Studies on the littoral seaweed epifauna of St Croix Island. 3. *Gelidium pristoides* (Rhodophyta) and its epifauna

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The distribution of *Gelidium pristoides*, a commercially important seaweed in South Africa, was investigated on St Croix Island in Algoa Bay. Total area of the midlittoral *G. pristoides* belt was 4241 m^2 and total summer standing crop of this perennial seaweed was 265 kg (dry mass). Monthly numerical composition of *G. pristoides* epifauna at three sites on St Croix is presented and discussed. Nematodes dominated the epifauna throughout the year with harpacticoids the second most abundant taxon. The presence of nauplius, annelid and Diptera larvae as well as juvenile amphipods and molluscs in the epifauna indicates the role of seaweeds as nursery areas for littoral fauna. *G. pristoides* epifauna averaged $1,77 \times 10^5$ animals m^{-2}. Total summer standing stock of *G. pristoides* epifauna on St Croix was determined by two methods which yielded $6,4 \times 10^8$ and $7,3 \times 10^8$ animals respectively.

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Die verspreiding van *Gelidium pristoides*, 'n seewier wat ekonomies belangrik is in Suid-Afrika, is op St Croix Eiland in Algoabaai ondersoek. Die totale oppervlakte van *G. pristoides* op die midlitorale gordel was 4241 m^2 met 'n totale somer biomassa van 265 kg (droë massa). Maandelikse getalle en samestelling van *G. pristoides* epifauna by drie plekke op St Croix word aangebied en bespreek. Nematoda oorheers die epifauna die hele jaar met Harpacticoida as die tweede volopste takson. Die teenwoordigheid van nauplius-, Annelida- en Diptera-larwes sowel as jong Mollusca en Amphipoda in die epifauna beklemtoon die rol van seewiere as kweekgebiede vir intergety diere. Die gemiddelde getal *G. pristoides* epifauna op die eiland was $1,77 \times 10^5$ diere m^{-2}. Totale somergetalle van *G. pristoides* epifauna op St Croix is op twee maniere bereken wat onderskeidelik $6,4 \times 10^8$ en $7,3 \times 10^8$ diere opgelewer het.

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Gelidium pristoides (Turner) Kützing is a characteristic littoral seaweed of the south coast of southern Africa (Isaac 1942) and is distributed from Sea Point on the west coast to Port Edward on the east coast (Day 1969). It is particularly abundant in the Eastern Cape where it is gathered for the production of agar (Seagrief 1967; Simons 1977) and in 1979 the total yield for the coast south of the Kei River was 104 metric tons (Jarman pers. comm. 1980).

On St Croix Island (33°48′S/25°46′E) *G. pristoides* is a dominant seaweed occurring in a distinct belt around the island. Preliminary investigations (Beckley & McLachlan 1980) showed this seaweed to support an abundant and diverse epifauna. Because it is of commercial importance and is easily accessible on the mid-shore, *G. pristoides* was selected for further studies of the associated fauna. This paper examines the distribution and standing crop of *G. pristoides* on St Croix as well as the composition, abundance and standing stock of the associated fauna.

Methods

The total area of the midlittoral *G. pristoides* belt on St Croix was determined by measuring the width of the belt at 10-m intervals using graduated poles and a tape-measure. All penguin (*Spheniscus demersus*) landing stages, where denudation of littoral biota occurs, were recorded and measured. The percentage cover of *G. pristoides* in each 10-m interval was estimated visually. The relationship between percentage cover and biomass was determined by estimating coverage in thirteen 625-cm^2 quadrats randomly selected around the island and collecting all the *G. pristoides* from each quadrat. These samples were rinsed in fresh water and oven-dried for 24 h at 90 °C before weighing. Variation in shore coverage of *G. pristoides* was monitored monthly by photographing a permanent 625-cm^2 quadrat on the north coast of St Croix and determining the area covered using a planimeter.

Six tufts of *G. pristoides* were collected monthly from April 1976 through to April 1977 at three sites which differed in extent of wave action, being sheltered, moderately exposed and exposed (sites S, M & E in Beckley & McLachlan 1979). Techniques used for sampling, epifauna extraction, preservation and staining were as described by Beckley & McLachlan (1980). Two subsamples (totalling 20% of the sample) were drawn from each sample, counted in graduated perspex dishes and results expressed as numbers per gram of dry *G. pristoides*.

Results and Discussion

G. pristoides distribution and standing crop

The midlittoral perimeter of St Croix Island was found to be 3180 m and it supported an almost continuous belt of *G. pristoides* with a mean width of 1,33 m. Discontinuities in the *G. pristoides* belt occurred at 30 penguin landing stages and in total 80 m of shore was denuded of *G. pristoides* by penguin abrasion (Figure 1). The total area of the *G. pristoides* belt was calculated to be 4241 m^2.

Figure 1 A penguin landing stage on the north coast of St Croix Island showing the absence of *Gelidium pristoides* due to abrasion.

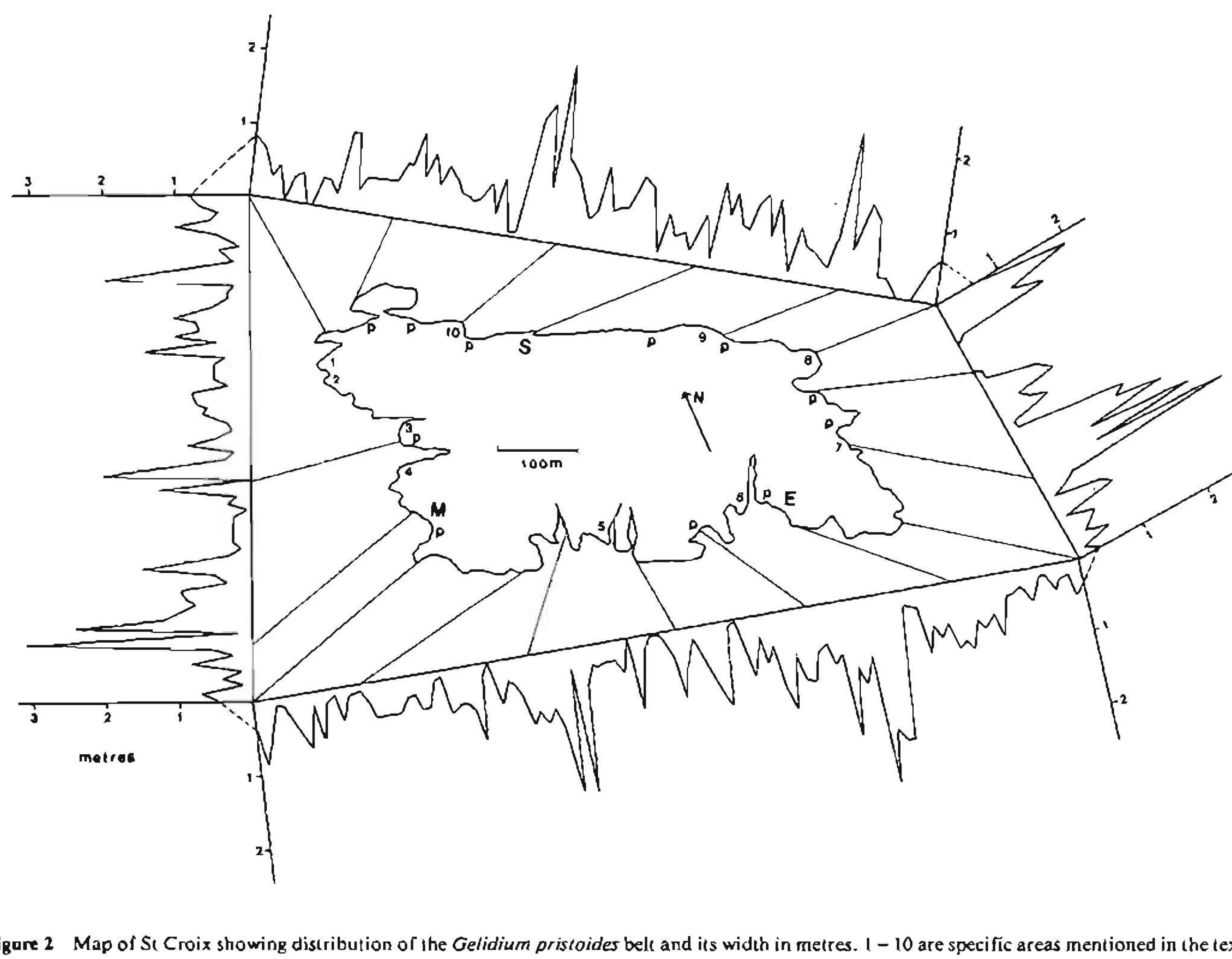

Figure 2 Map of St Croix showing distribution of the *Gelidium pristoides* belt and its width in metres. 1 – 10 are specific areas mentioned in the text, p indicates major penguin landing stages and S, M and E are sampling sites.

The *G. pristoides* belt was widest on promontories moderately exposed to wave action such as areas 1 – 4 and 8 – 10 in Figure 2. Narrowest zones of *G. pristoides* occurred on the south and east shores of St Croix except at areas 5 – 7 where rocky shelves protect these sites from the brunt of the prevailing swells. Wave action also determines the position of the *G. pristoides* belt on the shore. Figure 3 indicates the upward shift of the *G. pristoides* belt in response to increased wave action on St Croix.

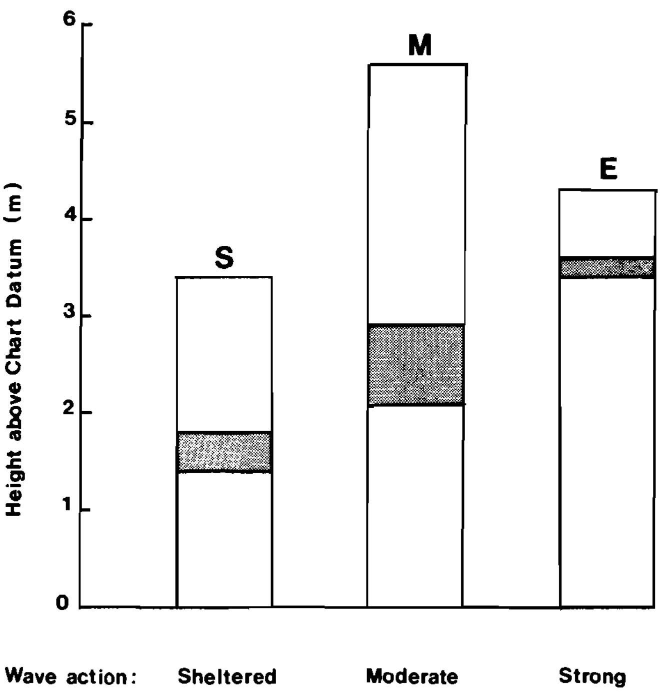

Figure 3 Vertical range of the *Gelidium pristoides* belt in the littoral zone as related to wave action at the three sampling sites on St Croix Island. The upper limit of the littoral zone is taken as the upper limit of *Littorina* spp. on the shore.

Estimations of percentage cover of this belt by *G. pristoides* for each 10-m interval around the island revealed a greater mean percentage cover on the west coast (14%), than on the north (9%), south (6%) or east coasts (6%). With 1% coverage found to equal 5,0 g dry mass m^{-2}, the total summer standing crop of *G. pristoides* on St Croix was calculated from area and percentage cover estimates to be 265 kg dry mass or 883 kg wet mass (70% H_2O). Using the value of 18,334 kJ g^{-1} dry mass (Beckley & McLachlan 1979) the total summer standing crop of *G. pristoides* on St Croix was equal to 4,86 × 10^6kJ.

The coverage of *G. pristoides* in the permanent quadrat was fairly constant over the year with slight increases in autumn and spring (Figure 4). It is therefore concluded that the summer standing crop is available throughout the year as a micro-environment for littoral animals.

Epifauna composition and abundance

Eighteen animal taxa were found to be associated with *G. pristoides* on St Croix. Tables 1, 2 and 3 give the mean number of animals per gram dry mass of *G. pristoides* found at the three sampling sites (sheltered, moderately exposed and exposed) over the study period.

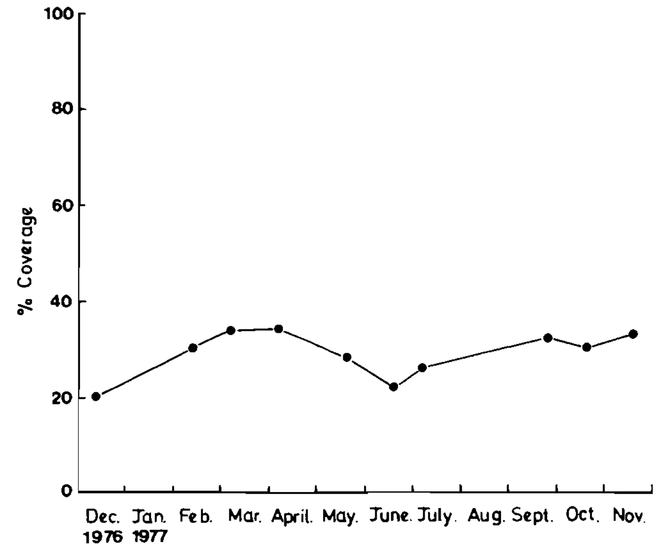

Figure 4 Variation over a year in percentage cover of *Gelidium pristoides* in a permanent quadrat in the St Croix Island littoral zone.

Foraminifera occurred around the holdfasts of *G. pristoides* and numbers were consistently lower at Site E than at the other two sites. Many of the Foraminifera were similar in appearance to those described by Hedley, Hurdle & Burdett (1967) from intertidal *Corallina officinalis* in New Zealand.

Two small species of Turbellaria and occasional specimens of the larger *Planocera gilchristi* occurred in the *G. pristoides* epifauna. Turbellaria were more abundant from May to November than December to April at all three sites. Nemertean worms were never abundant in the epifauna but were present throughout the year except for December.

Nematodes were the most abundant animals in the epifauna (Figure 5) and the highest number recorded from

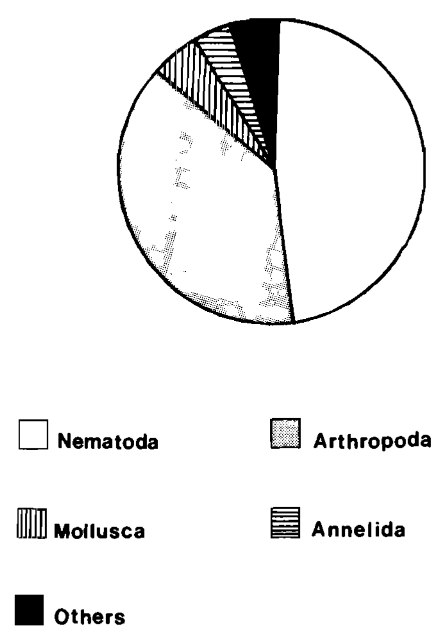

Figure 5 Mean composition (numbers) of *Gelidium pristoides* epifauna on St Croix Island.

Table 1 Mean number of animals per gram dry mass of *Gelidium pristoides* from a site (S) sheltered from wave action

	April 76	May	June	July	August	September	October	November	December	January 77	February	March	April	Mean
Foraminifera	34	9	42	43	11	30	10	5	11	44	30	70	147	37
Turbellaria	13	24	78	8	92	94	25	94	3	3	2	5	0	34
Nemertea	3	6	4	0	13	0	1	6	0	0	0	3	6	3
Nematoda	867	654	1900	3209	1938	2204	929	1309	2837	1515	941	939	1516	1597
Annelida	35	51	79	52	63	170	46	84	95	97	48	5	70	69
Annelid larvae	22	44	58	6	107	60	30	72	53	24	11	3	6	38
Sipuncula	3	0	0	0	0	0	0	0	0	0	0	4	1	1
Ostracoda	51	36	150	168	336	127	109	153	128	139	62	32	107	123
Harpacticoida	314	389	858	708	467	851	193	593	1700	474	380	281	595	600
Tanaidacea	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Isopoda	16	6	22	12	19	42	23	79	16	20	11	0	2	21
Amphipoda	35	41	112	64	66	41	24	32	192	76	136	73	58	73
Nauplius larvae	47	197	416	370	192	584	63	1181	860	65	122	23	154	329
Collembola	0	0	0	0	0	0	0	7	0	7	0	0	0	1
Diptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diptera larvae	1	6	3	0	4	2	0	2	2	1	4	1	2	2
Aranae	0	0	0	0	0	0	1	1	0	1	0	0	0	0
Acari	23	24	58	81	53	66	44	71	282	38	34	43	64	68
Gastropoda	8	4	16	16	16	26	47	17	6	24	5	6	10	15
Pelecypoda	75	87	98	196	156	128	39	160	241	284	164	173	271	159
Tardigrada	5	36	75	171	30	220	48	64	403	7	109	27	53	96
Total	1552	1614	3969	5104	3563	4645	1633	3930	6829	2819	2059	1688	3062	3266

Table 2 Mean number of animals per gram dry mass of *Gelidium pristoides* from a site (M) moderately exposed to wave action

	April 76	May	June	July	August	September	October	November	December	January 77	February	March	April	Mean
Foraminifera	50	91	15	21	24	18	37	1	36	1	36	15	56	31
Turbellaria	2	16	35	0	28	22	15	47	15	1	0	0	0	14
Nemertea	3	1	6	5	4	3	8	1	0	1	4	0	3	3
Nematoda	589	1361	570	842	624	704	524	799	640	336	752	543	1100	722
Annelida	34	60	56	63	68	94	88	56	85	29	52	46	114	65
Annelid larvae	3	21	54	0	29	24	20	23	30	6	2	0	0	16
Sipuncula	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ostracoda	60	54	34	102	38	31	70	6	27	11	48	11	63	43
Harpacticoida	250	648	272	301	226	305	175	339	324	91	273	138	799	319
Tanaidacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isopoda	22	4	9	8	21	30	27	11	63	4	1	4	2	16
Amphipoda	20	54	12	2	32	68	33	28	34	27	14	91	2	32
Nauplius larvae	98	413	98	112	31	106	73	152	101	10	43	20	61	101
Collembola	0	0	0	0	1	0	0	45	0	0	0	0	0	4
Diptera	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Diptera larvae	0	3	1	0	0	0	1	0	6	1	0	4	2	1
Aranae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acari	36	48	21	82	27	61	28	33	64	52	44	40	86	48
Gastropoda	9	21	8	27	12	16	26	8	28	3	8	11	45	17
Pelecypoda	26	28	61	50	34	73	49	36	38	26	13	32	159	48
Tardigrada	24	45	34	124	14	36	34	29	42	19	40	26	21	38
Total	1226	2868	1286	1739	1213	1591	1208	1615	1533	618	1330	981	2513	1518

Table 3 Mean number of animals per gram dry mass of *Gelidium pristoides* from site (E) exposed to wave action

	April 76	May	June	July	August	September	October	November	December	January 77	February	March	April	Mean
Foraminifera	4	7	0	2	0	7	5	1	5	2	5	0	3	3
Turbellaria	45	60	245	21	98	166	104	77	10	0	0	0	0	64
Nemertea	1	10	6	4	9	0	9	0	0	1	0	1	4	3
Nematoda	710	748	1262	1999	1562	837	678	964	1355	828	1486	1083	849	1105
Annelida	19	44	47	75	94	62	47	142	135	27	41	15	30	60
Annelid larvae	7	25	0	67	57	7	26	30	74	16	7	2	3	25
Sipuncula	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ostracoda	2	2	11	8	9	8	8	13	22	3	4	3	4	7
Harpacticoida	879	433	684	1049	302	580	399	509	755	354	273	235	527	537
Tanaidacea	0	0	0	0	0.	0	0	0	0	0	0	0	0	0
Isopoda	8	18	4	22	21	24	17	5	10	2	0	0	2	10
Amphipoda	50	70	2	14	65	38	91	58	81	266	148	215	232	102
Nauplius larvae	463	67	240	290	25	212	89	648	81	34	33	886	32	238
Collembola	0	0	0	0	39	0	0	0	0	0	0	0	0	3
Diptera	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Diptera larvae	1	10	6	11	2	4	1	8	5	1	11	9	15	6
Aranae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acari	48	76	133	239	120	135	57	133	149	165	71	149	147	125
Gastropoda	2	3	6	2	8	5	43	6	6	5	0	3	2	7
Pelecypoda	86	97	69	403	63	110	119	173	188	192	152	128	119	146
Tardigrada	20	19	25	35	24	16	12	77	42	18	39	55	32	32
Total	2345	1689	2740	4241	2498	2211	1705	2844	2918	1914	2270	2784	2003	2473

one gram dry mass of *G. pristoides* was 7746. In general nematodes were more abundant at Sites S and E than at the moderately exposed Site M. The nematodes belonged chiefly to the orders Enoplida, Chromadorida, Monohysterida (*Theristrus* sp.), Araeolaimida and Desmodorida. Many nematodes were found at Site S where the sheltered conditions allow the accumulation of sediment around the seaweeds. Wieser (1952) and Moore (1971), who worked on nematodes associated with littoral seaweeds and kelp holdfasts respectively, also found that algae which accumulated sediment, supported many nematodes. The abundance of nematodes at Site E was unexpected but Dommasnes (1969) has reported a similar occurrence for an exposed locality in Norway.

Both Oligochaeta and Polychaeta were recorded, oligochaetes constituting on average 49% of the annelid epifauna (Figure 6). Syllids were the most numerous polychaetes and errant nereids (including *Pseudonereis variegata*) and tube-living sabellids were also found. Colman (1939), Glynn (1965) and Bennett (1971) have recorded the association of marine oligochaetes with seaweeds whilst Chapman (1955), Morton & Miller (1968), Hicks (1971) and Sarma & Ganapati (1972) have documented the abundance of syllids in seaweed epifauna. Annelid larvae were often abundant in the epifauna but during the late summer months numbers

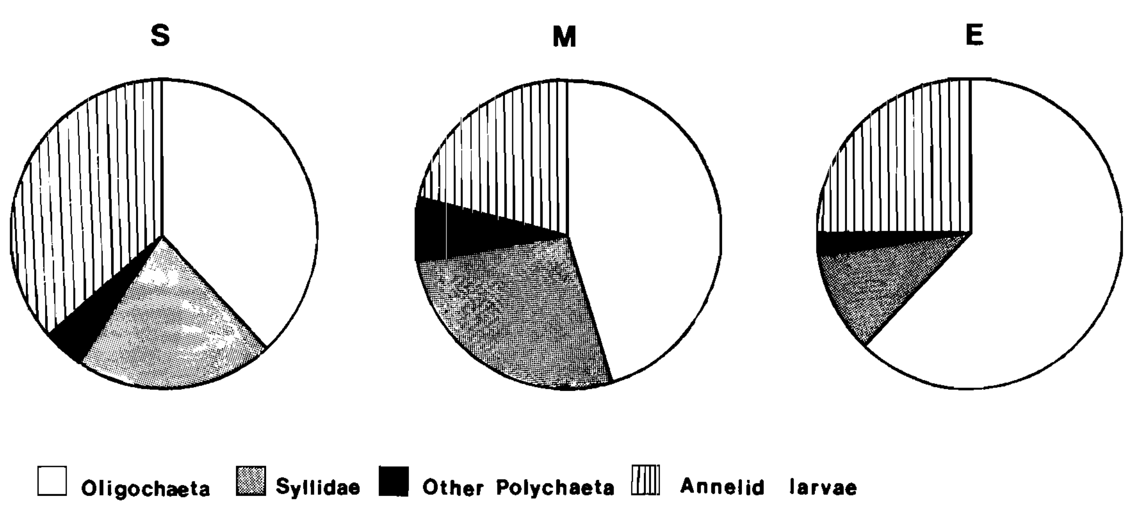

Figure 6 Mean composition (numbers) of the annelid epifauna of *Gelidium pristoides* at Sites S, M and E on St Croix Island.

declined at all three sampling sites.

Ostracods, harpacticoids, isopods, amphipods and nauplius larvae constituted the crustacean epifauna of *G. pristoides* on St Croix. The two dominant species of ostracods were *Cytherideа puncillata* and *Xestoleberis* sp. Few ostracods were found at Site E and the upward shift of the *G. pristoides* belt on the shore due to greater wave action at this site probably explains this phenomenon. Hagerman (1968) and Williams (1969) have investigated ostracods associated with seaweeds and have found some species to be specific to the seaweed habitat.

Harpacticoid copepods were abundant in the epifauna of *G. pristoides* and the most numerous were *Orthopsyllus* sp., *Parastenhelia* sp. and *Phyllodopsyllus* sp. Others that occurred in lesser numbers were *Porcellidium clavigerum, Harpacticus nicraensis, Mesochra pygmaea, Robertsonia* sp., *Laophonte cornuta* and *Leptocaris* sp. All these genera have been recorded from seaweed epifauna by various workers including Colman (1939), Chapman (1955), Dommasnes (1969) and Hicks (1971, 1977a, 1980). The harpacticoids associated with *G. pristoides* occurred amongst the fronds and in the sediment accumulated about the holdfast. On the basis of his detailed work on harpacticoids associated with *Corallina*, Hicks (1977b) has postulated that spatial separation between these two microhabitats could reduce crowding and competition between associated species during periods of high population density.

The isopod epifauna consisted of species belonging to the Flabellifera and Asellota. *Ianiropsis palpalis* (Asellota) was the most abundant isopod and the flabelliferans included *Exosphaeroma* sp., *Cymodocella* sp., *Dynamenella* spp. and *Parisocladus stimpsoni*. Gordon (1963) investigated the habits of numerous seaweed-dwelling isopods from the littoral zone of New Zealand and found *Dynamenella huttoni* to be the most abundant.

Ninety-five percent of all amphipods collected from *G. pristoides* were *Hyale grandicornis* and most of these were juveniles (Beckley 1980). Other amphipods found were *H. hirtipalma, H. saldanhae, H. plumulosa, Paramoera capensis, Ventrojassa frequens* and *Ischyrocerus ctenophorus* (the last two being new records for the Eastern Province). Fenwick (1976) found greater numbers of amphipods associated with sublittoral *Caulerpa* in areas more exposed to wave action, and in the present study most amphipods were also found at the exposed site, although *G. pristoides* at the sheltered site supported more than the moderately exposed site. Tanaids were only recorded from *G. pristoides* on one occasion whilst crustacean nauplius larvae were abundant throughout the year.

The littoral collembolan *Anurida maritima* was occasionally found in the epifauna. Only on one occasion was an adult dipteran *Telmageton minor* captured though these small flies were commonly observed in the littoral zone at low tide. Dipteran larvae were found throughout the year with the greatest numbers occurring at Site E probably because of the upward shift of the *G. pristoides* belt on the shore.

Occasional specimens of the shore spider *Desis formidabilis* were found amongst the *G. pristoides* at Site S whilst marine mites belonging to the Prostigmata and Astigmata were always present in the epifauna (Table 4). *Hyadesia* sp. was particularly abundant at Site E and studies on *Hyadesia fusca* associated with *Enteromorpha* (Chlorophyta) by Ganning (1970) have shown that these mites feed on seaweeds and are extremely tolerant of adverse environmental conditions.

Minute Opisthobranchia and Prosobranchia were associated with *G. pristoides*. Bishop & Bishop (1973),

Table 4 Mean number of marine mites per gram dry mass of *Gelidium pristoides* at three sites on St Croix Island

	April 76	May	June	July	August	September	October	November	December	January 77	February	March	April	Mean
Site S														
Halacaridae spp.	22	19	51	61	46	26	34	53	44	38	22	31	49	38
Hyadesia sp. nov.	1	5	7	20	7	13	9	18	238	0	12	12	15	28
Tyrophagus sp. nov.	0	0	0	0	0	27	1	0	0	0	0	0	0	2
Total	23	24	58	81	53	66	44	71	282	38	34	43	64	68
Site M														
Halacaridae spp.	35	40	19	75	26	38	25	13	50	23	44	23	65	37
Hyadesia sp. nov.	1	8	2	7	1	18	2	20	14	29	0	17	21	10
Tyrophagus sp. nov.	0	0	0	0	0	5	1	0	0	0	0	0	0	1
Total	36	48	21	82	27	61	28	33	64	52	44	40	86	48
Site E														
Halacaridae spp.	13	24	13	52	28	54	15	33	38	21	26	29	32	29
Hyadesia sp. nov.	35	52	120	187	92	71	42	100	111	143	45	120	115	95
Tyrophagus sp. nov.	0	0	0	0	0	10	0	0	0	1	0	0	0	1
Total	48	76	133	239	120	135	57	133	149	165	71	149	147	125

working on the association between molluscs and marine plants, commented on the small size of epifaunal molluscs. Transient macrobenthic gastropods such as *Siphonaria capensis, Patella granularis, Littorina knysnaensis, Burnupena* spp. and *Thais* spp. were also occasionally found on *G. pristoides* tufts.

The dominant bivalve in the *G. pristoides* epifauna was *Kellya rubra* which according to Kensley (1974) is synonymous with the well-studied *Lasaea rubra*. These tiny bivalves numerically constituted 93% of the total bivalve epifauna. They are suspension feeders (Morton & Miller 1968) and eggs are maintained in the parental mantle cavity until the juvenile stage of development (Glynn 1965). During the present study a specimen with a shell length of 1,8 mm had nine juveniles with shell lengths of 0,8 mm within its mantle cavity. Juvenile brown mussels *Perna perna* were found in the epifauna of *G. pristoides* and it appears that primary settlement of these bivalves occurs on littoral seaweeds on St Croix (Beckley 1979).

Tardigrada were recorded from *G. pristoides* at all three sampling sites during the study period. The bryozoan *Electra verticillata* was occasionally found on the fronds of *G. pristoides*. No echinoderms, decapods, hydroids or sponges were recorded from *G. pristoides* during the study period.

The results in Tables 1, 2 and 3 expressed as numbers of animals per gram dry *G. pristoides* show that significantly more epifauna occurred at the sheltered and exposed sites than at the moderately exposed site ($P < 0{,}005$). At both E and S *G. pristoides* occurred in small compact tufts with the mean size of sampled tuft equal to 0,62 g and 0,60 g dry mass respectively ($n = 78$ per site). At Site M the tufts were larger ($\bar{x} = 0{,}76$ g dry mass; $n = 78$), less compact and had longer fronds. As much of the epifauna occurs around the holdfast of *G. pristoides* the lower numbers at M can perhaps be explained by the decreased ratio of holdfast size to total plant mass as opposed to that at Site E or S. Numbers at M are therefore not expressed on exactly the same basis as the other sites.

Epifauna standing stock and community structure

The mean coverage of *G. pristoides* at Site S was 18%, at M 23% and at E 5% (Beckley & McLachlan 1979). Using the relationship: 5 g dry *G. pristoides* = 1% coverage m^{-2}, the standing crop of *G. pristoides* at S, M and E was calculated to be 90 g m^{-2}, 115 g m^{-2} and 25 g m^{-2} respectively. The mean number of animals was found to be 3266 g^{-1} at S, 1518 g^{-1} at M and 2473 g^{-1} at E. Calculations per m^2 of *G. pristoides* belt therefore give $2{,}94 \times 10^5$ animals at S; $1{,}75 \times 10^5$ at M and $0{,}62 \times 10^5$ at E. These figures are similar to those found by other workers on seaweed epifauna. Colman (1939) found $2{,}0 \times 10^5$ animals m^{-2} for midlittoral *Ascophyllum nodosum*, Glynn (1965) found $2{,}1 \times 10^5$ animals m^{-2} for *Endocladia muricata* and Chapman (1955) found $3{,}8 \times 10^5$ animals m^{-2} of lower shore *Corallina granifera* turf. Sarma & Ganapati (1972) found epifauna numbers between $3{,}2 \times 10^3 m^{-2}$ (*Porphyra vietnamesis*) and $1{,}1 \times 10^6 m^{-2}$ (*Spongomorpha indica*) in their study of Indian littoral seaweeds.

Estimates of total standing stock of *G. pristoides* epifauna on St Croix can be made using total standing stock of *G. pristoides* (265 kg dry mass) and the mean number of animals g^{-1} (2419), or the total area of the *G. pristoides* belt (4241 m^2) and the mean number of animals m^{-2} of *G. pristoides* ($1{,}77 \times 10^5$). The first method gives a total standing stock of $6{,}4 \times 10^8$ epifaunal animals and the second method gives $7{,}5 \times 10^8$ which when corrected for penguin landing stages (106,4 m^2) gives a total standing stock of $7{,}3 \times 10^8$ animals.

On St Croix seaweed epifauna is abundant and comprised chiefly of nematodes, crustaceans, mites, molluscs and annelids. The investigation of *G. pristoides* epifauna has, however, illustrated that much natural variation occurs in epifauna community structure. Because of this variation there has to be a compromise between statistical acceptability and practical possibility in sample analysis when determining the number of samples to be taken in a seaweed epifauna community study. It is suggested that, to improve on statistical acceptability, future work in this field be concentrated on specific groups of animals, for example, phytal harpacticoids (Hicks 1980), rather than entire communities.

A feature of seaweed epifauna community structure which became apparent in the present study was the abundance of early life-stages of animals, for example, nauplius larvae, annelid larvae, Diptera larvae, juvenile molluscs (Beckley 1979) and juvenile amphipods (Beckley 1980). Seaweeds appear to be important nursery areas for littoral animals and consideration should be given to this when planning and implementing commercial exploitation of seaweed resources. Harvesting of the seaweed, in particular the holdfast region, could be detrimental to the recruitment of surrounding littoral populations. It is suggested that, in the case of *G. pristoides* which is an important commercial species, legislation be effected to allow only the harvesting of the fronds. This would leave the holdfast intact to serve as shelter for the associated fauna and also provide a base from which this perennial seaweed can proliferate again.

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