

Frictional properties of the snake skin

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The legless locomotion of snakes requires adaptations of their ventral scales to maintain friction force in different directions. The skin microornamentation of the sand boa was studied by means of scanning electron microscopy, and the friction properties of the skin were tested on substrates having different roughness. The results show that on the substrates with surface asperities, ranging from 1 to 8 μm , friction coefficients of ventral scales are considerably lower than on the substrates with smaller or larger asperities. On flat substrates, friction is larger presumably due to stronger contribution of adhesion, whereas on rough substrates friction is maintained by mechanical interlocking. These data predict that on the intermediate roughness snakes will have troubles in generating propulsive movements necessary for locomotion. Comparative study of the scale microstructure from various body regions in different snakes shows local frictional adaptations of the skin surfaces and reveals some surfaces with frictional anisotropy due to the specific geometry of the microstructure.

