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Reproduction and the unusual condition of hermaphroditism in *Sarcophyton glaucum* (Octocorallia, Alcyoniidae) in KwaZulu-Natal, South Africa

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Abstract

The genus *Sarcophyton* is an abundant soft coral on the marginal, high-latitude reefs in KwaZulu-Natal. A 2-year study on reproduction in the most common species, *S. glaucum*, revealed that gametogenesis in male and female colonies takes 9–10 and 16–18 mo, respectively, in this gonochoric, seasonal, broadcast spawner. Gametogenesis and spawning are synchronised in and between colonies, and with other common soft corals on the reefs. Spawning occurs annually in March between full and new moon with the release of spermsacs and the mature oocytes, the smaller oocytes being retained for further development. Thus far, the reproductive attributes of *S. glaucum* are comparable with other studies on the genus. However, the KwaZulu-Natal population of *S. glaucum* manifested the unusual attribute of hermaphroditism in 9% of the colonies, these having Stage I and II spermaries and predominantly Stage III and IV oocytes in their polyps. Small numbers of Stage I and II oocytes indicated that such colonies may be simultaneous hermaphrodites but this could not be confirmed. The complex reproductive strategy and associated measure of hermaphroditism in *S. glaucum* on KwaZulu-Natal reefs are discussed in terms of the species' recruitment success in this marginal, high-latitude environment.

Introduction

Octocorals are predominantly gonochoric, with a few brooding species that are hermaphroditic (Benayahu, 1997), in contrast to the scleractinians in which hermaphroditic spawners are dominant (Benayahu et al., 1990). Early studies on sexual reproduction in octocorals focused mainly on the brooding species, *Alcyonium digitatum* Linnaeus, 1758 (Hartnoll, 1975), and the Xeniidae (Gohar, 1940). More recent studies, however, have shown that octocorals employ diverse reproductive strategies, viz., broadcast spawning as well as internal brooding or external surface brooding (Benayahu et al., 1990). With the exception of the surface brooder *Rhytisma fulvum fulvum* (Forskål, 1775), gonochoric broadcast spawning is the general mode of reproduction in tropical members of the family Alcyoniidae (Benayahu & Loya, 1983; Benayahu et al., 1990; Benayahu, 1997). Brooding is more common among the temperate alcyoniids (MacFadden et al., 2001).

Coral communities in South Africa constitute the southernmost distribution of this fauna on the African coast and fall almost entirely within marine-protected areas (MPAs) in northern KwaZulu-Natal (Schleyer, 2000: Fig. 1). The reefs on which they are found are not true, accretive reefs since corals grow merely as a thin veneer on the limited Pleistocene sandstone substrata in the region

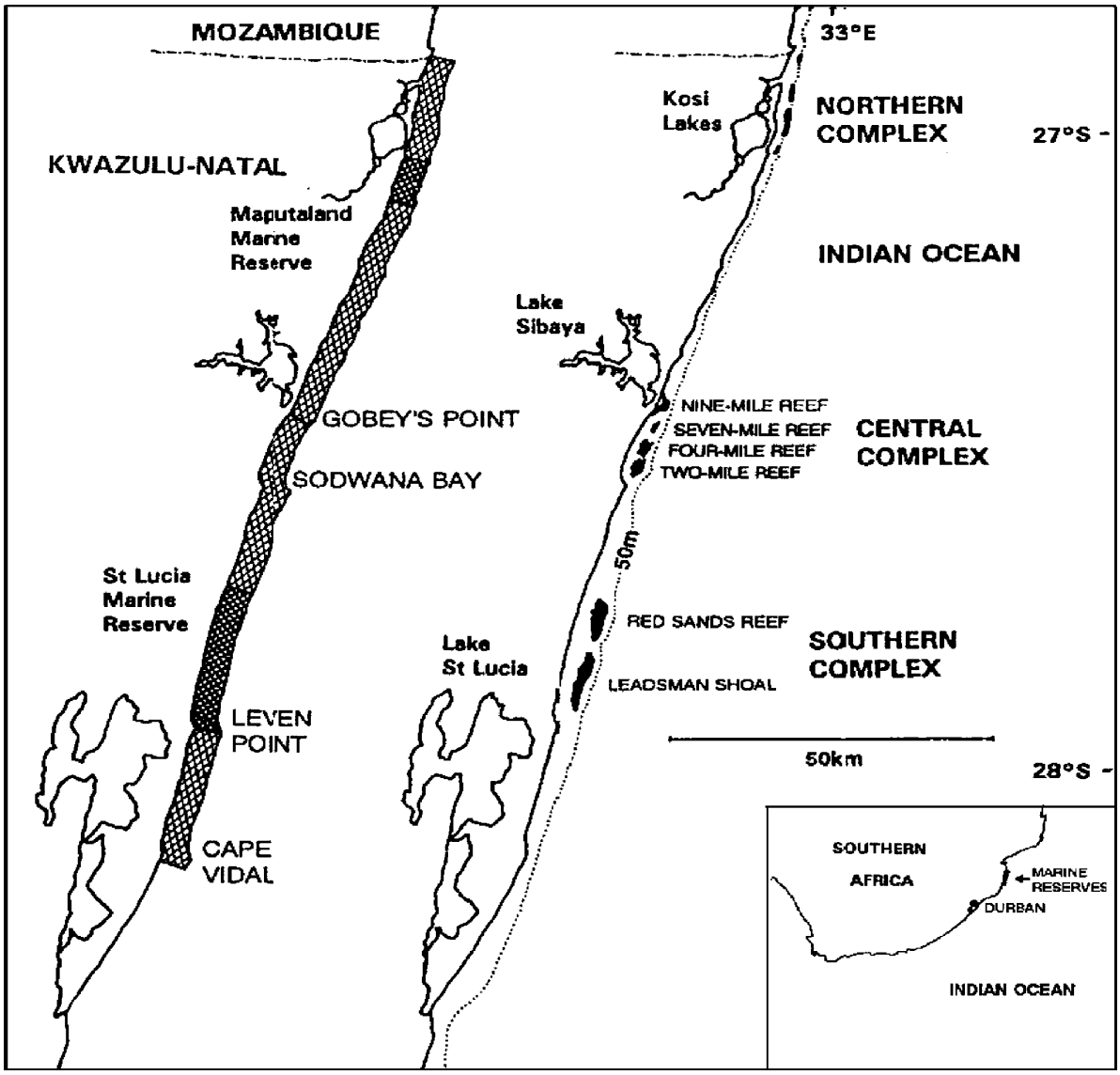

Figure 1. The major coral-inhabited reefs in KwaZulu-Natal fall within reserve (light shading) and sanctuary (dark shading) areas in the Maputaland Marine Reserve north of Gobey's Point and the St Lucia Marine Reserve to the south. These marine protected areas (MPAs) now form part of the Greater St. Lucia Wetland Park.

(Ramsay & Mason, 1990; Ramsay, 1996). As coral reefs, they are thus marginal in nature. Despite this, the coral communities attain a high biodiversity at this latitude on the East African coast and soft coral cover, comprising relatively few species, exceeds that of the more diverse scleractinian cover over much of the reef area (Riegl et al., 1995; Schleyer, 2000).

Intensive research commenced on the reefs in the early 1990s. An early question posed during these studies was whether sexual reproduction occurred in the coral communities in view of their marginal nature. Seven coral species, manifesting the full range of reproductive strategies, were thus examined histologically, and normal reproduction was encountered (Schleyer et al., 1997; Kruger & Schleyer, 1998; Kruger et al., 1998). The results on *Anthelia glauca* Lamarck, 1816, and *Pocillopora verrucosa* (Ellis & Solander, 1786) were published in detail (Kruger & Schleyer, 1998;