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Dear Prof Benton,

We wish to submit a new manuscript entitled “Trait-based ecology of terrestrial arthropods” for consideration by *Biological Reviews*.

We confirm that this work is original and has not been published elsewhere nor is it currently under consideration for publication elsewhere. In accordance with the journal’s requirements, below we describe the ways in which our synthetic review is well suited to the aims and scope of *Biological Reviews*.

**Why does the field need a review now?**

Trait-based ecology is an extremely fast moving field, and trait-based studies on plants are continually advancing understanding of their community and ecosystem ecology. In recent years trait-based approaches have also been increasingly applied to investigate the ecology of terrestrial arthropods, such as ants, bees, beetles, butterflies, spiders and many others. Indeed, researchers working in these areas have recently established protocols for selecting and measuring traits, extensive databases consolidating trait information, and guidelines for using trait-based approaches to enhance ecosystem services (sources cited in manuscript). However, the explicit justification, conceptual unifying framework, and primary evidence base for the burgeoning field of ‘terrestrial arthropod trait-based ecology’ have not been well established. Consequently, there is some confusion over the scope and relevance of this field, and crucially, a tendency for many studies to overlook important assumptions and limitations of the trait-based approach (discussed in manuscript). As trait-based approaches continue to be applied to empirical and applied studies on terrestrial arthropods, and as their trait data continues to accumulate in new databases, it is imperative that future work on these diverse organisms operates within a coherent framework and is supported by evidence from the literature.

**What does the article contribute beyond describing the literature?**

In addition to summarizing and critically evaluating the existing literature, our manuscript provides multiple novel contributions that will reshape and direct the rapidly expanding field of terrestrial arthropod trait-based ecology. The first contribution is a rigorous justification for the use of trait-based approaches in studies on terrestrial arthropods, which is currently missing from

the literature. In doing so we establish a new foundational basis for future work in this rapidly expanding field. The second contribution is a synthesis incorporating all relevant concepts in trait-based ecology (including those from research on plants) that establishes a common framework for trait-based research on terrestrial arthropods. Novel elements in this framework, such as a focus on the hierarchical performance paradigm of arthropod traits, will provide investigators with new tools to tackle difficult questions, such as the relationships between competition and coexistence. The broad framework also promotes a common understanding of trait-based ecology among investigators working on markedly different systems (e.g., plants and arthropods), thus facilitating communication, comparison and collaboration across different fields. Our third contribution is a methodical roadmap to guide future trait-based studies on terrestrial arthropods (as well as other taxa), which is specifically tailored to address the many critical assumptions and limitations that are currently overlooked by many studies (discussed in the manuscript). Our fourth contribution is a tour of the frontiers in terrestrial arthropod trait-based ecology, where we propose new areas for future studies that will have most impact to ecological understanding and application, and discuss how to bridge current research to such work. In addition to the above novel contributions, we critically evaluate the evidence presented throughout the review; thus the article will certainly go beyond a description of the literature.

**To what extent will the article appeal to a broad readership of non-specialists?**

The content of our manuscript has direct and timely relevance to the many researchers studying the ecology of terrestrial arthropods, especially those working within the expansive fields of community and ecosystem ecology. Terrestrial arthropods are not only among the most diverse organisms on the planet, but are also integral functional components of ecosystems and providers of many ecosystem services. Trait-based approaches have considerable potential to elucidate the mechanisms underpinning a variety of ecological phenomena, and also to improve ecological prediction. Hence, our article will have a very broad appeal to individuals working in both empirical as well as applied areas of ecology. As our manuscript discusses research from a wide variety of fields and systems, we have intentionally made the content clear and accessible, by keeping technical jargon to a minimum, and clarifying all important terms and concepts of trait-based ecology. Preliminary feedback from our colleagues suggests that graduate students will be able to understand and apply the concepts discussed in the manuscript.

Thank you for your consideration of our manuscript.

Please address all correspondence concerning this manuscript to me at the following email address: [mark.wong@zoo.ox.ac.uk](mailto:mark.wong@zoo.ox.ac.uk)

Sincerely,

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