

# An ambidextrous fiddler crab

by Peter Hogarth and Mark Beech

Anyone who has spent time in mangrove habitats will have been struck by the abundance of colourful little fiddler crabs (*Uca*), several species of which occur in the UAE (Hogarth and Beech, *in press*). Male fiddlers have one claw very much larger than the other – in some species it may be longer than the animal's entire body and weigh a third or more of the total body mass. The minor claw of males, and both claws of females, are very different in shape and are used for feeding. *Uca* feeds by scooping up sand or mud, using its mouthparts to separate organic particles from sand grains, dumping the latter and passing the digestible organic matter into its gut. As males have only one feeding claw, compared with the two of females, feeding is much harder work for them (Weissburg 1993).

The male's enlarged claw is waved around in a distinctive pattern characteristic of each species, as a signal to attract females and deter rival males. If the threat fails to deter, then the claw becomes a weapon in the ensuing joust. In some species of *Uca* the major claw is consistently on one side, usually the right, but in most species, such as *U. inversa*, the population splits into roughly equal numbers of right-handed and left-handed individuals.

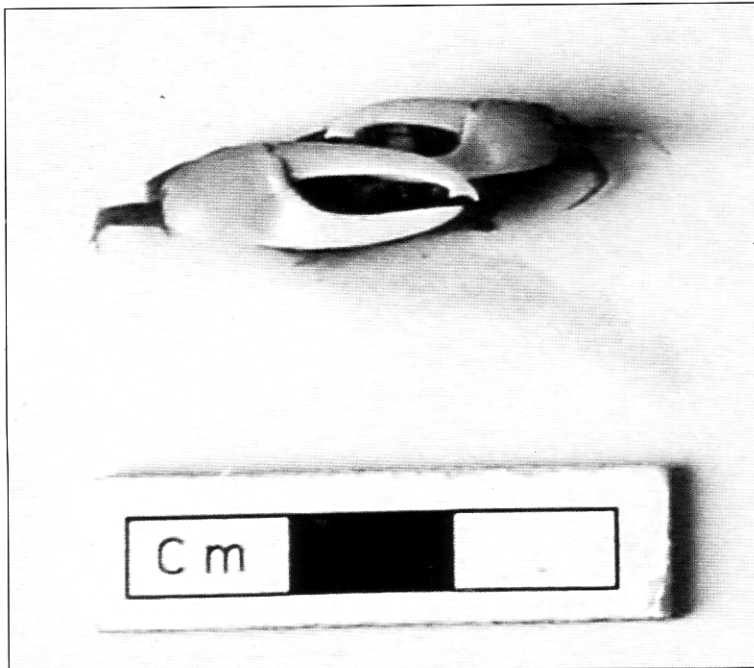
On a recent visit to the mangroves of Kalba, we came across a male *Uca inversa*, one of the common fiddler species of the UAE, which bore two major claws, one slightly smaller than the other, but both clearly shaped for display rather than feeding purposes (*see Figure*). Males with two major claws have been noted in one or two species of *Uca*, but are extremely rare (Takeda and

Yamaguchi 1973, Yamaguchi 1977, and personal communications from several colleagues).

How did this come about? It raises questions about what determines fiddler crab handedness in the first place. There have been several theories, none convincingly established. Fiddler crabs start out symmetrical, with handedness appearing progressively in males while they are still small. In exclusively right-handed species this must be determined genetically, but in other species, such as *U. inversa*, it may be random. Once an individual crab becomes left- or right-handed, it never subsequently changes. It has been shown experimentally in several species of *Uca* that if a major claw is lost, the replacement is always another major claw, never a minor one, so handedness remains the same (Vernberg and Costlow 1966, Ahmed 1978).

Losing claws and legs is an occupational hazard of being a crab. In fact, crab legs have a weak point and a special muscle so that they can autotomise, or spontaneously snap off their own leg. This is important to survival. If, for example, a crab is trapped by a stone rolling onto its leg, or if the leg is seized by a predator, the crab can escape. Occasionally a crab can be found hobbling around on two legs and a claw, the remaining seven limbs having been shed.

Crabs are good at regenerating lost limbs. Regeneration takes time, and progress is only made when the crab moults its carapace. Usually the first sign of regeneration is a tiny bud at the point where the leg was lost. After a moult this may appear as a tiny limb folded up within the regeneration bud. After the next moult, this becomes a



Male *Uca inversa* from Khor Kalba - the animal almost concealed by its two major claws

free limb, complete in all its parts, but much smaller than the one it replaces. It catches up in size over successive moults.

The Kalba specimen has one claw smaller than the other, suggesting that the mistake was made during regeneration of a lost minor claw, and that the regenerating left claw would eventually have increased to full size as a mirror image of the major right hand one. Apart from this, there is no clue about what went wrong. If this is a result of a mistake during regeneration, the size of the smaller major claw indicates that it happened several moults earlier, and that the male has survived successfully for some time. How did it feed during this time, with no minor claw? There have been observations of fiddlers using major claws to shovel mud towards the mouth, and of some that had lost both claws ploughing into the sediment with their mouthparts alone. Feeding may be inefficient, but is still possible, without the requisite limbs.

Finally, it would be interesting to know the impact of having two major claws on this individual's social life. Was it twice as effective at attracting a mate, or were any social advantages outweighed by the cost of carrying two such extravagant structures around and being handicapped in feeding?

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