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Posterior Maxillary Fangs of the Flathead Snake, Tantilla gracillis (Serpentes: Colubridae), Using Scanning Electron Microscopy

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General Notes

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POSTERIOR MAXILLARY FANGS OF THE FLATHEAD SNAKE, *TANTILLA GRACILIS* (SERPENTES: COLUBRIDAE), USING SCANNING ELECTRON MICROSCOPY

Opisthoglyphous snakes constitute a group of more or less venomous, rear-fanged species within the family Colubridae (Smith, 1952; Fitch, 1970; Bellairs, 1970; Porter, 1972). The fangs reside on the posterior end of the maxillary bone and are larger, grooved, and often recurved compared to other maxillary teeth. Injection of venom into prey is accomplished by chewing the victims in the so-called "slash and swab" method (McDowell, 1986); the poison is released from the parotid gland (Duvernoy's gland) through a single duct which opens into a furrow along the lateral sides of the teeth.

The genus *Tantilla*, a New World group of small colubrid snakes comprising around 46 species, ranges throughout most of the southeastern and south-central United States (Telford, 1966) and is found in parts of the arid southwestern United States. The group is characterized by a combination of characters which includes the presence of posterior maxillary grooved teeth (Wilson, 1982). Hardy and Cole (1968) and Savitzky (1983) illustrated the maxillary bone of *Tantilla* and showed the grooved nature of the fangs; i.e., the grooves lie on the lateral face of the teeth. The present study examines the fangs and other maxillary teeth of the flathead snake, *Tantilla gracilis*, for the first time using scanning electron microscopy in order to reveal their surface morphology.

The left maxilla of 14 adult and juvenile specimens of *Tantilla gracilis* collected from the Interior Highlands of Arkansas were prepared for scanning electron microscopy (SEM). Each maxilla was removed using jewelers forceps and microscissors, stripped of muscle and connective tissue, and placed into vials of 70% ethanol. Routine laboratory techniques were employed to prepare teeth for SEM (Dawes, 1988). Maxillae were dehydrated in a graded series of ethanol and amyl acetate, dried with a Samdri critical point dryer, coated with gold/palladium in a Hummer IV sputter coater, and viewed with a JEOL100 CXII TEM-SCAN electron microscope at an accelerating voltage of 40 kV. All snakes and prepared tissues are deposited in the Arkansas State University Museum of Zoology.

All maxillary teeth of *Tantilla gracilis* showed varying degrees of structural modification (Figs. 1 and 2). The fangs are of two basic types: 1) curved and 2) linear. Also, the nature of the groove differed between these two types. Two fangs per maxilla is the general rule (excluding replacement fangs) in this species (Fig. 1B and E), although one specimen (Fig. 1D) exhibited three fangs. In most cases, fangs were separated from the anterior maxillary teeth by a space or diastema (Fig. 1G). The fangs of juveniles (Fig. 1A and B) are similar to those of adults (e.g., Fig. 1E) in that the fangs are curved, and the grooves project antero-laterally. However, the linear fang type is straighter, and grooves project laterally (Fig. 1C and D). The fang groove, a concavity running the entire labial surface of the fang, is situated between the mesial and distal surfaces; the groove is presumably formed by an expansion of dental ridges (Wright *et al.*, 1979; Vaeth *et al.*, 1985) that are characteristic of all maxillary teeth. The dental ridges are, however, more conspicuous in teeth near the fangs (Fig. 1F and G; Fig. 2D) compared to anterior teeth (Fig. 2C) and contribute to the semblance of grooves most noticeable on teeth near the fangs. Anterior maxillary teeth may also exhibit dental ridges that possess serrations (Fig. 2C), whereas, in other instances, these ridges appear smooth (Fig. 2D).

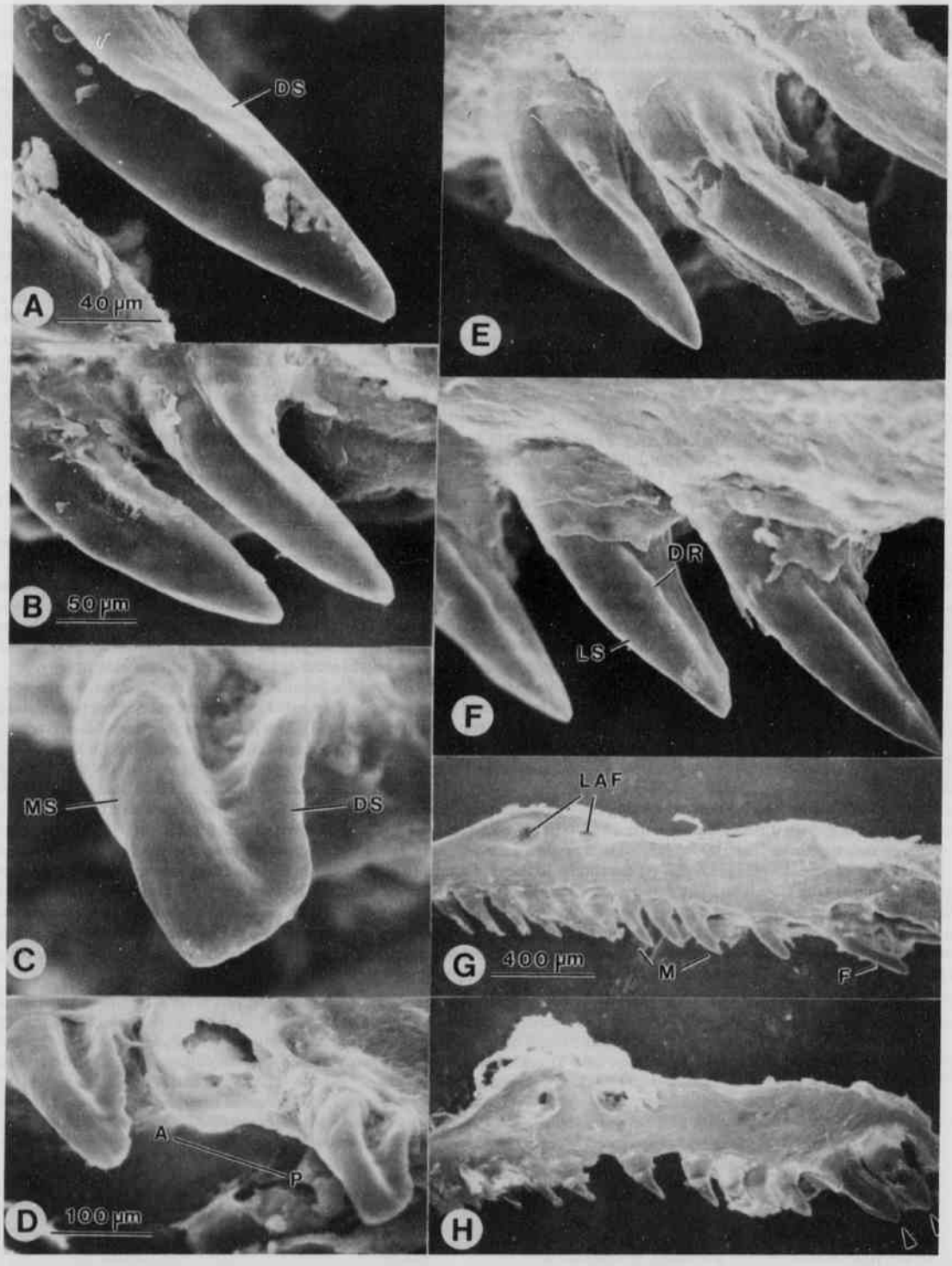

Figure 1. Scanning electron micrographs of maxillae and posterior maxillary fangs of *Tantilla gracilis*. Snout-vent length = SVL. A. Labial view of fang of a juvenile (87 mm SVL); DS= distal surface. B. Labial view of fangs of a juvenile (76 mm SVL). C. Ventral view of fang of adult male (147 mm SVL) illustrating the mesial (MS) and distal surfaces (magnification the same as A). D. Adult male (in C) exhibiting three fangs (middle one broken off). The anteroposterior axis of the maxilla (A-P) showing grooves of fangs facing outward. E. Fangs of an adult male (152 mm SVL); magnification the same as in D. F. Maxillary teeth craniad to fangs showing apparent grooves; LS = labial surface; DR= dental ridge. Magnification the same as in B. G. Maxilla of an adult female (137 mm SVL); LAF= lateral anterior foramina; M = maxillary teeth (same as in F); F = fang. H. Maxilla of an adult male (in E). Arrows point to fangs (magnification as in G).

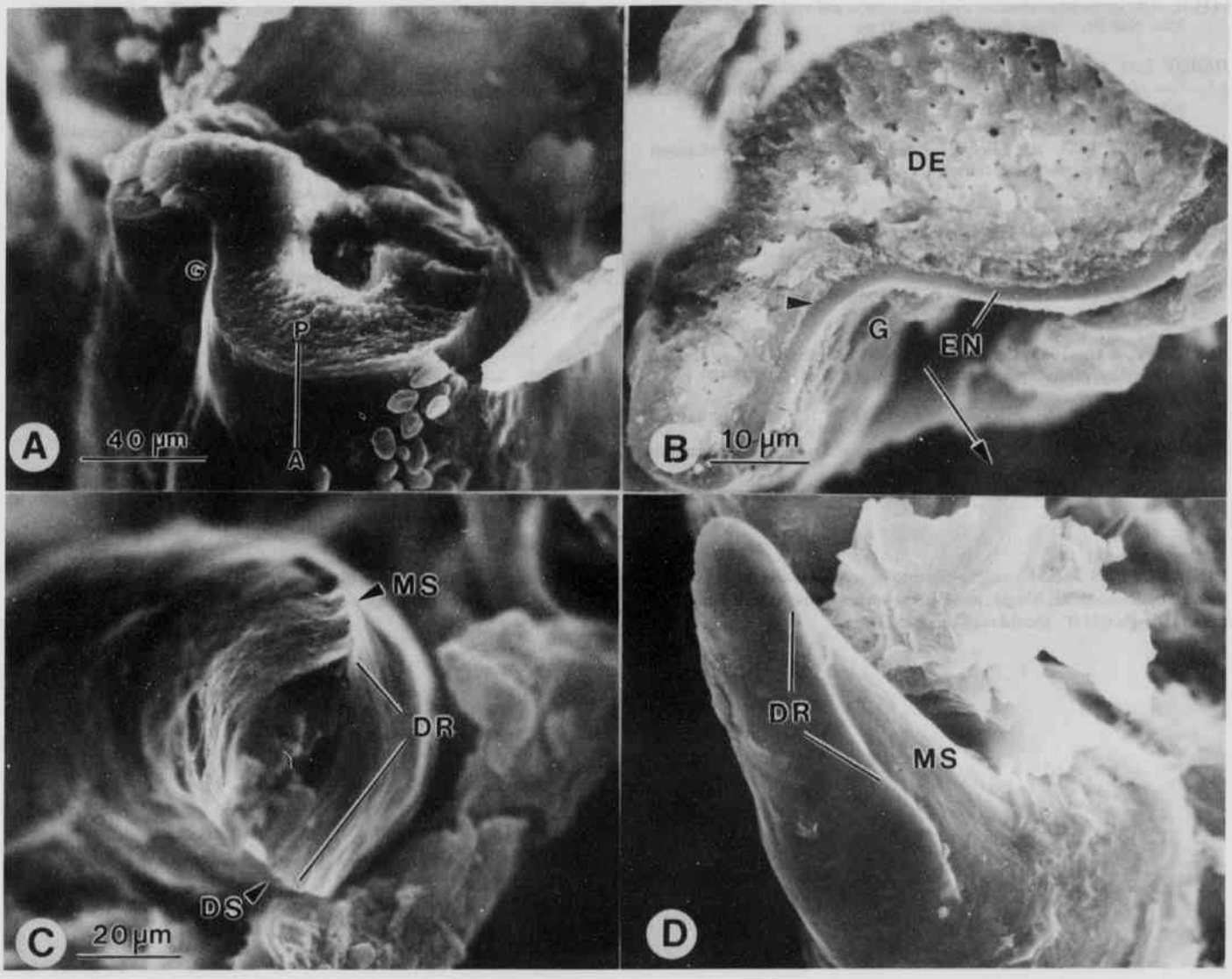

Figure 2. Scanning electron micrographs of maxillary fangs and anterior maxillary teeth of *Tantilla gracilis*. A. Cross section of a fang broken near its base. The anteroposterior axis (A-P) of the maxilla reveals groove (G) facing slightly craniad and shows the mesial portion of tooth which is larger than the distal portion. B. Magnification of A. Pointer separates the outer enamel layer (EN) from the inner dentine (DE). Notice the dentine is quite porous. Arrow points laterally. C. End-on view of an anterior maxillary tooth (tip broken off) showing serrated dental ridges (DR) on both the mesial and distal surfaces. D. Anterior maxillary tooth showing dental ridge on mesial surface. Magnification as in A.

Tantilla gracilis feeds primarily on arthropods (Carpenter, 1958; Collins, 1982; Johnson, 1987) and, especially, their soft-bodied larvae. As with other insectivorous, opisthoglyphous snakes (Savitsky, 1983; Vaeth *et al.*, 1985), the anterior maxillary teeth of *T. gracilis* primarily serve to engage and penetrate prey. Then, immobilization of prey is accomplished by venom injection using the posterior maxillary fangs.

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CORRECTION – In the article "Sexual dimorphism and intersexual differences in resource allocations of a dioecious shrub, *Lindera melissifolia* (Walt.) Blume" by Richardson, Wright, and Walker which appeared in Volume 44 (1990) of the Proceedings of the Arkansas Academy of Science, Page 101, Column 2, Line 11, "male 623.0" should read "male 62.0".