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THE SALTICID FANG. D. E. Hill

The two fangs of the jumping spider are versatile tools in the handling of prey. They are used in unison, like ice tongs, to seize the prey as it is jumped. The fangs extend as the chelicerae are moved laterally, and flex to impale the prey as the chelicerae are brought together, with a sudden force. Subsequently the fangs are employed in the injection of the venom, and the maceration (chewing) of the prey. In maceration, as in grooming, the fangs apparently operate independently of the movement of the chelicerae.

The basic external features of the salticid fang, and the distal chelicera, are shown in Figs. 1 and 2.

Each fang pivots in a single (near vertical) plane, from a laterally extended position, to a retracted (flexed) position within the fang groove. Composed of thick and rigid cuticle, presumably "sclerotized" or hardened to a high degree, the fang articulates with the chelicera at anterior and posterior pivot points (*dicondylic joint*, Whitehead and Rempel 1959). At the base, medially and laterally, the fang is surrounded by flexible cuticle which permits this movement. Several groups of slit sensilla (or lyriform organs, Figs. 1 and 2) presumably respond to the mechanical deformation of the cuticle which accompanies the applied force of the extended fangs against some resistance, as the fangs are retracted (flexed), or forced into the prey. This movement is under the control of powerful muscle bundles which originate on the walls of the chelicerae, and which insert on the fang base by means of cuticular flexor and extensor cables.

The situation of the opening of the venom duct is analogous to the placement of the aperture of the hypodermic needle (Fig. 3). The opening should be as close to the apex of the fang as possible, in order to facilitate penetration of the venom. On the other hand, if the opening is too close to the tip, the strength or sharpness of the penetrating fang tip (cuticle) is reduced greatly. The resultant design (Fig. 1) combines the advantages of a strong, sharp apex to penetrate the cuticle of the prey with near-apical discharge of venom. This discharge is accomplished by contraction of a muscular layer which surrounds each of the two bulbous venom glands in the prosoma.

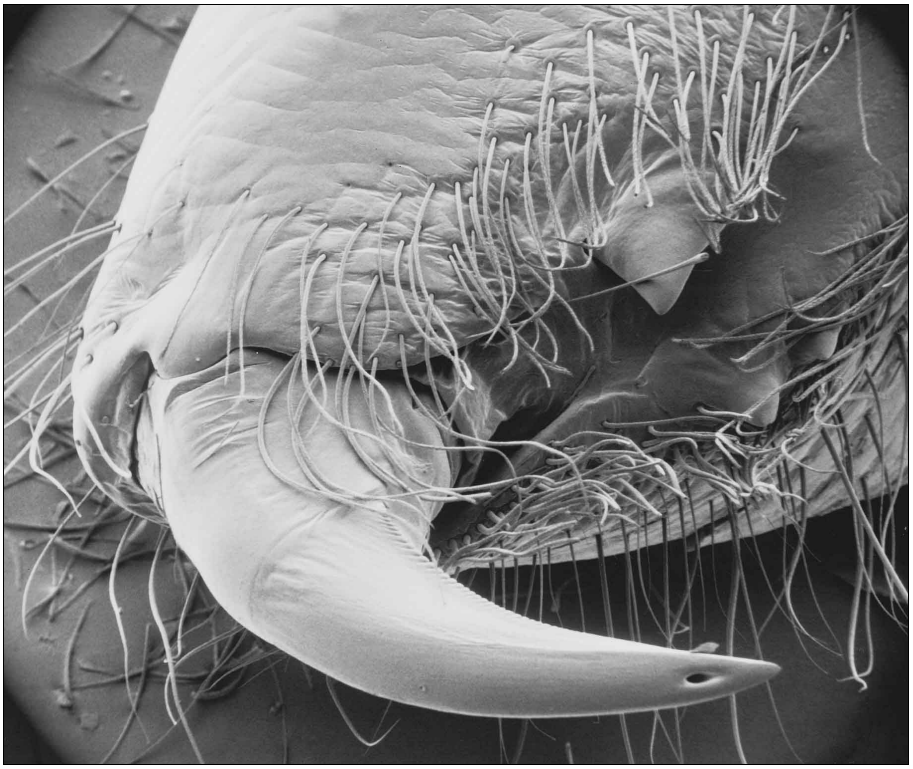

Fig. 1. Inside (posterior) view of distal left chelicera, immature *Phidippus audax* from Johnson County, Iowa (SEM X 125). The fang is only partly extended.

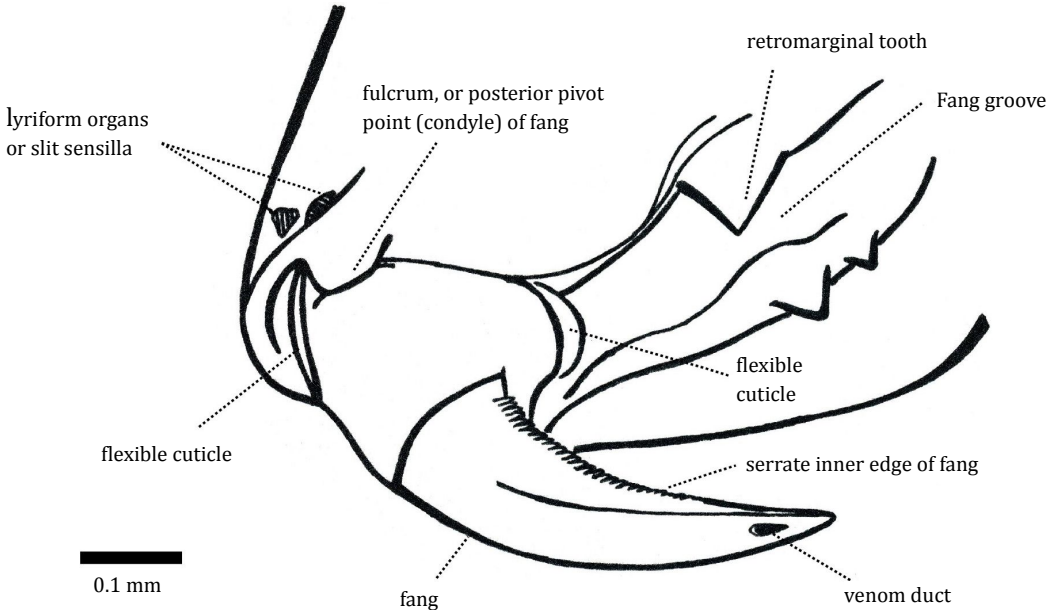

Fig. 2. Diagram based upon Fig. 1.

The inner margin of the fang bears a sharp, serrate cutting (or gripping) edge, used in the maceration of prey. In this activity, each fang works against the support provided by teeth which line the margins of the fang groove. Thus, the presence or development of these teeth may be functionally related to the extent to which a particular salticid species macerates its customary prey. The serrate edge of the fang may also be employed in grooming.

At the bottom, right of Fig. 1 are numerous stout setae of the anterior face of the chelicera. These are presumably simple mechanoreceptors. Some of the smaller, curved setae which line the fang groove appear to be long whorled setae, or contact chemoreceptors. These could provide the spider with its first chemical evaluation of the prey.

REFERENCE:

WHITEHEAD, W.F. & J.G. REMPEL. 1959. A study of the musculature of the black widow spider, *Lactrodectus mactans* (Fabr.). Can. J. Zool. 37: 831-870.

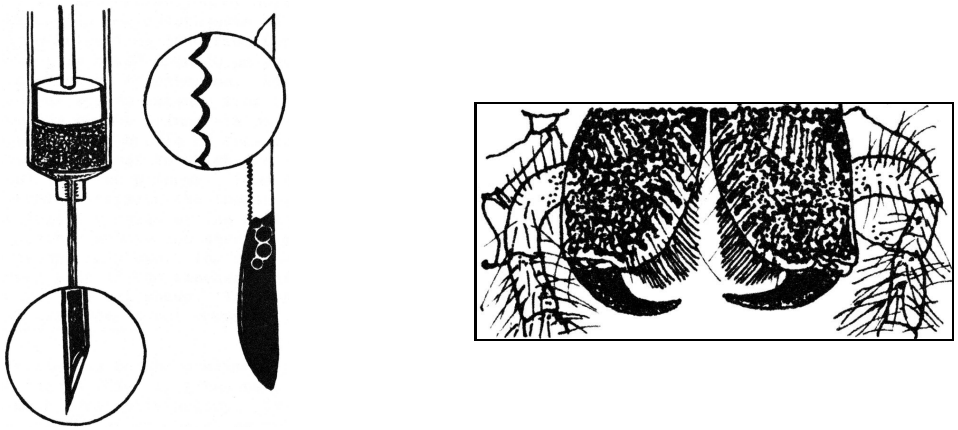

Fig. 3 Some functional equivalents of the spider fang. Left: hypodermic syringe; Right: kitchen knife with serrate edge.