

Pattern of terrace lines of the trilobite species *Nileus armadillo*.

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A kind of 'shell sculpture', the terrace lines, is a fine and ridged structure, the intervening slopes of which are the combination of gently and steeply inclined one, thus asymmetric in cross section. The structure is equipped on the surface of some bivalve, brachiopod and decapod crustacean 'shells', the animal of which are generally known as professional burrowers. In the case of decapod crustaceans, the ridges generally lie vertical to burrowing directions. Functionally, the structure was said as a friction amplifier, which aid animal during burrowing by the frictional asymmetry of its gentle and steep slopes. To understand the mode of lives and adaptive strategy of extinct animal groups such as trilobites, the structure with clear functional grounds helps a lot, although exceptions are known in extant decapods. In some decapod crustaceans, none professional burrowers and rocky environment dweller do have terrace lines on their carapaces. Another exception is that the number or the shapes of ridges that generate frictional forces do not catch up with the animal growth. What the exceptions imply is that the terrace lines may supplementary function as a frictional amplifier, but primarily differ in function. We noticed a close relationship between mechanoreceptors and terrace lines in decapods. Setae, a kind of arthropod mechanoreceptor, are originated from or very close to the steep slope of a terrace line and inclined as to cover the shell surface as much as they can. The animal can know which part of the shell covered by sediments or attached by rocks or stones during hiding themselves. Thus the shell surface area with denser the terrace lines lie means highly tuned to detect attachment to surrounding conditions such as rocks, muds and sands. In the trilobite *Nileus armadillo*, terrace lines are so densely lie on the genal periphery of the cephalic doublure, around peripheral outline of thoracic segments and pygidium. All these area are the area possibly most frequently attach to the substrate. We thus conclude that the terrace lines in trilobites primarily functioned as the posture auto-recognition system of the animal itself.