RESEARCH ARTICLE

Functional morphology and bite performance of raptorial chelicerae of camel spiders (Solifugae)

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SUMMARY

Solifugae are an understudied group of relatively large arachnids with well over 1000 species distributed on almost all major continents. These highly active predators utilize their large chelicerae for feeding, defense, burrowing and mating. We investigated the differences in cheliceral morphology and performance of two ecologically divergent species from North Africa; the cursorial Galeodes sp. and the burrowing Rhagodes melanus. Morphological data show differences in aspect ratio between the two species. Bite force measurements show Rhagodes (N=11) to be a much stronger biter than Galeodes (N=8), in terms of both absolute maximum force (Rhagodes 5.63N, Galeodes 2.12N) and force relative to cheliceral size. Synchrotron microtomographs of one specimen for each species reveal large differences in physiological cross-sectional area (PCSA) and estimated muscle stress, resulting in a much higher muscle stress in Rhagodes. This species also showed a longer muscle fiber length. Muscle volume and PCSA were found to differ between the two chelicerae in the two scanned specimens. Whereas Rhagodes reflects this morphological asymmetry in having a higher bite force in the right chelicera, Galeodes shows no such bias.

Key words: Solifugae, Rhagodes, Galeodes, bite force, functional morphology.

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