DIMORPHISM OF CHELIPEDS IN THE FIDDLER CRAB, *UCA ARCUATA*

BY

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ABSTRACT

Dimorphism of chelipeds due to regeneration occurs both in males and females of *Uca arcuata* (De Haan, 1833). After the loss of the large cheliped in males, a new large claw is regenerated at its original place, and no transformation of handedness occurs. However, the regenerated chelipeds have no distinct tooth on either the movable or immovable fingers. Females have a pair of teeth on their chelipeds but the regenerated cheliped has no teeth. Young crabs of early stages, both males and females, possess two small, symmetrical chelipeds with teeth, but regenerated chelipeds have no teeth. It is assumed that both males and females of *U. arcuata* have a special morphogenetic mechanism at the base of the cheliped. The mechanism starts to work after the loss of the cheliped and transforms the regenerating cheliped into the toothless type.

RÉSUMÉ

Le dimorphisme des ché lipè des, dû à la régénération, est présent à la fois chez les mâles et chez les femelles de *Uca arcuata* (De Haan, 1833). Après la perte du grand ché lipè de chez les mâles, une nouvelle grande pince est régénérée à sa place originelle et aucune modification de l’état droitier ou gaucher ne se produit. Cependant, les ché lipè des régénérés n’ont pas de dent distincte, aussi bien sur le doigt mobile que sur le doigt fixe. Les femelles ont une paire de dents sur leurs ché lipè des, mais les ché lipè des régénérés en sont dépourvus. Les jeunes crabes des premiers stades, qu’ils soient mâles ou femelles, possèdent deux petits ché lipè des symétriques munis de dents, mais les ché lipè des régénérés n’ont pas de dents. On suppose que les mâles, comme les femelles de *U. arcuata*, ont un mécanisme morphogénétique particulier à la base du ché lipè de. Ce mécanisme commence à fonctionner après la perte du ché lipè de et transforme le ché lipè de en régénération en type édenté.

INTRODUCTION

The most characteristic feature of the fiddler crabs of genus *Uca* is the presence of one enormously developed large cheliped in males. In several species, dimorphism of the large cheliped has been reported. Von Hagen (1962) found that males of *Uca tangeri* (Eydoux, 1835) regenerate a large cheliped on the same place as the original large claw. However, the regenerated cheliped lacked teeth. The
original cheliped has a tooth on the upper margin of the pollex and one on the lower margin of the dactyl. Those teeth are absent in the regenerated cheliped. A similar morphological change is found in *Uca lactea* (De Haan, 1835) (Yamaguchi, 1973). The original large cheliped of *U. lactea* develops a distinct tooth on both pollex and dactyl. After the accidental loss of the large cheliped, a new one appears at the same place; there occurs no reversal in handedness. However, the regenerated cheliped has no teeth. In addition to the disappearance of the teeth there occurs another morphological change. Well-developed regenerated chelipeds are more slender and thinner than the original ones. Yamaguchi & Takeda (1973) examined specimens of *Uca marionis* (Desmarest, 1825) (= *U. vocans* (Linnaeus, 1758)) obtained at the Yaeyama Group of the Ryukyu Islands, Japan. Among the specimens examined they found a very large male with a small, regenerated large cheliped. Its chela was toothless. They supposed that larger crabs, being older than smaller crabs, had more chance to lose their large chelipeds by fighting or by accident. The percentage of the toothless chelipeds would increase with size, if caused by regeneration. Yamaguchi & Takeda (1973) divided the collected specimens into four size groups. The percentage of the toothless type in Group I, containing the smallest specimens with a carapace width (CW) of 7 to 11 mm, was 2.1 and it increased to 29.6 in Group IV, containing the largest specimens, with a CW of 22 to 26 mm. They concluded that the toothless cheliped is regenerated. George & Jones (1983) revised the fiddler crabs of Australia and showed the occurrence of dimorphism in three species, viz., *U. elegans* George & Jones, 1983, *U. hirsutimanus* George & Jones, 1983 and *U. voveris* McNeill, 1920 (= *U. vocans voveris* of Crane (1975)). I examined the specimens held in the Nationaal Natuurhistorisch Museum, Leiden and in the Natural History Museum, London and found 21 species with a cheliped dimorphism (Yamaguchi, 1994). Those are as follows (excluding the above-mentioned species): *U. albimanus* (H. Milne Edwards, 1852), *U. annulipes* (H. Milne Edwards, 1837), *U. coarctata* (H. Milne Edwards, 1852), *U. dussumieri* (H. Milne Edwards, 1852), *U. dussumieri spicata* Crane, 1975, *U. elegans* George & Jones, 1982, *U. forcipata* (Adams & White, 1848), *U. gaimardi* (H. Milne Edwards, 1852), *U. inversa* (Hoffmann, 1874), *U. leptodactyla* Rathbun, 1898, *U. perplexa* (H. Milne Edwards, 1837), *U. pugilator* (Bosc, 1802), *U. rosea* (Tweedie, 1937), *U. signata* (Hess, 1865), *U. tetragonon* (Herbst, 1790), *U. urvillei* (H. Milne Edwards, 1852), *U. vocans hesperiae* Crane, 1975. Backwell et al. (2000) made a detailed examination of the regenerated and original large chelipeds of *Uca annulipes*. They showed that regenerated chelipeds are slender and less robust.

Adult males of *U. arcuata* have a very distinct dimorphism of the large cheliped. The toothless chela is slender and sometimes longer than the toothed chela. I also found a cheliped dimorphism in females. Most females have two small