THE REPRODUCTIVE BEHAVIOUR AND MATE CHOICE OF 
THE FIDDLER CRAB (UCA LACTEA LACTEA) 
IN MID-TAIWAN

by

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(With 4 Figures)

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Introduction

Uca reproduces in either semi-monthly cycles (Crane, 1958; Christy, 1978, 1982a, 1982b; Greenspan, 1982; Salmon, 1984) or monthly cycles (Zucker, 1978). Recent studies of the mating system and mate choice of U. pugilator and U. vocans found the two species to be very different from each other (Christy, 1983; Christy & Salmon, 1984; Salmon, 1984). U. vocans is widely distributed in the tropical western and Indo-Pacific areas (Crane, 1975). It adopts a resource-independent promiscuous mating system and female choice seems to be based on the precopulatory behaviour of the males (Salmon, 1984). U. pugilator lives along the eastern coast of America. It follows a resource-defense polygynous mating system, and females choose males by their burrow quality (Christy, 1983).

Taxonomically, U. lactea belongs to the same subgenus Celuca as U. pugilator, while it overlaps geographically with U. vocans through most of its range. The U. lactea found in Taiwan belongs to the subspecies U. l. lactea which ranges from Hong Kong to Japan. Yamaguchi (1971) described qualitatively U. lactea's mating behaviour, and Murai et al. (1987) studied some male-female interactions and the gonadal conditions of this
species in the breeding season. Its mating system, however, is complex (Murai et al., 1987) and much remains to be understood. Furthermore, it is worthwhile to examine closely the reproductive behaviour of U. lactea in order to compare and understand better the mating systems and the criteria of mate choice in fiddler crabs.

This study aims 1) to determine the daily activity and reproductive cycle of U. lactea, and 2) to investigate the nature of the mating system and mate choice in this species.

Methods and materials

The study site and basic measurements.

This study was carried out inside Chuanhsing Industrial Park in Changhua County, in central Taiwan. The study site was on a mud flat separated from the sea by a dike through which water could pass at high tide by a drain. Besides U. lactea, there were two other species of fiddlers on the flat, U. arcuata and U. formosensis.

We erected two 0.6 cm wire mesh enclosures (Block I and Block II). They were 50 m apart and each covered 1.5 x 1.5 m. The wire fences stood 8 cm above the ground and were buried 7 cm deep in the mud. They were designed to prevent crabs from leaving or entering the area, while still permitting them to live under natural tidal conditions and to feed on naturally replenished food. The two enclosures were both located on the supratidal zone. There were a few individuals of the crab Helice tridens in the enclosures.

Between 14 July and 13 September 1985, we caught and measured all the U. lactea that were above ground within each enclosure, and recorded the size of the major cheliped and the condition of appendages for each individual. Each crab was then marked with nail polish on its carapace for individual identification, and returned to its burrow within 10 minutes. When a mark became faint, we tried to recapture the crab to mark it again. When unmarked individuals emerged during observations, we tried to capture and mark them when possible. Still, a few unmarked crabs appeared periodically either because the nail polish was totally rubbed off, or we had failed to capture them earlier. A flag bearing the same mark as the crab was inserted beside its burrow. The location of the burrow and any subsequent burrow change were noted.

Field observation.

Field observations were made in two periods. Between 14 July and 13 September 1985, we focused on body size, daily activities, and reproductive behaviour, while from 7 March to 4 April 1986 we investigated courtship behaviour. U. lactea are diurnal and stay in their burrows during high tide. Thus, we made only about 5 hours of observations during the low tide period of each day. Five undergraduate students assisted us in data gathering.

1. Daily activities.

Observations were made with two persons sitting quietly on opposite sides of one enclosure, each watching over half of the area. Given the small size of the enclosures and the slow pace of activities of U. lactea, we were able to observe practically all of the above-ground activities within each enclosure. We recorded the time an observation began, the total number of males and females above ground, and which of the marked individuals were present. In addition, we recorded the following information.