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Variations of Reproductive Traits of Two Semi-terrestrial Isopods, *Ligia exotica* and *L. taiwanensis* (Crustacea: Ligiidae), in Southern Taiwan

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Dept. of Zoology, National Taiwan Univ., Taipei, Taiwan 106, R.O.C. Tel: 886-2-363-0231 ext. 3324, Fax: 886-2-3638554, E-mail: D1205001@ccms.ntu.edu.tw

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Min-Li Tsai, Hon-Cheng Chen (1997) Variations of reproductive traits of two semi-terrestrial isopods, *Ligia exotica* and *L. taiwanensis* (Crustacea: Ligiidae), in southern Taiwan. *Zoological Studies* **36**(1): 33-41. Both inter- and intraspecific reproductive traits of 2 semiterrestrial isopods were examined and compared in an attempt to provide insights into the adaptive strategies of reproduction. Gravid females of *Ligia exotica* (Roux) from the littoral zone and *Ligia taiwanensis* (Lee) from mountain brooks show differences in reproductive allocation per brood ($F_{1,198} = 706$, $p < 0.001$), weight-specific egg weight ($F_{1,198} = 166$, $p < 0.001$), and weight-specific fecundity ($F_{1,198} = 120$, $p < 0.001$), but they also display similarities in the interrelationships between reproductive traits.

The reproductive traits of *L. taiwanensis*, such as larger weight-specific egg size and lower reproductive allocation, seem more in accordance with theoretical predictions for *K*-selected traits than those of *L. exotica*. When the effects of body size are removed, both species show a significant positive correlation between fecundity and brood weight (*L. exotica*: $r = + 0.49$, $t = 5.50$, $p < 0.001$; *L. taiwanensis*: $r = + 0.96$, $t = 36.09$, $p < 0.001$), and a negative correlation between fecundity and egg size (*L. exotica*: $r = - 0.77$, $t = 11.78$, $p < 0.001$; *L. taiwanensis*: $r = - 0.32$, $t = 3.41$, $p < 0.001$) intraspecifically. The reciprocal relationships between egg size and fecunidity in *L. exotica* and *L. taiwanensis* seem to match the assumption of optimality theories of life-history evolution.

Key words: *Ligia*, Reciprocal relationship, Life-history evolution.

Ligia exotica is a common, widely distributed semiterrestrial species in the supralittoral zone of sheltered and exposed coasts around Taiwan (Chen 1987). In contrast, *L. taiwanensis* is only found on the banks of mountain brooks on the Hengchuen Peninsula in southern Taiwan. The resemblances in morphology and taxonomic relationship between these 2 species have been noted by Lee (1994).

Life history patterns and reproductive traits of crustaceans in the same or different environments are extremely variable (Sastry 1983). Warburg (1994) investigated 7 species of terrestrial isopods inhabiting 3 types of habitats and found no positive relationship between the reproductive patterns and their anatomy, taxonomy, or ecological conditions within their habitats. Different isopod species with specific morphological constraints may evolve different strategies. The survival and reproduction of an organism are a function of its particular ecological setting, as governed by the effects of mechanical and physiological constraints. Thus ecological constraints form the backdrop for all life history (Roff 1992).

There have been some studies on intraspecific variations in isopod life histories (Sunderland et al. 1984, Warburg 1987, Souty et al. 1994). It is conceivable that species with close taxonomic relationships that are similar in morphology and physiology would evolve different reproduction strategies in response to constraints of different environmental challenges. Intraspecific correlation

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