CORRESPONDENCE

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Taxonomy and coral reef ecology

In their recent *TREE* article, Knowlton and Jackson[1] make the valuable point that newer, more sensitive techniques, and greater scrutiny are disclosing many instances in which broadly distributed 'species' of coral reef invertebrate are turning out to be complexes of sibling species each with somewhat more narrowly defined ecological requirements. They use this observation to make the somewhat less useful claim that reef ecologists' enthusiasm for models of community organization 'dominated by chance and disturbance' is a result of bad taxonomy. This is a classic 'baby and bathwater' kind of deductive reasoning, which I find both disappointing and dangerous.

It is true that modern taxonomic techniques are disclosing richer biodiversity than we had assumed in some places. In such cases, new taxonomic discoveries will require a reassessment of ecological interpretations, and Knowlton and Jackson have provided a timely reminder to ecologists that this possibility exists. However, it does not follow that all previous taxonomy should be suspect, nor that marine ecologists who discover evidence of the importance of chance and disturbance do so because of faulty taxonomy. The fishes of coral reefs are relatively well known taxonomically. Application of sensitive molecular techniques has not resulted in a proliferation of sibling species. And reef fish ecology is strongly influenced by chance variation in patterns of dispersal and recruitment[2–4].

If we accept for a moment that the claim made by Knowlton and Jackson can be broadly applied to corals, the ecological contrast between reef fishes and reef corals has an added new dimension. Reef fishes are highly iteroparous within seasons, with several reproductive episodes per year[5] (the bluehead wrasse, *Thalassoma bifasciatum*, is one of many species that spawn daily over lengthy seasons[6]), while many species of coral spawn synchronously once a year[7]. Reef fish produce larvae that are well adapted for a pelagic existence, and the larval stage is lengthy (10–100 or so days) and presumably widely dispersed[5], while many reef corals brood their young or produce larvae that are pelagic for hours[7,8]. Although broadly sketched, and replete with ecologically interesting, subtle differences among fishes or among corals, these two features (frequency of spawning bouts, and duration of pelagic life) make for radically different approaches to living in the tropical marine environment. Why this should be so is an ecologically and evolutionarily interesting question. Perhaps (or perhaps not), the corals and other invertebrates are also locally more highly coevolved, and organized by competition into complexes which partition resources systematically. Knowlton and Jackson closed by reminding ecologists that 'Robert MacArthur really knew his warblers', to which I can only reply that all fish ain't birds.

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Reply from N. Knowlton and J.B.C. Jackson

The primary aim of our review was to point out that the broad habitat requirements used to justify the dismissal of niche diversification[1] are often an artefact of bad taxonomy. While we do not deny the impact of chance and disturbance on observed patterns of distribution and abundance, the scope of their influence is necessarily reduced if communities of reef invertebrates have more structure than previously realized, particularly when one considers these patterns at the appropriate temporal and spatial scales[2,3].

As Sale points out, fish and marine invertebrates have important differences. The use of visual signals by many reef fish is presumably related to the conspicuous color patterns that have aided taxonomists in defining species. In contrast, a century-long tendency to view marine invertebrates as ecologically and morphologically plastic has produced a generally 'suspect' taxonomy in which complexes of cryptic species are turning out to be the rule rather than the exception[4]. In the months since we wrote our review, another conspicuous case has been discovered in a well-studied coral 'species' that dominates shallow-water near-shore reefs off Queensland, Australia[5].

We agree with Sale that life history can have far reaching ecological and evolutionary consequences, but these are likely to be more complex than he suggests. Corals themselves exhibit enormous variability in timing of spawning and duration of pelagic life[6], and ecologically distinctive but morphologically cryptic species are not limited to groups that brood their young[5,7].

In summary, our intention was never to throw out a baby, but rather to put the venerable but much maligned idea of niche diversification back in the tub. We hope any splash associated with our enthusiasm was more invigorating than dangerous.

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