LETTER

On velvet worms and caterpillars: Science, fiction, or science fiction?

Velvet worms (phylum Onychophora) are fascinating animals. Their colored velvety skin and glue-shooting organs attract the attention of nature lovers. Their geographical distribution across the former Gondwana fascinates biogeographers. Onychophora is also the single animal phylum with a strictly terrestrial distribution. And their abundant Cambrian fossil record has greatly inspired paleontologists. A new claim, however, published by D. I. Williamson (1) makes them even more fascinating. This proposal makes onychophorans the evolutionary source of insect caterpillars—after their adult insect genome hybridized with that of a velvet worm.

The matter appears extracted from a science fiction novel but has grave implications. This paper has fallen through the cracks of the review process of one of the most prestigious scientific journals, and this has not passed unnoticed. Online debates have erupted between those appalled that such article has appeared in a scientific forum and those who feel that scientific debate requires that all ideas, no matter how ill-formed, be discussed. But we should ask whether an individual can propose any theory, no matter how unsupported that idea may be, and demand that others do the work to test it scientifically.

Williamson has published his ideas about the origins of macrodiversity in a book and in several journals (see references cited in ref. 1) during the past two decades, gathering a negligible number of citations by fellow zoologists. Williamson sets the bases for his theory: ". . . that early animals hybridized to produce chimeras of parts of dissimilar species, that the Cambrian explosion resulted from many such hybridizations, and that modern animal phyla and classes were produced by such early hybridizations. . ." (2). But how could one test Williamson's speculation for hybridization scientifically? One could design a phylogenetic test and ask whether an onychophoran is more closely related to a butterfly caterpillar than to an adult or even ask whether an onychophoran is more closely related to insects with caterpillars than to insects without caterpillars or to any non-insect group. These questions have already been examined in the scientific literature. Multiple researchers have addressed the issue of the phylogenetic position of onychophorans. From the early days of phylogenetic research, onychophorans were placed as the sister group of arthropods based on morphological grounds (3, 4), only to be recently confirmed by data obtained from the genomes of many metazoans (4–6)—not just to those arthropods that have a caterpillar-like stage. What remains to test from Williamson's phylogenetic speculation? Why did the author ignore the weight of phylogenetic evidence that utterly falsifies his claim?

Perhaps the most amazing thing from this article is not the bold proposal, but the fact that the author believes that there is a research program behind his claims: "As an initial trial, it should be possible to attach an onychophoran spermatophore to the genital pore of a female cockroach and see if fertilized eggs are laid" (1). I am not sure this can be taken seriously.

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Author contributions: G.G. wrote the paper.

The author declares no conflict of interest.

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