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Short Communication

New southern geographical records of intertidal sea urchins (Echinodermata: Echinoidea), with notes on abundance

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Ten species of epifaunal sea urchin were identified at Preslies Bay, Transkei, establishing new southern geographical distributions for seven of the species. Local distributions intertidally, subtidally, and within the Mtakatye estuary were documented. Estimates of abundance on the intertidal rocky shore indicated vertical separation between certain species.

Tien spesies van epifauniese seekastaiings is by Presliesbaai, Transkei, geïdentifiseer, wat 'n nuwe suidelike geografiese verspreiding vir sewe van die spesies daarstel. Die bestaan van plaaslike bevolkings is vasgestel in die tussengetyen ondergetysones, sowel as in die Mtakatye riviermonding. Skattings van die hoeveelheid daarvan op die rotsagtige tussengetystrook dui op 'n vertikale skeiding tussen sekere spesies.

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Members of the class Echinoidea are common inhabitants of intertidal and subtidal rocky substrata. Within Southern Africa the taxonomy and geographical distribution of rock-dwelling echinoids is documented and summarized by Day (1974), and more extensively by Clark & Courtman-Stock (1976). Whereas only one intertidal species, *Parechinus angulosus*, is found along the southern and western coastlines, the east coast is particularly rich in sea urchin species (Clark & Courtman-Stock 1976). With the exception of *P. angulosus*, the ecology of the sea urchins inhabiting the east coast has apparently not been investigated (Fricke 1979, 1980; Greenwood 1980; Greenwood & Bennett 1981; Buxton & Field 1983; Sweijd 1990). In this paper we present results which extend the southern distribution of seven species of sea urchin and document their local distributions and abundance at Preslies Bay, Transkei.

To investigate the richness of sea urchins, a survey was undertaken intertidally and subtidally along a rocky shore at Preslies Bay, and subtidally in the mouth of the nearby Mtakatye estuary, Transkei (31°53'S / 29°15'E; 32°S parallel). Representatives of each species present, were collected and are to be housed in the East London Museum. After species richness had been established, species abundance on an intertidal rocky platform was estimated by stratified sampling along a transect (using a 1 × 6 m area). Eight samples were taken in the low-shore (cochlear and lower balanoid zones; Branch & Branch 1983, pp. 26), as well as in the upper-shore (upper balanoid and *Littorina* zones). These regions were distinguishable by the presence of *Gelidium pristoides* in the low-shore region. Both the open rock and rock pools were examined.

Ten species representing seven families of epifaunal sea urchin were found at Preslies Bay (Table 1). For seven of the species this represents an extension of their recorded southern distribution. All species, excepting *Eucidaris metularia*, of which only one specimen was found, were common. The most remarkable new records are those of *E. metularia*, *Echinothrix calamaris*, *Echinostrephus molaris* and *Diadema setosum* (presumably mistaken by Day (1974) for the more common *Diadema savignyi*), all of which have not previously been reported south of the 29° parallel (Mtunzini). Other than *P. angulosus*, these species are regarded as being Tropical Indo-West Pacific in their distribution, and only three additional epifaunal species, *Astropyga radiata*, *Temnopleurus toreumaticus* and *Toxopneustes pileolus* occur at Inhaca, Mozambique (26°00'S; 650 km N; Clark & Courtman-Stock 1976). Subsequent intertidal surveys at Morgan Bay (32°42'S; 78 km S) and East London (33°00'S; 108 km S), revealed that only *Tripneustes gratilla*, *P. angulosus* and *Echinometra mathaei* were present at Morgan Bay (confirming their distributions as reported by Day (1974)), with only *P. angulosus* being abundant. *P. angulosus* is the only species which occurs south of East London (33°00'S), extending its southern distribution to Cape Agulhas (34°20'S; Clark & Courtman-

Table 1 List of species of sea urchin inhabiting rock substrata identified at Preslies Bay, Transkei (31° 53'S / 29°15'E). Previous southernmost distributions according to Day (1974) and Clark & Courtman-Stock (1976) are also given. Species showing a new southern record are marked with an asterisk. Dash indicates no record. 1° Ref. represents the co-ordinates for one degree reference squares. That within which Preslies Bay is located, is thus 32°S / 29°E

Family: Species	1° Ref.	C & C-S (1976) Place	Day (1974) Place
Cidaridae:			
*Eucidaris metularia**	26°S/33°E	Inhaca	—
Diadematidae:			
*Diadema savignyi**	31°S/29°E	Port Edward	—
*Diadema setosum**	26°S/33°E	Inhaca	Durban
*Echinothrix calamaris**	29°S/31°E	Mtunzini	—
Stomechinidae:			
*Stomopneustes variolaris**	31°S/29°E	Port Edward	Port St Johns
Temopleuridae:			
*Salmacis bicolor**	29°S/31°E	Mtunzini	Durban
Toxopneustidae:			
Tripneustes gratilla	32°S/29°E	Coffee Bay	East London
Echinidae:			
Parechinus angulosus	34°S/23°E	Cape Agulhas	Cape Agulhas
Echinometridae:			
Echinometra mathaei	30°S/30°E	Amanzimtoti	Morgan Bay
*Echinostrephus molaris**	29°S/31°E	Mtunzini	—

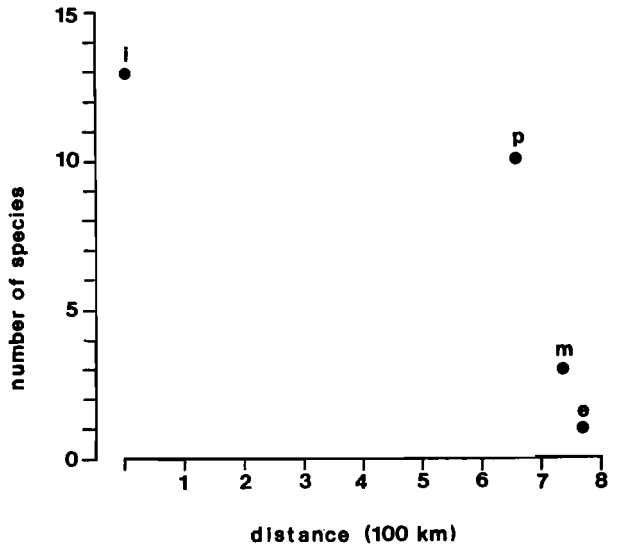

Figure 1 Species richness of epifaunal rock-dwelling sea urchin occurring at Inhaca, Mozambique (i; from Clark & Courtman-Stock 1976), and at three sites of various distances south of Inhaca: Preslies Bay, Transkei (p), Morgan Bay (m) and East London (e).

Stock 1976), and thence up the West Coast.

The present study shows that there is a marked decline in species richness over a small distance south of Preslies Bay (108 km S; Figure 1). The change from a tropical to a temperate echinoid fauna therefore appears to occur within a short definable region. It would be interesting to determine whether similar transitions exist for tropical representatives of other littoral fauna and flora.

Four species were recorded in the estuary and subtidally, alike (Table 2). However, the absence of records of other species in these regions may be due to the possible incompleteness in sampling. Two species, *E. calamaris* and *Salmacis bicolor*, were found in the Mtakatye estuary only (Table 2). Intertidally, species diversity was greatest in the upper-shore zone with six species being recorded from pools (Table 2). *E. mathaei* was the most abundant urchin having a density of 166 individuals per 48 m^2 (3,46 ± 1,55 (8) m^{-2}; $\bar{x}$ ± *SD* (*n*)). There was variability in abundance and species composition between pools in the upper-shore. Where *D. savignyi* was abundant, there was a low count for *Stomopneustes variolaris*, and *D. setosum* and *T. gratilla* were observed in 50% or less of sampled pools.

Table 2 Lower and upper intertidal, subtidal (S) and estuarine (E) distributions and abundance of epifaunal sea urchin at Preslies Bay (*N*, total number of individuals counted within 8 × 6 m^2; *n*, number of samples in which the species was present). P indicates an observation of more than one individual; N/O indicates species was not observed

Species	L/intertidal *N (n)*	U/ intertidal *N (n)*	S	E
Diadema savignyi	N/O	34 (7)	P	P
Diadema setosum	N/O	5 (4)	N/O	P
Echinothrix calamaris	N/O	N/O	N/O	P
Stomopneustes variolaris	105 (8)	40 (7)	P	N/O
Salmacis bicolor	N/O	N/O	N/O	P
Tripneustes gratilla	N/O	4 (3)	P	N/O
Parenchinus angulosus	107 (8)	N/O	N/O	N/O
Echinometra mathaei	N/O	166 (8)	P	N/O
Echinostrephus molaris	N/O	27 (6)	N/O	N/O

Only two species, *P. angulosus* and *S. variolaris* were found on the low-shore, where they occurred in equal numbers (Table 2). *P. angulosus*, however, was notably more common at the extreme low-water level. Although *S. variolaris* showed the widest vertical distribution, their abundance declined upshore. It is interesting to note that *P. angulosus* was absent from the upper-shore at Preslies Bay, as this species was commonly found in upper-shore pools at Morgan Bay.

The distributions of these urchins could be influenced by a number of factors, and studies on inter-specific competition and resource partitioning could prove rewarding. Tolerance of physical conditions is also of importance in determining their distribution. Firm adhesion to the substratum by *P. angulosus* in comparison to the upper-shore urchins, *Diadema* and *P. gratilla* (pers.obs. D.J.M), will allow it to withstand more vigorous forces of wave-wash. The long, slender spines of *Diadema*, whilst affording protection against predators, will offer resistance to wave-wash. The distribution of the boring urchin, *E. molaris*, must depend on rock substratum.

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