientalis* in region C.

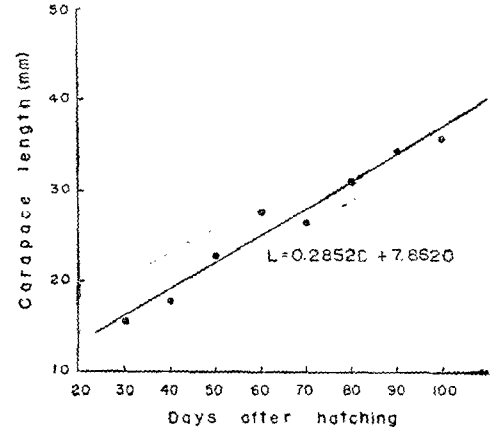

Fig. 4. Relationship between the days (D) after hatching and the carapace length (L) of *P. orientalis* in region D.

The regression equation between the days after hatching and the carapace length is $L=0.2852D+7.8620$ in the region D (Fig. 4).

In comparing Figs. 3 and 4, the growth rate of *P. orientalis* in the region D is higher than that in the region C. It was reported that the number of *P. japonicus* is not related to the sandy bottom (Yasuda et al., 1957). In this study, however, the sandy bottom is unfavorable

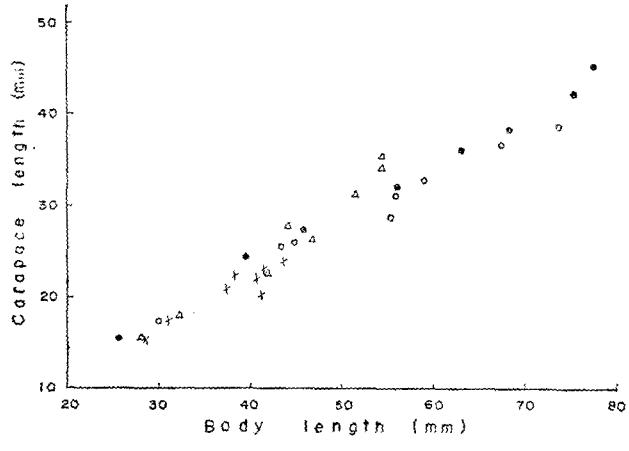

Fig. 5. Relationships between the body length and the carapace length of *P. orientalis* in different regions. Regions : ●, A; ○, B; ×, C; △, D.

for the growth of *P. orientalis* in comparison with the muddy bottom (Figs. 3 and 4). Furthermore, Fig. 3 shows that the carapace growth of the prawn is remarkably limited under the conditions of nonfeeding and sandy bottom.

The relationship between the body length and the carapace length of *P. orientalis* is represented in Fig. 5. The growth rates of the carapace and body lengths in both regions A and B are higher than those in regions C and D. In comparing the growth rate of the carapace of *P. orientalis* in the muddy experimental region with that of the carapace in the sandy region, the growth rate in the muddy bottom is higher than that in the sandy bottom whether the prawns are fed or not.

SUMMARY

1. The effects of different conditions of the feedings in connection with the bottom stata on the growth rate of *Penaeus orientalis* have been investigated.

2. The relationships between the days (D) after hatching and the carapace lengths (L) of *P. orientalis* are represented by the following equations:

Feeding, muddy bottom: $L=0.3939D+6.8965$

Feeding, sandy bottom: $L=0.2652D+12.2620$

Nonfeeding, sandy bottom: $L=0.0713D+16.0655$

Nonfeeding, muddy bottom: $L=0.2852D+7.8620$

3. The growth rate of the carapace length of *P. orientalis* in the region of muddy bottom is higher than that of the carapace in the sandy bottom whether the prawns are fed or not.

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