

Abstract

Chemical analysis of the dinoflagellate symbiont of *Pseudopterogorgia bipinnata* (Verrill) revealed higher concentrations of kallolides and related diterpenes than are present in the intact holobiont. Further, biosynthetic studies of the dinoflagellate with 3 H-labeled geranylgeranyl diphosphate indicated that this alga is capable of kallolide biosynthesis. These data indicate that the symbiotic zooxanthellae of *P. bipinnata*, as we have previously shown with *R. elisabethae*, are capable of biosynthesizing diterpenes previously ascribed solely to the host coral. Analyses of *R. bipinnata* colonies indicate significant chemical variation within this species, and 4 distinct chemotypes have been identified. Of these, only Chemotype A was found to both contain diterpenes and be capable of diterpene biosynthesis. We analyzed small subunit rDNA restriction fragment length polymorphism patterns and internal transcribed spacer sequences of the zooxanthellae associated with the 4 chemotypes for genetic differences that could explain the chemical differences. Both studies determined that all chemotypes are predominantly populated by the symbiont *Symbiodinium* sp. Clade B.