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Ethics in Entomology

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“Entomologists, with constantly regarding the beautiful structure of insects, acquire such a kind feeling for them that they seldom or never unnecessarily kill the objects of their study, and almost invariably take much more care than indifferent persons to avoid doing them any injury. And the various schemes which have been invented for killing insects in the most expeditious manner, prove, at least, that the entomologist is not willing to occasion them suffering.” Newman (1841)

Entomologists have always valued insects highly, above all things (after all, they are frequently more relatable than our academic colleagues down the hall). But until recently, most of us would have said that the wider public did not share this sentiment, despite 30 years of conservation efforts since E. O. Wilson’s wonderful call to arms for ‘the little things that run the world’ (Wilson 1987). That has all changed in the blink of an eye, with widespread public consternation over reported global trends in insect declines (Basset and Lamarre 2019, Cardoso and Leather 2019). Capitalizing on this out-pouring of public concern, and new-found societal interest in insects, will present incredible new opportunities to promote Entomology more broadly, but it is not going to come without challenges – some of which could reshape the discipline as we know it today.

As senior Editors at *Insect Conservation and Diversity* our *raison d’être* is to promote and disseminate a wider understanding of the importance and conservation of insects. A key foundation of this role, of course, is to ensure that we meet the highest ethical standards in research and publishing. In this regard, one emerging issue that we see is an increasing concern over the ethical treatment of insects in scientific research. Questions such as ‘why do we need to kill rare insects if the goal is to conserve them?’; ‘why do insects have

to suffer cruelly as a result of our research?’ and ‘why do we need to kill so many non-target insects?’ are only going to become more frequent, and more pointed, as public pressure to conserve insects mounts. This will inevitably influence how we go about doing our research, and publishing our results. Readers might well have heard the anecdotal stories of manuscripts reputedly being rejected from unnamed journals because the study methods had killed too many pollinator insects. Students of history might see parallels here in the shifting societal values that led to tightening of regulatory frameworks for the ethical treatment of vertebrates (since the 1980s) and more recently cephalopods and decapod crustaceans (since 2000).

It was with interest, therefore, that *Insect Conservation and Diversity* received a proposal from Bob Fischer (Texas State University) and Brendon Larson (University of Waterloo) to bring a philosophical and social sciences perspective to bear on the issues surrounding animal ethics, as they relate to entomology. The key thesis of Fischer and Larson (2019) is that it is time to consider whether the lives of individual insects matter. Yes, most entomologists value insects, in a broad sense, and indeed follow informal codes of conduct such as not indiscriminately collecting rare insects if this could plausibly lead to population decline or extinction. But

these codes only consider insects as general exemplars of their species, or for their general instrumental value within ecosystems, and not as unique individuals (Fischer and Larson 2019). This is quite different from the way society, and science, view many vertebrate animals (think of all the cetacean or primate seminars you have seen, where each study individual is given a unique name). Individual vertebrates are recognised to be sentient, feel pain, reason, demonstrate unique behavioural personalities and, who knows, even have aspirations for the future. Do some, or any, of these considerations about individuals apply to insects? Fischer and Larson (2019) discuss the evidence for individual insects feeling pain, and question the degree of confidence we have in our understanding of insect consciousness. They argue that the case for pain sensation (if not some degree of consciousness) is not obviously any better for crustacea or cephalopods than it should be for insects, and it would be worth rethinking how our ethical codes might be modified to consider insects as individuals.

The foundation for the ethical consideration of individuals, is the so-called ‘3Rs’ of animal use in research: (i) **replace** animals with non-living models, (ii) **reduce** the number of animals used, and (iii) **refine** animal care and use practices so that animals are better off (Fischer and Larson

2019). Demonstrably, many entomologists already do some, or all, of these things on a daily basis in their research. They are, however, not generally implemented or formalized with individual considerations in mind. Fischer and Larson (2019) make the point (which is worth quoting here) that “these guidelines probably would not take the same form as the ones found in vertebrate or crustacean ethical codes, as the difference in confidence about consciousness is relevant to the constraints placed on research: higher confidence in consciousness – and so in the capacity to experience pain – justifies more significant restrictions” (p.176). Accordingly, they propose “that entomologists should aspire to study insects without killing them, to reduce the number of insects they kill, and to refine their methods so that when they do capture or kill insects, they do so in ways that are sensitive to their subjects’ well-being” (p.179). As we highlighted with a science haiku (‘sciku’) when this paper was published (twitter.com/InsectDiversity/status/1126014019062652928):

*Because we love them
We need to think carefully
When we collect them*

There are many practical ways in which these types of guidelines could be implemented. Lethal sampling methods could be replaced by non-lethal ones, where possible. Lethal approaches could also be modified or replaced with more specific and targeted approaches (e.g., pheromonal attraction). In a world of declining insect populations, it is worth reflecting on the long-term viability of mass trapping approaches that capture one or two orders of magnitude more non-target insects than the actual targets of interest. When such approaches are essential, Fischer and Larson (2019) argue that it would be easier to justify mass-trapping if the use of captured organisms was maximised, such as by creating a register of ‘non-target’ components of bulk samples that could be used in the future by other researchers. Of course, as we all know, museums around the world are already filled with bulk ‘wet collection’ accessions of tens of millions of specimens, and these are comparatively rarely used as a resource. Perhaps one outcome of formalizing a 3Rs framework would actually be increasing re-use of archived material. Advances in some or all of these areas would undoubtedly

need major new investment in 3Rs strategies.

In the short-term, Drinkwater *et al.* (2019) suggest five pragmatic ways in which individual researchers can improve their own ethical approach to sampling, and reduce harm to insects: (1) conduct a power analysis to determine whether total sampling effort can be reduced; (2) if existing sampling methods have to be used, alter the deployment protocol to reduce by-catch; (3) change to more specific trapping methods to avoid by-catch; (4) make by-catch available for future use; and (5) minimize the suffering of insects during the collection process (modified from Drinkwater *et al.* 2019).

Ultimately, it is up to entomologists to forge a way forward. Fischer and Larson (2019) simply encourage us to view the 3Rs as relevant, and important, to the development of our discipline. So, go ahead and take up the challenge. Engage with Fischer and Larson on the philosophical and societal importance of ethics in entomology, and debate with your colleagues the appropriate framework and actions that should be taken to reduce harm and limit conservation risk.

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