“Heel” pads of stick insects (Carausius morosus) are pressure-sensitive friction pads with little adhesion

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Indian stick insects (Carausius morosus) possess two pad types per leg. 'heel' pads 'toe' pad

‘Toe’ pads are 'true' adhesive pads, so what is the function of the 'heel' pads?

How does normal load influence performance?

Part I

Part II

Contact area increases with normal load

(i) Increase at the pad perimeter

(ii) More hairs make contact inside contact area

(iii) Side contact of individual hairs

Why does normal load increase contact area?

1. With an increase in load, individual acanthae bend and allow shorter or more tilted acanthae to come in contact.

Does the increase in contact area with normal load influence adhesion?

- Adhesion did not change significantly with preload and was smaller than 5% of the body weight.

Does the increase in contact area with normal load influence friction?

- Friction significantly increased with preload ranging from 10-200% of the body weight, with a coefficient of friction $\mu$ of around 1.5.

Can the increase in contact area explain the increase in friction?

- Normal load increased both projected contact area and contrast; if friction is corrected for both variables, it is no longer significantly influenced by normal load.

Conclusions

In contrast to adhesive 'toe' pads, 'heel' pads:

- Are used solely under compression
- Generate little adhesion but large friction, which increases with normal load

'Heel' pads are specialised pressure-sensitive 'friction pads'

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