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## Size-defined morphotypes in *Zoanthus* (Hexacorallia: Zoantharia) populations on shores in KwaZulu-Natal, South Africa

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### Abstract

Colonial zoanthids are a conspicuous feature of the subtropical rocky intertidal in KwaZulu-Natal but those of the genus *Zoanthus* have a confused taxonomy with 10, difficult to separate, nominal species described from the region. This paper presents an analysis of polyp size, measured as mean diameter determined photographically from the number of polyps occupying an area of  $6 \times 4 \text{ cm}^2$ . The results, based on diameter frequency of 127 samples from five shores, indicate three populations (morphotypes) with means of 4.3 (SD  $\pm 0.53$ ), 5.7 (SD  $\pm 0.70$ ) and 8.4 (SD  $\pm 0.58$ ) mm occurring in the approximate abundance ratios of 10:5:1, possibly corresponding to *Zoanthus sansibaricus*, *Z. natalensis* and *Z. lawrencei*. The underlying assumptions with regard to population structure (the number, size and degree of fragmentation of clones) and the normality of data are discussed, as are trans-oceanic larval dispersal, recruitment, and genetic connectivity. The essential, traditional species description in *Zoanthus*, using internal morphology, on its own may be an inadequate discriminator of species. The status of the few possibly valid species is discussed in relation to the present results and recent studies based on the application of molecular genetics. Thorough studies of the population structure (genets and ramets) and a taxonomic approach based on the combined use of morphology, genetic methods and statistically robust, quantitative morphometrics are proposed as a potential way forward.

**Key words:** Zoanthidea, Zoanthidae, taxonomy, morphometrics, Semper's larvae, zoanthina, zoantheta, Indo–West Pacific, Indian Ocean currents, connectivity, clones, genets, ramets, intertidal ecology, keys to species.

### Introduction

The exposed rocky shores of KwaZulu-Natal, warmed by the Mozambique and Agulhas Currents, are remarkable—possibly unique—in having the lower midlittoral (exposed on spring tides) extensively colonized by zoanthids (non-calcified hexacorals of the order Zoantharia or Zoanthidea)<sup>1</sup>, particularly species of *Palythoa* and *Zoanthus* (Branch & Branch, 1981; Stephenson, 1947; Stephenson & Stephenson, 1972) (Fig. 1). The zoanthids grow, by marginal and intercalary budding, to form generally compact—but sometimes extensive—patches of polyps arising from, or partially immersed in, an extensive colonial coenenchyme. The polyps of *Palythoa* (family Sphenopidae) incorporate sand into their mesogloea, those of *Zoanthus* (family Zoanthidae) do not, and the latter are also often distinguished by the bright and contrasting colours of their oral disk and tentacles. The tentacles form a double circle, marginal to the oral disk, and their number is the same as that of the inter-mesenterial spaces in the coelenteron. The polyps grow, and the number of mesenteries increases, during life.

The identification of zoanthids to species level is problematic (there are no skeletal features and the sand incorporation found in many genera makes internal study difficult) and their underlying taxonomy controversial. Early species descriptions (largely dependent on the polyp form of preserved material and the number of mesenteries/tentacles) often, in fact, allow for little more than generic placement. Polyp size varies greatly, from

1. The vernacular name 'zoanthid' (plural 'zoanthids') is ambiguous. Though strictly applicable only to members of the family Zoanthidae (as used by Gray, 1830), as more families were created and diagnoses improved, it became applied to the whole order following introduction of the name Zoanthidea by Bourne (1900). At that time Alcyonaria and Zoantharia were widely used in the sense of Octocorallia and Hexacorallia: hence the scope for confusion. In this paper 'zoanthid' is always used in the broader and generally accepted sense (cf. *Zoanthus* or Zoanthidae for the narrower meaning).