APPLICATION OF ULTRASOUND TECHNOLOGY TO CRUSTACEAN PHYSIOLOGY; MONITORING CARDIAC AND SCAPHOGNATHITE RATES IN BRACHYURA

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Machines used in diagnostic radiology and cardiology have application in crustacean organ systems. Gribble & Reynolds (1993), and Gribble (1994) demonstrated the use of angiography to describe cardiovascular function in a crab. In January 1994, I made preliminary ultrasound scans of a live crayfish. Although sagittal and transverse series of images produced little resolution of internal organs, movements of the heart and scaphognathites were easily detected. This paper reveals the ability to monitor the activities of these organs in brachyuran crabs.

MATERIALS AND METHODS

Four swimming crabs, *Portunus gibbesii* (Stimpson, 1859) from Florida were maintained in recirculated artificial sea water (34%, 18°C, 8.1-8.9 ppm DO) for 90 days prior to experimental handling. The crabs were fed a diet of frozen mussel, *Mytilus edulis* L., 1758, every other day. All diagnostic observations were conducted in water at the same conditions.
The specimens were partially immobilized for ultrasound analysis. Each crab was secured, in a natural position, to a platform in a manner that did not mask the carapace (fig. 1). A resin-based grate, 15 × 15 cm, with a circular base 75 mm in diameter served as the platform base. A piece of cellulose sponge was cemented to the center of the top of the grate to provide a cradle for the specimen. Velcro™ straps cemented to the underside of the grate edges provided anchoring points for other flexible Velcro™ straps used to secure the crab to the platform.

The platform (with the crab attached) was placed in a plastic aquarium (26 × 16 × 16 cm) filled with 4.8 l of sea water. At least 2 cm of water above the crab provided a depth range through which the specimen could be moved to achieve optimal resolution of ultrasound images. The aquarium was fitted with a siphon tube that facilitated draining, and with an air stone that provided aeration and circulation of the water. The aquarium was placed on an adjustable support jack for ease in positioning the specimen under the probe.