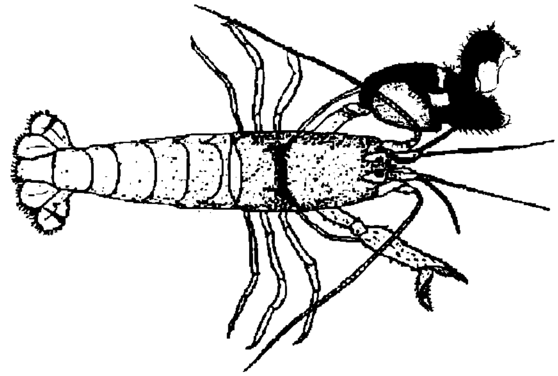

FIG. 1. Drawing of a snapping shrimp (*Alpheus heterochaelis*), approximately 55 mm in size, with its snapper claw cocked open.

FIG. 2. Photograph of the snapper claw, made transparent by a special chemical process, in nearly closed position. The arrow indicates the direction of the water jet.

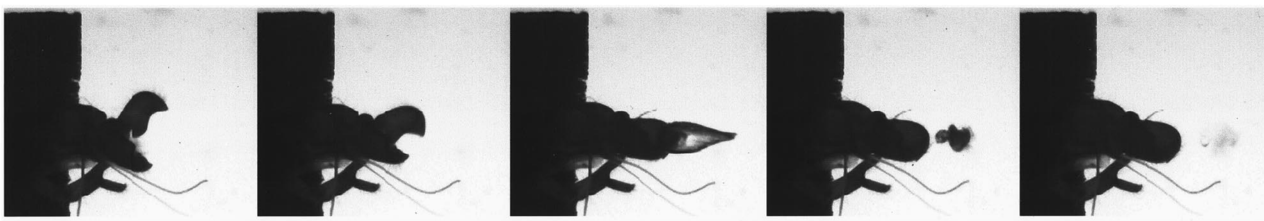

FIG. 3. A sequence of high-speed images taken at 500 μs intervals showing the closure of the claw (a,b), the formation of the cavitation bubble (c) and the violent collapse of the single bubble into a cloud of tiny bubbles (d) which quickly dissolve (e).

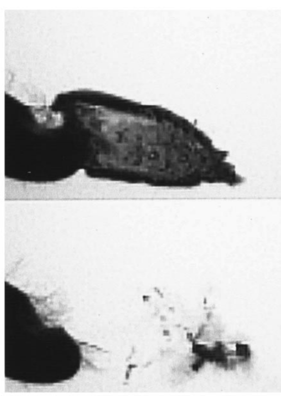

FIG. 4. Closeup of the collapse of the cavitation bubble. The main peak of the snapping sound and the collapse of the bubble always coincide.

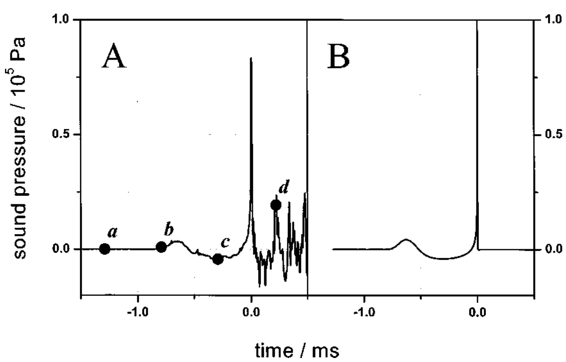

FIG. 5. Experimental (A) and modeled (B) sound pressure curve. The letters in (A) correspond to the frames in Fig. 3. Just as in the experiment, the modeled bubble is destroyed on collapse. After the collapse, the experimental sound signal is affected by sound reflections.

On the Sound of Snapping Shrimp

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Snapping shrimp produce a snapping sound by an extremely rapid closure of their snapper claw. Source levels reported for *Alpheus heterochaelis* (Fig. 1) are as high as 220 dB (peak-to-peak) re. 1 μPa at 1 m distance. The loud snap has been attributed to the mechanical contact made when the snapper claw contracts. Our recent ultrahigh speed imaging of the snapper claw closure at 40 500 frames per second[1] has revealed that the sound is, in fact, generated by the collapse of a cavitation bubble formed in a fast flowing water jet (Fig. 2) forced out from between the claws during claw closure. A temporal analysis of the sound recordings and the high-speed images (Fig. 3) shows that no sound is associated with the claw closure, while a very prominent signal is observed during the collapse (Fig. 4) of the cavitation bubble. We have developed a theoretical model for a bubble under these conditions. The dynamics of the bubble radius and its corresponding sound can be described by the Rayleigh–Plesset equation. The model accounts for the time dependence of the bubble radius and for the emitted sound (Fig. 5).

[1]M. Versluis, B. Schmitz, A. von der Heydt, and D. Lohse, Science **289**, 2114 (2000).

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