Short Communications

Subtidal distribution of *Callianassa kraussi* and *C. gilchristi* in Algoa Bay

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Four subtidal transects were sampled in Algoa Bay. *Callianassa kraussi* and *C. gilchristi* were recorded from the sheltered south-western shores of the bay. The contribution of these two species to total macrofaunal and crustacean biomass is given for the King's Beach transect. The factors affecting the distribution of these species in Algoa Bay are discussed.

Monsters van vier subgety-transekte is in Algoabaai geneem. *Callianassa kraussi* en *C. gilchristi* is van die beskutte suidwestelike kus van die baai aangeteken. Die bydrae van dié twee spesies tot die totale biomassa van die makrofauna en crustacea vir die King's Beach-transek word gegee. Die faktore wat die verspreiding van hierdie spesies in Algoabaai beïnvloed, word bespreek.

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Callianassa kraussi (Stebbing) occurs around the South African coast from Lamberts Bay (Day 1959) in the west to San Martinho in Mozambique (Forbes 1973a). Its geographical range is considered to be largely temperature controlled (Forbes 1973a). *C. kraussi* has been recorded in open and closed estuaries (Barnard 1950; McLachlan & Grindley 1974; Hanekom 1980; Day 1981) and in sheltered lagoons and bays (Day 1959; Forbes 1973a and McLachlan, Cockcroft & Malan 1984). Forbes (1973b, 1974) considered this species well adapted to South African estuaries by virtue of its abbreviated larval development and osmoregulatory ability. *C. gilchristi* is only known from marine environments and is recorded from Saldanha Bay to Durban (Kensley 1974). Few data are available on its biology.

This paper reports on the distribution and biomass of *C. kraussi* and *C. gilchristi* recorded from four subtidal transects in Algoa Bay (Figure 1). As the swell mostly approaches from the south-west and refracts into the bay, beaches increase in exposure from Cape Receife north-eastwards to Sundays River. Two transects were sampled on the sheltered south-western shores and two on the more exposed north and north-eastern side of the bay. Hobie Beach (most sheltered) is a sandy/rock beach characterized by sandy areas between reef outcrops. The nearby King's Beach has a surf zone 50–100 m wide with breaking waves averaging 0,5–1 m in height. On the more exposed side of the bay the Blue Water Bay surf zone ranges from 50–150 m in width with average breaking-wave heights of 1,5 m, while the exposed

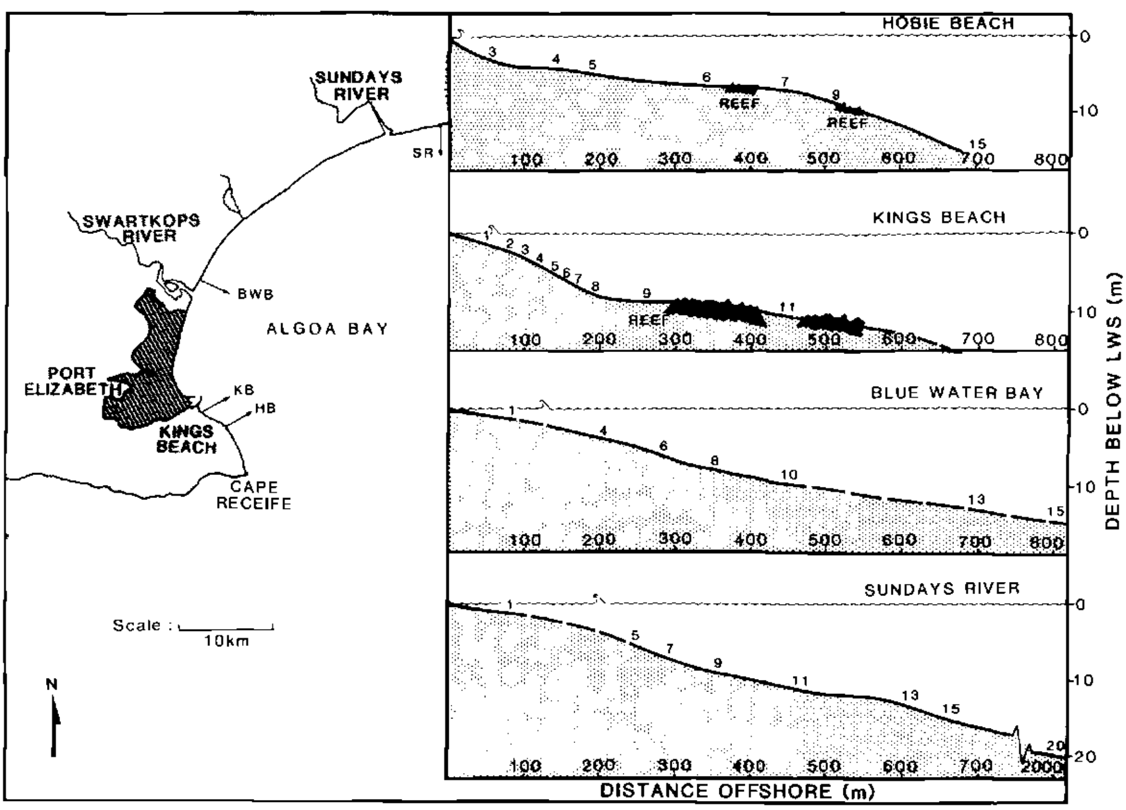

Figure 1 Algoa Bay showing four transect sites and subtidal profiles. Numbers indicate water depth at each site sampled. HB = Hobie Beach, KB = King's Beach, BWB = Blue Water Bay and SR = Sundays River.

Sundays River surf zone ranges from 200–300 m in width with wave height averaging 2–4 m.

Subtidal profiles (Figure 1) were determined using SCUBA, depth gauges and a compass. All depths were adjusted to L.W.S. Core samples (30 × 10 cm^2) were taken at stations indicated on the four transects (Figure 1) and were used for physical and chemical analysis. A 50 g sand sample was wet-sieved through a series of screens at 0,5 phi intervals and the usual parameters (Table 1) calculated (Folk 1974). The organic content of the sand was determined using the micro-kjeldahl method.

A diver operated suction sampler modified from Christie & Allan (1972) was used to sample macrofauna along three sandy-beach transects. This sampled an area of 0,1 m^2 to 50 cm, the sand being passed through a 1-mm mesh collecting basket to trap the macrofauna. As Christie (1976) found that three replicate samples were sufficient to trap 88% of the common species in a similar environment, this number of samples was taken at each station. Macrofaunal samples were preserved in 10% formalin, all species identified and dry biomass determined by drying at 70°C. The suction sampler was not used on the more rocky Hobie Beach transect except for two non-quantified samples at 8 m and 10 m water depth. Prawn holes enclosed in a circular 1/8 m^2 ring were counted with at least five replicates at each station.

A laboratory microcosm was used to determine the ratio of prawn numbers to surface holes and to observe burrowing speed, mechanism and depth. A total of 56 prawns was held in the laboratory for periods ranging from three days to one month.

The sediment parameters, total prawn numbers and biomass from the four transects are given in Table 1.

Table 1 Summary of sediment parameters and prawn numbers and biomass (Md = median particle diameter

Profile	Water depth	Substrate depth (cm)	Md µm	62 µm % sub-sieves	N (mg g^{-1} sand)	% Organics	Prawn numbers m^{-2}	Prawn biomass g m^{-2}
King's Beach	1	60	243	2,5	0,3	1,77	0	0
	2	60	277	3,5	0,26	2,37	0	0
	3	60	222	3,8	0,19	1,64	0	0
	4	60	226	4,4	0,12	2,01	13	3,08
	5	60	205	4,0	0,25	2,63	216	25,38
	6	60	209	3,6	0,26	1,80	155	16,23
	7	60	190	6,9	0,41	3,41	110	9,01
	8	60	197	3,2	0,21	1,68	350	16,78
	9	60	161	6,7	0,33	2,68	0	0
	11	60	205	3,2	0,16	1,38	104	24,32
Hobie Beach	3	80	–	–	–	–[a]	0	0[b]
	4	11	–	–	–	–	0	0
	5	12	–	–	–	–	0	0
	6	40	190	2,01	0,38	3,47	28	2,94
	7	117	181	2,91	0,34	3,16	35	3,67
	8	101	185	3,96	0,38	3,47	105	11,02
	9	100	170	4,5	0,40	3,63	161	16,90
	10	100	170	4,6	0,40	3,63	168	17,64
	13	60	150	6,9	0,31	2,93	35	3,67
	15	60	120	7,5	0,21	2,17	0	0
	20	100	81	18,9	0,18	1,93	0	0
Blue Water Bay	1	40	216	2,4	0,09	1,78	0	0
	13	40	207	2,4	0,09	1,78	0	0
	15	60	235	6,8	0,14	2,29	0	0
Sundays River	1	60	239	2,4	0,09	1,02	0	0
	5	60	229	3,2	0,07	1,04	0	0
	7	60	144	10,8	0,12	1,66	0	0
	9	60	177	2,5	0,11	1,76	0	0
	11	60	183	6,7	0,20	1,79	0	0
	13	60	154	8,5	0,28	1,89	0	0
	15	60	110	15,2	0,12	1,60	0	0
	20	60	86	26,5	0,13	1,76	0	0

[a]Calculated from $N = 0,13$ (% Org) – 0,55; $r = 0,75$; $p < 0,001$ (McLachlan *et al.* 1984).

[b]Mean individual biomass from McLachlan *et al.* (1984).

Microcosm results gave a mean of 1,2 ± 0,4 holes per prawn and this was used to calculate prawn numbers in the Hobie Beach transect. Total number of holes (open and closed) were used in this case as total number of holes were counted in the field. In laboratory experiments Forbes (1973a) found that the number of open burrows never exceeded the number of prawns in the aquaria. The ratio of open holes to prawn numbers was almost 1:1 under calm conditions but decreased to 1:5 when aeration was supplied. Hanekom (1980) found one hole per prawn using a suction sampler in the Swartkops estuary.

Linear regression analysis showed the percentage of sub-sieve particles to be negatively correlated with median particle diameter (Md μm) (r = 0,80; $p < 0{,}001$; N = 30).

No prawns were recorded in the Blue Water Bay and Sundays River transects. *C. kraussi* were recorded from the Hobie Beach samples and both *C. kraussi* and *C. gilchristi* from the King's Beach transect (Table 2).

Total prawn numbers along the King's Beach transect are similar to the number of prawn holes recorded by Forbes (1973a). He found the mean number of prawn holes increased from 1 m^{-2} (3 m depth) to 320 m^{-2} (8 m) with a maximum of 364 m^{-2} at 6 m in Algoa Bay and Hanekom (1980) recorded 1–116 *C. kraussi* m^{-2} in the subtidal regions of the Swartkops estuary. Brown 1953 (in Day 1981) estimated *C. kraussi* densities of 300 m^{-2} in the blind Kleinemonde estuary and Christie & Moldan 1977 (in Day 1981) recorded densities of 83 m^{-2} in Langebaan lagoon.

No clear relationship between organics in the sediment and prawn biomass (Figure 2a) was evident and prawns were found in sediment ranging from 1,25–3,75% organics. Prawns were found in sediments having 2–8% subsieves (Figure 2b) and substrates ranging from 120–240 μm Md (Figure 2c).

Transects across high energy coasts (McLachlan *et al.* 1984) include an inner turbulent zone, a transition zone and an outer turbulent zone. In the inner turbulent zone wave energy precludes the formation of semi-permanent burrows. The transition zone marks the region where wave energy reaching the bottom rapidly declines from

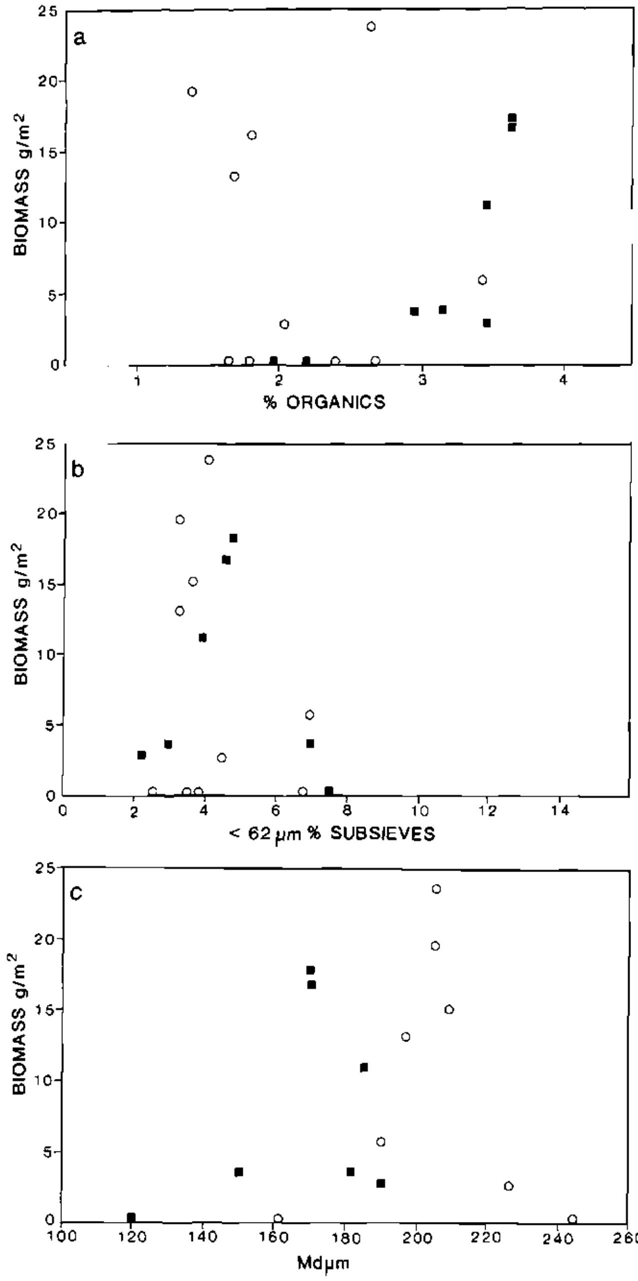

Figure 2 Relationship between *C. kraussi* biomass and (a) % organics; (b) % subsieves; (c) median particle diameter in the King's Beach (○) and Hobie beach (■) transects.

Table 2 King's Beach transect — % contribution of *C. kraussi* and *C. gilchristi* to total* macrofaunal biomass and crustacean biomass (biomass values on a dry basis)

Water depth (m)	No. m^{-2} *C. kraussi*	No. m^{-2} *C. gilchristi*	Biomass g m^{-2} *C. kraussi*	Biomass g m^{-2} *C. gilchristi*	% Total macrofauna biomass *C. kraussi*	% Total macrofauna biomass *C. gilchristi*	% Crustacean biomass *C. kraussi*	% Crustacean biomass *C. gilchristi*
4	10	3	2,7	0,385	29	4	84	12
5	206	10	23,71	1,672	37	3	91	6
6	148	7	15,01	1,224	42	4	90	7
7	107	3	5,95	3,061	23	11	63	32
8	333	17	13,02	3,771	54	16	72	21
9	0	0	0	0	0	0	0	0
11	87	17	19,33	5,01	48	12	65	21

*Total macrofaunal and crustacean biomass from McLachlan *et al.* (1984).

its peak at the breakpoint and the outer turbulent zone is characterized by high diversity and biomass. In the King's Beach transect *Callianassa* were first recorded around the outer limit of the transition zone (4 m) and were abundant in the outer turbulent zone which started at 5 m. The absence of *Callianassa* from the outer turbulent zone at Sundays River is not explained by our data and must be related to a factor other than substrate. Forbes (1973a) postulated that water movement and sediment transport limited the distribution of *C. kraussi*. The stronger longshore currents in the exposed eastern side of the bay and the possible increase in sediment transport may preclude *Callianassa* from this area.

Using the mean *Callianassa* spp. biomass (10,04 ± 8,9 g m^{-2}) for the 15 stations sampled in the transition and outer turbulent zones of King's and Hobie Beaches (area *ca* 2 km^2) a conservative biomass estimate of 20 000 kg is obtained for this sheltered section of Algoa Bay. The total standing biomass for the Swartkops estuary was estimated at *ca* 12 000 kg by Hanekom (1980). This population of prawns is a major food source for fish, and is important in bioturbation and ventilation of the sediment.

Further study is required to establish factors influencing competition/co-existence between the two *Callianassa* species found in the King's Beach transect.

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The chromosomes of the tsessebe *Damaliscus lunatus*

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Mitotic chromosome studies in five male tsessebe are described. The diploid chromosome number of 36 (NF = 61) is reported for the first time.

'n Ondersoek is na die mitotiese chromosome van vyf tsessebebulle uitgevoer. Die diploïede chromosoomgetal van 36 (NF = 61) word vir die eerste keer beskryf.

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The mitotic chromosome complement of tsessebe *Damaliscus lunatus* is reported here for the first time. Chromosome analyses of free-ranging large mammals have been carried out by various researchers in Southern Africa. Prominent among these are the investigation into chromosomes of the Perissodactyla by Heinichen (1970), and the extensive survey of chromosomes of Artiodactyla, Carnivora, Proboscidea and Perissodactyla in the Kruger National Park by Wallace (1976).

Tsessebe are rare in South Africa and study material is not readily available. Wallace (1976) attempted bone marrow chromosome analysis from a male and female tsessebe in the Kruger National Park, but this was not