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On the progress of ecology

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The practitioners of any discipline are responsible for its character. Yet many ecologists dislike what ecology has become. A large and growing body of literature has questioned the integrity of ecology as a field of study (e.g. Pielou 1981, Simberloff 1981, Woodward 1987, Hall 1988, Peters 1991, Grime 1993, Weiner 1995). Ecologists appear to be endlessly uncertain and critical of the scope and methodology of their discipline. Most of these critiques have expressed dismay over a lack of progress in ecology, and have offered proposals for fixing the problem and moving forward. The same criticisms, however, continue to resurface. Why is this so? The reason, I suggest, is that ecology can be likened to a curious and obstinate child determined to sample and explore life on her own unconventional terms, much to the chagrin of her guardian, who regards the child as underachieving and is determined to steer her down the traditional straight and narrow path to accomplishment. Many of the guardians of ecology want ecology to become something that it does not want to be.

Some have come to the defence of ecology's record of success (e.g. Crawley 1987, Silvertown 1988). Nevertheless, many ecologists continue to be dissatisfied with the progress of ecology. Just like the child who has not yet settled down and "made something of himself" in the mould cast by his guardian, the study of ecology, in comparison with other fields has produced relatively few conclusive answers to relatively few key questions. Answers to most of the central questions in ecology are usually accompanied by qualifications like, "it depends". Yet, if ecology suffers from progress deficit, how do we account for the continuing increase in the number of new ecology journals and in the number of pages per year in many ecology journals? I think this means that most ecologists are at least privately satisfied with the progress they are making. Many, however, are reluctant to proclaim progress more widely for ecology as a discipline because of the general expectation, indoctrinated by the guardians of ecology, that progress can be measured only by scientific standards

based on testable theories. On this scale, ecology admittedly has a weak record.

However, why can we not let ecology loose to find where it wants to go and what it wants to be – to realize its own measure of success? Why can we not regard ecology as a subject of study that employs not just science, but a variety of concepts and approaches to arrive at understanding? I agree with Weiner (1995) that ecologists should not replace the concepts of truth and reality with those of taste and aesthetics. But I agree also with Fagerström (1987) that the study of ecology is advanced not only by exploring testable theories but also by the cultivation and appreciation of beauty in theories. Weiner (1995) suggests that when falsifiability is compromised in favour of such attributes as beauty, then theories become more like stories than truth and we are forced to reject the claim of ecology to be an empirical science. Truth and stories however are not dichotomies; stories assist in the quest for and interpretation of truth, and falsifiability and beauty can complement one another without compromising anything. Ecologists should stop worrying about having to reject the claim that ecology is a purely empirical science, and just do it! It is not true anyway and for this, ecologists need not be ashamed or apologetic. Progress is measured not only by the accumulation of definitive answers from testing falsifiable theories, but also by the generation of inspiration, the elucidation of possible answers, and the illumination of new intriguing questions. On this scale, the progress of ecology is unsurpassed.

Weiner (1995) recommends a kind of probationary period for ecological theory, suggesting that if a line of theoretical work does not yield falsifiable predictions after a certain number of publications, then further theoretical development should be more rigorously scrutinized and less readily accepted for publication. I think, however, that this would amount to a prejudicial censorship on literature and would stifle the potential for release of creativity in ecology. The peer-review system is already (and always was) inherently equipped

to judge the value of unpublished theory. As long as manuscripts in ecology are compelling, insightful and inspiring to a sufficient number of practitioners and reviewers, publishable progress can be made and patience for the arrival of testable predictions is easily found, at least for most ecologists.

In the spirit of preserving ecology within the realm of pure science, Weiner (1995) has suggested that there seems to be a “centrifugal force in ecology that keeps theory and data far apart from each other and from what we are trying to understand”, and that we need to “fight against these centrifugal forces by pulling theory and empirical work together and directing them both towards questions in ecology”. Can we expect most ecologists to embrace such a rigid and militant commitment? It is my view that if promise of greater progress rests here, then it would have happened already and without forcing it. Most progress in science is a product of following one’s natural inclinations and intuitions, not fighting with them. The fact that ecologists are busy publishing more peer-reviewed research than ever attests to the fact that they are already using theory and data to study problems that they are trying to understand, inspired by questions that they find interesting and important. It is true that “we might make more progress if more of us were both competent empiricists and theoreticians, rather than being excellent in one area and disinterested (or incompetent) in the other” (Weiner 1995). However, this is naive and impractical as a general prescription for ecologists. It is like expecting our school children to be excellent in every subject. Students, however, generally achieve excellence more narrowly, and their accomplishments are not dismissed as unprogressive and noncontributory because of it. The “centrifugal force” in ecology that keeps theory and data apart is largely a consequence of the human nature of some to be more preoccupied with ideas than with facts, and vice versa. It is a chronic symptom of our limited minds that science progresses by a series of small steps made by both theoreticians and empiricists, often working in isolation. The coming together of theory and data certainly contributes to progress and is cause for celebration, but history has produced relatively few great integrators and it is pointless to ask for this to change. Ecologists, therefore, need not doubt their progress on the basis of failing to measure up to a

standard to which very few will ever be naturally inclined or equipped to aspire, and hence, a standard that is not generally attainable.

If ecology is not just a science, how then should the practice of ecology be defined? The subject of ecology is concerned with patterns and effective processes in the abundance, distribution and diversity of organisms, taxa, biomass and productivity in nature. I suggest that the practice of ecology be defined as the interpretation of these patterns and processes using any approach of human endeavour that generates inspiration among practitioners for further interpretation of pattern and process in nature. To paraphrase Weiner (1995), the study of ecology asks why observed patterns of abundance, distribution and diversity occur and not other imaginable ones. I suggest that more progress in the form of conclusive answers to this question is attainable if ecologists espouse a more pluralistic approach, regard themselves as more than just scientists, and cease to police the boundaries of their discipline. There is no reason to be uneasy about merging and marrying with other disciplines (e.g. mathematics, statistics, physiology), or being distracted or converted by them. Ecology is not threatened with being “cannibalized” by these other fields of study (Weiner 1995); rather, ecology is the embodiment of their integration.

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