

## Reproductive Output of a Minute Crab, *Baruna sinensis* (Decapoda: Brachyura: Ocypodidae: Camptandriinae)

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**Pan-Wen Hsueh (1997)** Reproductive output of a minute crab, *Baruna sinensis* (Decapoda: Brachyura: Ocypodidae: Camptandriinae). *Zoological Studies* 36(2): 111-114. The reproductive output of a minute ocypodid crab, *Baruna sinensis*, was examined. A total of 107 ovigerous females was collected from oyster beds at the Kaomei tidal flat, Taichung, Taiwan, in August and September 1994. Size of carapace width (CW) of ovigerous females ranged from 5 to 9 mm. Fecundity varied for each size class, suggesting a possibility of multiple broods at each size class. Size-fecundity relationship showed a trend of positive allometry but was insignificant in linear regression analysis ( $F$  test,  $p > 0.05$ ). This result probably reflects an irregularity in reproductive output of the crab.

**Key words:** Size at maturity, Fecundity, Size-fecundity relationship, *Baruna sinensis*.

*Baruna sinensis* is a new species recently described by Tan and Huang (1995). It is a minute, sluggishly moving, brachyuran crab that is often found in mudflats, crevices of stone walls, or clutches of oyster shells (Tan and Huang 1995, Hsueh pers. observ.). Report indicates that its distribution is limited to Fujian and Taiwan, China (Tan and Huang 1995). However, in addition to its distributional report, there is no information on the biology of this species.

Fecundity is a major parameter for examining the reproductive output of female brachyuran crabs. In many brachyuran reproductive studies, size-dependent reproductive output in female crabs is well acknowledged (Hines 1982 1991, Hartnoll 1985, Shield 1991). The general rule of this size-fecundity relationship is that larger-sized females produce more eggs while smaller-sized females have fewer eggs (Hines 1982 1991, Hartnoll 1985, Shield 1991). However, in field observations, the author has noticed a rather high variation in fecundity of similar-sized ovigerous females of *B. sinensis*. Hartnoll (1985) suggested that reproductive patterns may affect the rate of growth in adult female crabs. This study reports on the fecun-

dity and size at maturity of this minute and poorly known crab. The size-fecundity relationship of ovigerous female crabs is also analyzed.

### MATERIALS AND METHODS

Field sampling of ovigerous female *Baruna sinensis* was conducted in the months of August and September 1994. Ripe females were taken from crevices of oyster clutches on cobble beds at the Kaomei tidal flat, Taichung County, Taiwan (24°39'N, 120°35'E, Fig. 1). All crabs were measured for carapace width (CW), and the egg clutch of each crab was removed and individually counted under a dissecting microscope. Fecundity and body size of crabs were logarithmically transformed for linear regression analysis (Somers 1991).

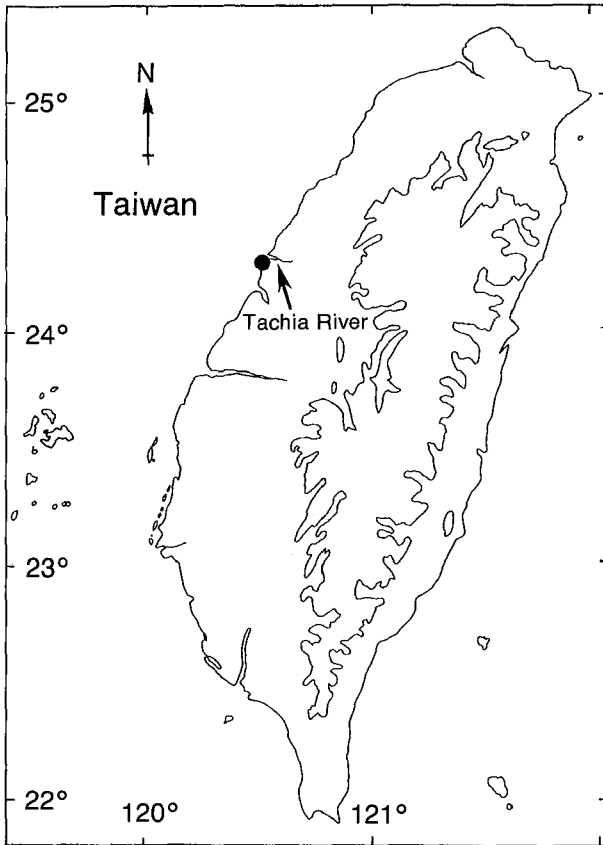
### RESULTS

A total of 107 ovigerous female *Baruna sinensis* was collected from the field in this study. Body sizes of egg-carrying females ranged from 5 to 9

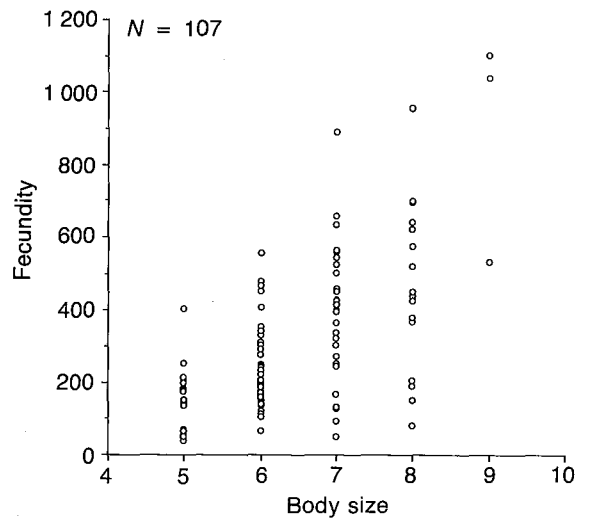
mm CW, with a mean size of  $6.5 \pm 1.0$  mm CW. Among these collected individuals, body sizes of 6 and 7 mm CW comprised the majority (42.2% and 30.4%) of the total collected crabs, followed by crabs sized at 5 (14.2%), 8 (10.8%), and 9 (2.4%) mm CW, respectively. The fecundity of ovigerous females showed a wide range for each body size category (Fig. 2). Ovigerous females sized at 5 mm CW had a fecundity ranging from 38 to 406 eggs with a mean value of  $150.3 \pm 89.8$  eggs per brood. Likewise, ovigerous females sized at 6 mm CW had a fecundity ranging from 65 to 556 eggs with a mean value of  $244.4 \pm 113.9$  eggs per brood. Ovigerous females sized both at 7 and 8 mm CW had the largest ranges in fecundity, with 50 to 894 ( $\bar{x} = 387.9 \pm 186.8$ ) and 80 to 957 ( $\bar{x} = 464 \pm 235.6$ ) eggs per brood, respectively (Fig. 2). Although the reproductive output showed an increase with larger females, the linearity of log/log fecundity and body size was insignificant ( $F$  test,  $p > 0.05$ ) (Fig. 3).

**DISCUSSION**

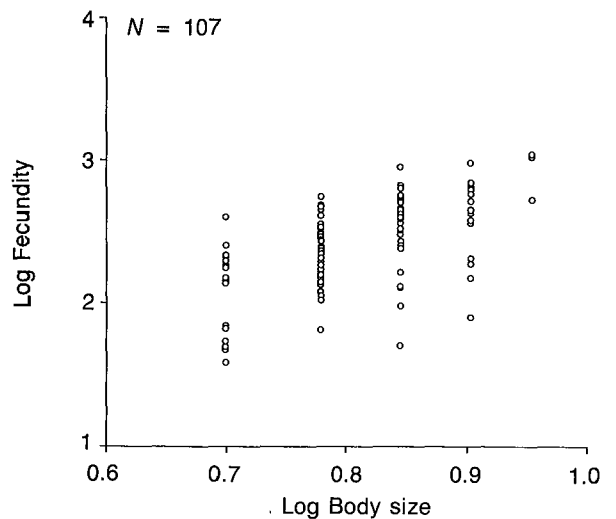
*Baruna sinensis* is a relatively small crab. The sizes of specimens examined by Tan and Huang (1991) were mostly only about 6 mm CW for both males and females. Specimens collected in this study indicate that their body size can reach almost 9 mm CW. However, size distribution of the ovigerous female population at the study site shows that crabs sized 9 mm CW are rather infrequent, and most individuals sized 5 to 8 mm CW, with population median skewed to 6 mm CW. The body size range of ovigerous females



**Fig. 1.** Map of Taiwan. Location of the study site indicated by enclosed circle.



**Fig. 2.** Fecundity of various sized female *Baruna sinensis*.



**Fig. 3.** Log-log relation of fecundity and body size of female *Baruna sinensis*.

in this study suggests that the size at onset of maturity for female crabs is 5 mm CW, and the largest ovigerous females can be as twice large as the smallest ones. This variation in body size of ovigerous females appears to be quite common in brachyuran crabs. Hines (1991) and Shields (1991) both noticed a wide range of size variation present in ovigerous females of 9 species of *Cancer* (Cancridae). For example, sizes of ovigerous *Cancer oregonensis* and *C. antennarius* ranged from 8 to 27 and 65 to 120 mm CW, respectively. Haddon (1993) reported an average size of  $84.6 \pm 9.65$  mm CW for ovigerous females of *Ovalipes catharus* (Portunidae), but the size range of smaller ovigerous crabs could be as small as 41-60 mm CW. Wenner et al. (1985) suggested that temperature, food quality, and genotypic differences may be responsible for the variation in size at onset of egg production. Alternatively, the variation in size of ovigerous crabs may reflect a determinate growth pattern with multiple post-puberty molts of female *B. sinensis*. Hartnoll (1985) reported an indefinite post-puberty molting pattern in the brachyuran families Cancridae, Grapsidae, Ocypodidae, and Xanthidae. He suggested that this reproductive pattern may allow egg production initiated at a small size to offset the risk of reproductive failure due to early mortality.

Fecundity for each size class of ovigerous *B. sinensis* also varied, indicating a possibility of multiple broods at each size class. More than 1 batch of eggs laid in each mature instar is well documented from many decapod brachyurans (Pearson 1908, Churchill 1919, Arriloo 1940, Boolootian et al. 1959, Cheung 1969, Hartnoll 1972, Schembri 1982). Boolootian et al. (1959) observed adult *Pugettia producta* (Majidae) becoming ovigerous again in aquaria 2 d after releasing zoeae of the previous batch. Brood sizes among different batches often varied as well.

In decapods, size-dependent reproductive output has been extensively documented (Hines 1982 1991, Hartnoll 1985, Lipcius 1985, MacDiarmid 1989). Larger-sized females often produce more eggs than smaller females. However, an insignificant linearity of log/log fecundity and body size of ovigerous *B. sinensis* in the present study may probably reflect an irregularity in reproductive output of the crab.

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## 中華扁背蟹之生殖產量研究

薛攀文<sup>1</sup>

本研究在探討體型微小之中華扁背蟹 (*Baruna sinensis*) 之生殖產量。在 1994 年的八月與九月間，從臺中縣高美灘地牡蠣床上一共採得 107 隻的抱卵雌蟹。這些抱卵雌蟹的甲殼寬分別在 5-9 公釐之間，由上述抱卵雌蟹最小甲殼寬可推知雌蟹之性成熟體型可小至 5 公釐。雌蟹單一個體之一次抱卵量在同體型下之變異頗多，這有可能由於每一體型之性成熟雌蟹，其單一個體可排卵多次所致。在性成熟雌蟹的體型與抱卵量關係上，其抱卵數似乎隨體型增大而增多，然而在線性分析上卻不顯著 ( $F$  test,  $p > 0.05$ )。這現象可能是反應這種蟹類產卵量的不規則性。

關鍵詞：性成熟體型，產卵量，體型與產卵量關係，中華扁背蟹。

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