The chaetodontids, popularly known as butterfly fishes, are a group that to both the public and the scientific community are highly representative of coral reef ecosystems. This reflects not only the diversity of highly visible and strikingly coloured species but their strong association with living corals both as a source of nutrition and as a habitat for newly recruited individuals. Indeed a number of earlier publications visualised this not as a passive linkage but as a functionally important association that provided an insight into the prevailing and future health of coral reefs. The role of chaetodontids as “indicator” species in the context of reef health ensured this group maintained a high profile in the coral reef literature and focused attention on obligate associations with living corals and trends in abundance linked to disturbances in reef ecosystems. However recent research has identified demographic and physiological properties of corals that provide direct metrics of their health and fitness, but more importantly have revealed a high diversity of behavioural, ecological and evolutionary processes in the chaetodontids themselves. The latter findings have enhanced our understanding of this group not just as obligate corallivores tied closely to living corals, but as a speciose group of perciforms with a complex biogeography and evolutionary history, a wealth of behavioural and life history features and a diversity of feeding interactions with the reef biota. In this context chaetodontids represent an ecological and evolutionary prism that allow us to probe the historical nature of associations of reef fishes with the changing profiles of Cenozoic reefs, the circumstances under which species may limit or expand consumption of food resources and the patterns of response to disturbance at both ecological and evolutionary time scales. And although the now-clarified fossil record of this group is sparse, the increasing focus on phylogenetic reconstruction and phylogeography has provided a platform for rigorous biogeographical analysis, investigation of patterns in the evolution of trophic and behavioural traits and geographical vs. ecological processes of speciation.

The significance of chaetodontids and especially the genus Chaetodon in the context of ecological and evolutionary studies can be summarized by three observations; i) They occur within a range of reef ecosystems...
manifesting very different geological histories and prevailing oceanographic conditions; ii) They show a pattern of feeding behaviour that provides an unparalleled opportunity to identify food resources, establish the degree of trophic specialization and show how nutritional and foraging profiles vary with temporal and spatial change; iii) Their distinctive colour patterns and behaviours allow close and detailed observation of reproductive and feeding patterns in undisturbed groups. Dietary patterns and foraging especially in the genus Chaetodon, have provided a critical focus in evaluating how both evolutionary history and current ecological circumstances have shaped these traits. The fact that members of this genus occur in all of the world's great tropical ocean basins, each with a unique history and prevailing oceanographic conditions, provides a key to evaluating the hierarchy of events from evolutionary to ecological that have shaped feeding behaviours. The large number of species (many endemic) that occur in regions with turbulent oceanographic histories or currently marginal conditions is especially useful in this context. The endemic species of the Red Sea and Persian Gulf, reef systems that are subject to highly variable conditions over evolutionary and ecological time scales, provide a counterpoint for comparative studies over the broader Indo-Pacific. However although the taxonomic structure of chaetodontids is better known than many other groups of reef fishes for individual species, the match between genetic structure and phenotypes, and the propensity to hybridise in specific locations, reminds us that reconstructing patterns of species divergence will be a challenge.

An intriguing aspect of current studies concerns the history and biogeographic distribution of feeding specialisation, specifically the emergence and frequency of obligate feeding on hard corals. Although corals appear to represent an abundant food resource for benthic feeding reef fishes, it is noteworthy that relatively few species have evolved the capacity to use them. These species are dominated by members of the genus Chaetodon. Feeding limited to specific taxa of hard corals appears to be the ultimate in resource specialisation. However it is worth remembering that individual corals represent a diverse repository of food sources ranging from animal tissue, microscopic plant assemblages, mucous and tissues enriched to varying degrees by bacterial content. Although the external manifestations of feeding behaviour indicate a high level of specialisation it is unclear what components of the corals are targeted in a nutritional context, something that may vary between species and locations. Probing the nexus between feeding and nutritional targets in species which specialise on hard corals represents an area that will repay increased research investment.

One of the most important findings in an evolutionary context is the strong support for the hypothesis that critical episodes of chaetodontid diversification occurred during the Miocene, at a period when the
distribution, structure and composition of coral reefs achieved a "modern" configuration. This pattern which seems such an obvious consequence of an integrated evolutionary development of corals and reef fishes urges a caveat. The temptation to develop one-size-fits-all approaches to the ecology and evolution of reef fishes should be tempered with detailed examination of other groups of reef fishes. The emerging picture suggests unique clade and taxon-specific histories in reef fishes in the context of the geological evolution of Cenozoic reefs and their associated oceanographic conditions. There is a need to identify those episodes in the evolution of reef fishes that can be legitimately generalised to a wide range of taxa. The most appropriate pathway for accomplishing this is to provide integrated perspectives on the evolutionary history and ecology of critical groups of reef fishes, perspectives that allow rigorous comparisons between major clades. The group of studies encapsulated in this volume represent a major advance in achieving this goal.

John H. Choat
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