

Echinodermata of The Snares islands, southern New Zealand

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Habitat information, frequency of occurrence at depth ranges, collections and sight records, and live colours of Echinodermata from The Snares (48° 07'S, 166° 36'E) are recorded. Forty species are now known from the islands, 16 of which are new records. The Snares appear to be an ecotone between southern New Zealand (Forsterian Province) and the southern islands (Antipodean Province) having stronger affinities with southern New Zealand.

Keywords: Echinodermata; The Snares; zoogeography; ecotones; annotated checklist; new records.

INTRODUCTION

The Snares (48° 07'S, 166° 36'E), a group of small islands and rocky islets 110 km south-west of Stewart Island, have been extensively studied in the last 20 years (see Horning (1978) for a brief outline of biological research at The Snares). Pawson (1965b) reported 17 species of echinoderms from the islands, 7 species of asteroids, 7 ophiuroids, 1 holothuroid, and 2 echinoids; these specimens were collected from the intertidal zone by Professor G. A. Knox (University of Canterbury) during the first University of Canterbury Snares expedition in early 1961.

A more thorough survey of the echinoderms, started in 1974, was completed during the 1976-77 University of Canterbury expedition. Habitat information, frequency of occurrence at depth ranges, and live colours were recorded. Few habitats were not searched and we are confident that only rare species remain undiscovered. Two newly recorded species were collected near The Snares by the New Zealand Oceanographic Institute (D. G. McKnight, pers. comm., 1976).

Forty species of echinoderms are now known from The Snares: 15 species of asteroids, 12 ophiuroids, 6 holothuroids, and 7 echinoids; 16 of these species are newly recorded from these islands.

These new records permit a more complete understanding of The Snares' position in New Zealand and subantarctic echinoderm biogeography. Published distribution records of these echinoderms are widely scattered except for the holothurians and

the echinoids. In summarising distributions we have relied on Clark (1970) for some asteroids, Pawson (1970) for holothuroids, and McKnight (1969) for echinoids. Specimens were identified using published keys and descriptions, and difficult specimens were checked with reliably identified material where possible.

All specimens are deposited in the National Museum of New Zealand, Wellington, except for some holothurians which are in the National Museum of Natural History, Washington, D.C.

ECHINODERMATA OF THE SNARES

As far as possible the following information is given for each species: references to previous Snares islands records, distribution within New Zealand waters, habitats occupied at The Snares, and live colours. Since abundance data is important in biogeography (Knox 1975), attempts were made to document the frequency of all species; for each species the total number of specimens collected and the number of collections in which they were taken is presented (e.g., 13 specimens from 2 collections is given as 13/2). Numbers of all species readily identified in the field were recorded during 28 30-40 min dives and their abundances summarised as follows:

Rare, 1 specimen; infrequent, 2-3; frequent, 4-6; common, 7-10; abundant, >10: The number of dives during which each species was observed is given in parentheses.

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ASTEROIDEA

Asteroiidae

Allostichaster insignis (Farquhar, 1895)

Previous records. Fell (1953), Pawson (1961, 1965b), Clark (1970).

Distribution. Cook Strait south to the Auckland Islands and The Snares, Chatham Islands, 0-238 m (Clark 1970).

Habitat. Sublittoral to at least 16 m; low numbers on rock, among algae, and in crevices.

Colour. Pale to bright orange and bright red.

Collections. 12/8. Abundance. Rare (1), infrequent (1).

Astrostole scabra (Hutton, 1872)

Previous records. None. Pawson (1965b) misidentified *A. scabra* from The Snares as *Coscinasterias calamaria* (Pawson, pers. comm., 1977).

Distribution. East Cape southwards to The Snares (Pawson 1965a), Chatham Islands, 0-200 m (Clark 1970).

Habitat. Sublittoral, 0-120 m, occasionally intertidal in pools. On rocks, among algae on rock, and in crab and crayfish pots.

Colour. Aboral surface green and purple; tube feet bright orange.

Collections. 12/10. Abundance. Rare (4), infrequent (3), frequent (1).

Calvasterias suteri (de Loriol, 1894)

Previous records. Mortensen (1925), Fell (1953, 1960), Clark (1970).

Distribution. Cook Strait southwards to The Snares, Auckland and Campbell Islands, Chatham Islands, 0-28 m (Pawson 1965a, Clark 1970).

Habitat. Lower littoral, pools and sublittoral to over 12 m, usually among algae, especially *Durvillaea antarctica*.

Colour. Aboral surface orange or dark green; oral surface and tube feet dull orange.

Collections. 17/12.

Sclerasterias mollis (Hutton, 1872)

Previous record. Pawson (1965b).

Distribution. Southern North Island south, Chatham Islands and The Snares, 3-697 m (Fell 1959, Clark 1970).

Habitat. Among algae and on rocks 4-120 m, under boulder in cave 3-7 m, in deep pool.

Colour. Aboral surface orange with cream clumps of pedicellaria surrounding large white spines; oral surface and tube feet white.

Collections. 8/6. Abundance. Rare (2), infrequent (1).

Stichaster australis (Verrill, 1867)

Previous records. Fell (1953), Pawson (1965b).

Distribution. North Cape to Bluff, possibly the Chatham Islands, and The Snares, 0-555 m (Clark 1970).

Habitat. On rock in deep pools and sublittoral, 2-16 m.

Colour. Light orange and pale purple.

Collections. 7/7.

Asterinidae

Patiriella regularis (Verrill, 1867)

Distribution. Northern New Zealand mainland south (Pawson 1965a) to The Snares and Chatham Islands (Clark 1970), 0-28 m.

Habitat. Among algae, lower littoral pool.

Colour. Dark green in alcohol.

Collections. 1/1.

Astropectinidae

Astropecten primigenius Mortensen, 1925

Previous record. McKnight (pers. comm., 1976).

Distribution. North and South Islands, Chatham Island (Clark 1970), The Snares (McKnight, pers. comm., 1976).

Psilaster acuminatus Sladen 1889

Distribution. Around both North and South Islands, Chatham Islands, and The Snares, 37-1757 m (Clark 1970).

Habitat. From craypots, 80-165 m.

Colour. Orange.

Collections. 4/3.

Echinasteridae

Henricia aucklandiae Mortensen, 1925

Previous record. Clark (1970).

Distribution. The Snares, Antipodes, Auckland, and Campbell Islands (Clark 1970, Mortensen 1925).

Henricia lukinsii (Farquhar, 1898)

Previous records. Dawson (1965), Clark (1970).

Distribution. The Snares, Antipodes, Auckland, and Campbell Islands (Mortensen 1925, Clark 1970).

Habitat. On rock and algae 1-22 m; one in craypot from 130-165 m.

Colour. Bright orange.

Collections. 9/9.

Henricia ralphae Fell, 1952

Distribution. Southern South Island, Auckland Islands, and The Snares, 1-74 m (Fell 1959, Clark 1970).

Habitat. Sublittoral, on algae and rock, also in caves, 1-18 m.

Collections. 7/5.

Goniasteridae

Pentagonaster pulchellus Gray, 1840

Distribution. Around New Zealand mainland, Chatham Islands (Fell 1959), and The Snares, 1-555 m (Clark 1970).

Habitat. On rock and algae 1-16 m, under boulders in littoral pools.

Colour. Aboral surface chocolate brown to greenish-grey; oral always cream.

Collections. 5/5. Abundance. Rare (3), infrequent (3), frequent (2).

Odontasteridae

Asterodon dilatatus (Perrier, 1875)

Previous records. Fell (1953, 1959), Pawson (1961, 1965b), Clark (1970).

Distribution. Southern North Island south to The Snares, 3-100 m (Fell 1959, Clark 1970).

Habitat. Predominantly sublittoral, 0-22 m, occasionally intertidal and in large pools. Usually on rock with sparse algae.

Colour. Pinkish red.

Collections. 11/6. Abundance. Rare (8), infrequent (1), frequent (1).

Eurygonias hylacanthus Farquhar, 1913

Distribution. Southern North Island, South Island (Fell 1959, Pawson 1965a, Clark 1970), and The Snares, 3-37 m.

Habitat. On rock among algae, 3-18 m.

Colour. Aboral surface bright red except for narrow white stripe in interambulacral regions, raised 'pins' white; oral surface white, marginal plates white, but separated by a distinct red band.

Collections. 3/3. Abundance. Rare (2), infrequent (1), common (1).

Odontaster benhami (Mortensen, 1925)

Distribution. Cook Strait southwards to The Snares and Chatham Islands, 5-555 m (Clark 1970).

Habitat. On or under rocks in caves 5-15m, on rock 18 m.

Colour. Light orange to pink.

Collections. 3/3.

OPHIUROIDEA

Amphiuridae

Amphioplus basilicus (Koehler, 1907)

Previous record. Pawson (1965b).

Distribution. East Cape (Mortensen 1924), southwards including The Snares, Auckland, Campbell, and Antipodes Islands; intertidal, shallow water (Fell 1953).

Habitat. Among algae and coralline algae in pools and subtidally to over 15 m.

Colour. Arms and disc uniform pale pink to orange; armspines greyish.

Collections. 17/6.

Amphipholis squamata (Delle Chiaje, 1828)

Previous record. Pawson (1965b).

Distribution. New Zealand mainland, The Snares, Auckland and Campbell Islands, intertidal to 600 m (Fell 1953, 1958).

Habitat. Among algae, terrestrial plant detritus, sediment and under boulders in pools, to over 14 m.

Colour. Aboral surface of disc brown, arms with grey and cream patches; oral surface of disc and arms cream.

Collections. 59/10.

Amphiura praefecta Koehler, 1907

Distribution. The Snares, Auckland and Campbell Islands, 0-40 m (Fell 1947, 1953).

Habitat. Among rhizomes of *Caulerpa brownii* and crustose coralline algae, 2-14 m.

Collections. 4/2.

Amphiura sp. 1

(possibly *A. amokurae* (Mortensen, 1925))

Distribution. *A. amokurae* is recorded from North Cape south including Stewart, Auckland, and Campbell Islands, in intertidal and shallow water (Fell 1952, 1953), and its occurrence at The Snares would not be unexpected.

Habitat. Among plant detritus under lower littoral rocks.

Collections. 6/1.

Amphiura sp. 2

(possibly *A. aster* Farquhar, 1901)

Distribution. *A. aster* is known from southern North Island southwards, 0-500 m (Mortensen 1924, Fell 1947, 1958).

Habitat. Among crustose coralline algae, 14 m.

Collections. 1/1.

Ophiactis hirta Lyman, 1882

Distribution. Cook Strait and The Snares, 100-600 m (Fell 1947, 1958).

Habitat. Among Bryozoa from craypot, 146 m.

Collections. 5/1.

Ophiactis resiliens Lyman, 1882

Previous record. Pawson (1965b).

Distribution. Island Bay, Cook Strait, and The Snares, 0-240 m (Fell 1947, 1958, Pawson 1965a).

Habitat. Among algae, coralline algae, terrestrial plant detritus, sediment, Bryozoa and under boulders, littoral pools to over 146 m.

Colour. Disc brown; arms cream to buff.

Collections. 98/14. Abundance. Common (2).

Ophionereidae

Ophionereis fasciata Hutton, 1872

Remarks. Several specimens which keyed out as *O. novaezelandiae* Mortensen were taken during the 1976-77 expedition. Examination of a range of specimens led us to the conclusion that the two species should be synonymised. Baker (1977) formally proposed this synonymy.

Distribution. Throughout New Zealand and at The Snares, intertidal to over 200 m (Fell 1952, Graham 1962, Pawson 1965a).

Habitat. Under rocks in pools and subtidally to over 30 m.

Colour. Disc cream, grey or mottled with purple, arms with bands of purple and cream.

Collections. 25/14. Abundance. Infrequent (2), frequent (1), common (4), abundant (2).

Ophiocomidae

Clarkcoma bollonsi (Farquhar, 1908)

Previous record. Pawson (1965b).

Distribution. North Cape to Otago and The Snares, 55-600 m (Mortensen 1924, Fell 1958, Graham 1962, Pawson 1965a).

Habitat. Found singly mainly under rocks in caves, also in *Lessonia variegata* holdfasts, crustose coralline algae and Bryozoa, 1.5-146 m.

Colour. Brick orange to dark reddish purple.

Collections. 7/7. Abundance. Infrequent (1), abundant (3).

Ophiopteris antipodum Smith, 1877

Previous record. Pawson (1965b).

Distribution. North Auckland, southwards to The Snares, 0-80 m (Mortensen 1924, Graham 1962, Pawson 1965a).

Habitat. Abundant under rocks in underwater tunnel, 7-8 m, rare under rocks on detritus, 4 m.

Colour. Purple.

Collections. 23/2.

Ophiodermatidae

Ophiopeza gracilis (Mortensen, 1924)

Previous record. Pawson (1965b).

Distribution. Northern New Zealand to Stewart Island (Mortensen 1924), The Snares and Auckland Islands, intertidal to over 200 m (Fell 1952, 1953, Pawson 1965a).

Habitat. Abundant among terrestrial plant detritus, 14 m; rare among algae, 6-15 m.

Colour. Aboral surface disc brownish grey, arms with equal light and dark grey bands, distal end of each dark band with short white band; oral surface of disc pale cream, arms light grey, bands indistinct.

Collections. 14/3. Abundance. Abundant (1).

Ophiomyxidae

Ophiomyxa brevirima Clark, 1915

Previous record. Pawson (1965b).

Distribution. Northern New Zealand southwards, The Snares and Auckland Islands, intertidal to 600 m (Mortensen 1924, Fell 1953, 1958, Pawson 1965a).

Habitat. On rock, among algae, under boulders, in pools, 1-20 m.

Colour. Disc cream, grey or mottled with orange, arms orange with irregular cream bands; arms of juveniles with few or no cream bands.

Collections. 45/15. Abundance. Rare (1), infrequent (3), frequent (1), abundant (1).

HOLOTHUROIDEA

Chirodotidae

Chirodota gigas Dendy & Hindle, 1907

Distribution. Chatham Islands, Dusky Sound (Fiordland), The Snares (Pawson 1970).

Habitat. Abundant under rocks on coarse shelly sand 20-30 m, infrequent on terrestrial plant detritus, 4 m.

Colour. Body wall colourless, thin and delicate, with dense white spots; longitudinal muscles of gut visible through body wall.

Collections. 26/4.

Trochodota dunedinensis (Parker, 1881)

Distribution. Hawke Bay to Stewart Island, The Snares, Auckland, Campbell, and Macquarie Islands, 0-180 m (Pawson 1970).

Habitat. Under rocks on coarse shelly sand, 0.5-30 m.

Colour. Body wall thin, delicate, opaque pink with small dense red spots.

Collections. 9/2.

Cucumaridae

Ocnus brevidentis (Hutton, 1872)

Distribution. Great Barrier Island to Stewart Island, The Snares, Auckland, Antipodes, Bounty, and Chatham Islands, 10-465 m (Pawson 1968, 1970).

Habitat. Among crustose coralline algae, 14 m.

Collections. 7/1.

Pseudocnus leoninoides (Mortensen, 1925)

Previous records. Dawson (1965), Pawson (1965b, 1970).

Distribution. 240 km NNE of Macquarie Island, Campbell Island, Auckland Islands, and The Snares, 0-112 m (Pawson 1970).

Habitat. On rocks in shallow lower littoral pools, locally abundant.

Colour. Buff to pale orange; oral tentacles bright orange.
Collections. 48/2.

Psolidiella nigra Mortensen, 1925

Distribution. The Snares, Stewart Island, Otago Peninsula, Banks Peninsula, intertidal (Pawson 1970).

Habitat. Under lower littoral rocks among terrestrial plant detritus.

Colour. Variable, buff to dark brown, 'sole' cream or white; oral region and oral tentacles white to dark brown.

Collections. 31/2.

Stichopodidae

Stichopus mollis (Hutton, 1872)

Distribution. Cook Strait, southern New Zealand, and the Chatham Rise, 0–27 m (Pawson 1970).

Habitat. Abundant on rock and coarse shelly sand, 2 to 130–165 m.

Colour. Dark brown to mottled brown and white.

Collections. 4/4. Abundance. Rare (3), frequent (2), common (1), abundant (2).

ECHINOIDEA

Apatopygidae

Apatopygus recens (Milne-Edwards, 1836)

Previous record. McKnight (1969).

Distribution: Mainly south of the South Island around Stewart Island and off The Snares, one record off the central east coast of the South Island, and scattered records from Wellington and north-west of Cook Strait (McKnight 1969).

Habitat. Predominantly on sandy gravel, 9–148 m depth (McKnight 1969).

Cidariidae

Goniocidaris umbraculum (Hutton, 1872)

Previous records. Dawson (1965), McKnight (1969), Brodie (1973).

Distribution. Along the east coast from Cook Strait to off The Snares, southern Fiordland, Auckland Islands, and 240 km north of Macquarie Island (McKnight 1969).

Echinometridae

Evechinus chloroticus (Valenciennes, 1846)

Previous records. Pawson (1961, 1965b), McKnight (1969), Dix (1969, 1970).

Distribution. Around New Zealand including Stewart Island, The Snares, and Chatham Islands, 0–55 m (McKnight 1969).

Habitat. In deep pools and below 10 m depth on open coasts.

Colour. Test green with lighter tubercules; spines dark green with white tips.

Collections. 3/3. Abundance. Rare (1), frequent (2), common (3), abundant (8).

Spatangidae

Paramaretia peloria (H. L. Clark, 1916)

Previous record. McKnight (1969).

Distribution. Off the Auckland Islands, The Snares, east of Stewart Island and along the east coast to off Taiaroa Heads (McKnight 1969).

Habitat. Mainly on sandy gravel, 126–177 m (McKnight 1969).

Temnopleuridae

Pseudechinus albocinctus (Hutton, 1872)

Previous record. McKnight (1969).

Distribution. Auckland Islands, off The Snares, Stewart Island, and north along both coasts of North and South Islands to Cape Egmont and Hawke Bay (McKnight 1969).

Pseudechinus huttoni Benham, 1908

Previous record. McKnight (pers. comm., 1976).

Distribution. Mainly southern South Island to Campbell Island, including The Snares; recorded from northern North Island, Cook Strait, and Chatham Islands, 9–549 m (McKnight 1969).

Pseudechinus novaezealandiae (Mortensen, 1921)

Previous record. Pawson (1965b).

Distribution. East coast of South Island, Fiordland, Macquarie, Campbell, Auckland, Bounty and Antipodes Islands and The Snares, 0–306 m (Pawson 1968, McKnight 1969).

Habitat. Singly under rocks, 0–20 m.

Colour. Spines dull greenish grey; test light brown.
Collections. 4/3.

DISCUSSION

DISTRIBUTION AT THE SNARES

Of the 40 known species of echinoderms listed above, 33 species constitute the in-shore (intertidal to 30 m depth) fauna. This seems a highly diverse fauna for such a small group of islands, especially when the scarcity of soft substrates and sheltered habitats is considered. Indeed, the abundance and extent of some species are severely limited by habitat availability. Two holothurians, for example, were found at only one place, in habitats not present elsewhere; *Pseudocnus leoninoides* was abundant in a shallow pool shaded by high cliffs on the very exposed west side of Main Island, and *Psolidiella nigra* was confined to the sheltered waters of Boat Harbour, where it was common intertidally in rock crevices filled with terrestrial plant detritus.

Some species are restricted in occurrence by the extreme wave exposure. The large urchin *Evechinus chloroticus* occurred on open coasts *only* at depths

greater than 10 m, where it was present in moderate to high densities. Nevertheless, it also occurred in large sheltered pools in the 0-10 m zone. This clearly indicates that wave action limits its distribution. A similar pattern is seen in the distribution of *Stichopus mollis*, which is mostly confined to depths greater than 20 m except in a few sheltered localities.

Two species of brittlestars were abundant only in the darkness of the long tunnel between Senecio Pool and Ho Ho Bay. *Ophiopertis antipodum* occurred in very high numbers under boulders. It is a suspension feeder, since individuals were usually found under boulders with their arms raised vertically. Both *Ophiopertis* and the co-occurring, but less common, *Clarkcoma bollonsi* responded very strongly to light, rapidly withdrawing into the crevices when illuminated by a torch. Further, their rate of movement over the bottom was remarkably fast. Although all other ophiuroids also sought cover when exposed to light elsewhere, their responses were not as strong as those of *Ophiopertis* and *Clarkcoma*.

Eight localities from which collections were often taken have been grouped subjectively according to their wave exposure. When the echinoderm fauna is related to these wave exposures (Table 1), three points emerge: the distribution of asteroid species appears independent of wave exposure; ophiuroids and holothuroids prefer sheltered sites; and the seven species of echinoids were found either at depth or in sheltered sites.

DISTRIBUTION OF SOUTHERN ISLANDS ECHINODERMS

Table 2 shows the distribution of the more common species of echinoderms that occur among the New Zealand subantarctic islands and Macquarie Island. Species known only from the two main islands and the Chatham Islands, but not recorded from the New Zealand subantarctic islands, are not included. Although the echinoderm faunas of the Chatham Islands and Stewart Island are incompletely known, there is a distinct increase in the number of echinoderm species from south to north. Fifteen species are known from Macquarie Island and 19, 32, 40, and over 50 are known from Campbell and Auckland Islands, The Snares, and southern New Zealand respectively.

Species from The Snares may be grouped according to their distribution among the other islands and the New Zealand mainland. The largest

group consists of 19 mainland species which reach their southern limit at The Snares. A group of three species (*Pseudocnus leoninoides*, *Henricia aucklandiae*, and *Amphiura praefecta*) reaches its northernmost limit at The Snares. The remaining 18 species from The Snares occur both on the mainland and among the islands south of The Snares.

A separate set of nine species found both north and south of The Snares are not known at The Snares themselves. Some species of echinoderms which occur elsewhere in New Zealand and its subantarctic islands may be excluded from inhabiting the shores of The Snares simply by the lack of suitable habitats. Intertidal sandy shores are conspicuously lacking, and there are no shallow water mud bottoms.

In addition, the high degree of water movement and the small, isolated nature of The Snares pose a problem for the establishment of larvae. Some littoral species at The Snares, such as *Allostichaster insignis*, *Calvasterias suteri*, *Amphioplus basilicus*, *Ophiomyxa brevirima*, *Ophiopeza gracilis*, and *Trochodota dunedinensis*, have apparently overcome this problem by brooding larvae, but others, including *Pseudocnus leoninoides* and *Pseudechinus novaezealandiae*, have planktonic larvae (Mortensen 1924, Fell 1953, Pawson 1968). The wide distribution of *P. novaezealandiae* among the southern islands and around the South Island could be attributed to its planktonic larval stage.

A closer look at the distributions of species brooding versus those with planktonic larvae shows that these habits do not necessarily imply restricted and wide distributions respectively. All six of the brooding species mentioned above occur throughout the latitudinal range of New Zealand and the southern islands. Further, *Pseudocnus leoninoides* has planktonic larvae but is confined to the southern islands (The Snares, Auckland and Campbell Islands, and near Macquarie Island), whereas the closely related *Pseudocnus laevigatus*, a brooder, is circumpolar in distribution (Pawson 1970). This agrees with McKnight's (1969) observations based on the distributions of echinoids with brooding larval development compared with planktonic larvae. Therefore, other explanations of the non-occurrence of these nine species must be sought.

THE SNARES ECHINODERM DISTRIBUTION AND ITS RELATION TO MARINE PROVINCES

Discussions of biogeographic provinces and their boundaries within the New Zealand region have been reviewed by Knox (1962, 1975). The original concept of provinces was challenged by Dell (1962) as he could find no clear boundaries in the marine molluscan fauna, but despite this criticism the marine faunal province idea persists (Pawson 1968, 1970, McKnight 1969, Knox 1975, Fenwick 1978) as a useful concept.

Table 1 Numbers of species of Echinodermata at sites of different wave exposure at The Snares.

Order	Wave exposure		
	High	Medium	Low
Asteroidea	10	10	9
Ophiuroidea	3	10	7
Holothuroidea	1	5	3
Echinoidea	0	2	7

Table 2 Distributions of echinoderms among the southern islands of New Zealand. Species arranged in order of their distribution patterns (O, taken near this island; F, Foveaux Strait; ?, identity of specimens uncertain; * new record for The Snares).

	Macquarie I.	Campbell I.	Auckland Is	Antipodes Is	The Snares	Bounty Is	Stewart I.	Chatham Is	southern South I.	northern South I.	North I.
<i>Cyathra macquariensis</i>	X										
<i>Henricia obesa</i>	X										
<i>Similasterias</i> sp. (c.f. <i>irregularis</i>)	X										
<i>Anasterias mawsoni</i>	X										
<i>A. sphaerulata</i>	X										
<i>A. directa</i>	X										
<i>Pseudopsolus macquariensis</i>	X										
<i>Pseudocnus laevigatus</i>	X										
<i>Trachythyone macphersonae</i>	X										
<i>Psolus antarcticus</i>	X										
<i>Pseudocnus leoninoides</i>	O	X	X		X						
<i>Pseudechinus novaezelandiae</i>	X	X	X	X	X	X	X	X	X		
<i>Trochodota dunedinensis</i> *	X	X	X	X	X	X	X	X	X	X	
<i>Goniocidaris umbraculum</i>	O	X	X	X	X	X	X	X	X	X	
<i>Ocnus brevidentis</i> *	X	X	X	X	X	X	X	X	X	X	
<i>Persephonaster neozelanicus</i>		X									
<i>Henricia compacta</i>	X	X									
<i>Calvasterias laevigata</i>	X	X	X								
<i>Henricia aucklandiae</i>	X	X	X	X							
<i>Amphiura praepecta</i> *	X	X		X							
<i>A. norae</i>	X	X					X				
<i>Asterina aucklandensis</i>	X	X						X			
<i>Henricia lukinsii</i>	X	X		X				X			
<i>Calvasterias suteri</i>	X	X	X		X	X	X	X	X		
<i>Allostichaster insignis</i>	X	X	X	X	X	X	X	X	X		
<i>Amphiura amokurae</i>	X	X		?	X		X	X	X		
<i>Amphioplus basilicus</i>	X	X	X	X	X		X	X	X		
<i>Amphipholis squamata</i>	X	X	X				X	X	X		
<i>Amphiura magellanica</i>	X	X					X	X	X		
<i>Psilaster acuminatus</i>	X			X		F	X	X	X	X	
<i>Asterodon robustus</i>			X								
<i>Ophioceres marginata</i>		X									
<i>Chirodota carnleyensis</i>		X									
<i>Placothuria squamata</i>		X			X						
<i>Paramaretia peloria</i>		O	X	X			X				
<i>Henricia ralphae</i> *		X	X				X				
<i>Trachythyone amokurae</i>		X			X		X	X			
<i>Ophionereis fasciata</i> *		X	X		X	X	X	X	X	X	
<i>Apatopygus recens</i>			X		X	X	X	X	X	X	
<i>Ophiopeza gracilis</i>			X		X	X	X	X	X	X	
<i>Ophiomyxa brevirima</i>			X		X		X	X	X	X	
<i>Chirodota nigra</i>			X		X		X	X	X	X	
<i>Trochodota dendyi</i>			X		X		O	X	X	X	
<i>Peronella hinemoae</i>			X		X		X	X	X	X	
<i>Pseudechinus albocinctus</i>			X		O		X	X	X	X	
<i>Spatangus thor</i>				X		X		X	X		
<i>Chirodota gigas</i> *					X	X	X	X	X		
<i>Psolidiella nigra</i> *					X	X	X	X	X		
<i>Stichopus mollis</i> *					X	X	X	X	X		
<i>Astropecten primigenius</i> *					X	X	X	X	X	X	
<i>Stichaster australis</i>					X	X	X	X	X	X	
<i>Patriella regularis</i> *					X	X	X	X	X	X	
<i>Evechinus chloroticus</i>					X	X	X	X	X	X	
<i>Astrostole scabra</i> *					X	X	X	X	X	X	
<i>Pentagonaster pulchellus</i> *					X	X	X	X	X	X	
<i>Odontaster benhami</i> *					X	F	X	X	X	X	
<i>Pseudechinus huttoni</i> *					X	X	X	X	X	X	
<i>Asterodon dilatatus</i>					X	X	X	X	X	X	
<i>Sclerasterias mollis</i>					X	X	X	X	X	X	
<i>Eurygonias hylacanthus</i> *					X	X	X	X	X	X	
<i>Clarkcoma bollonsi</i>					X	X	X	X	X	X	
<i>Ophiopteris antipodum</i>					X	X	X	X	X	X	
<i>Amphiura aster</i>					?			X	X	X	
<i>Ophiactis hirta</i> *					X	X	X	X	X	X	
<i>O. resiliens</i>					X	X	X	X	X	X	
<i>Kolostoneura novaezelandiae</i>					X		X	X	X	X	
<i>Pectinura maculata</i>					X	X	X	X	X	X	
<i>Ocnus calcarea</i>					X	X	X	X	X	X	
<i>Rynkatorpa uncinata</i>					X	X	X	X	X	X	
<i>Coscinasterias calcamaria</i>					X	X	X	X	X	X	
<i>Asterodon milaris</i>					F	X	X	X	X	X	
<i>Amphicyclus thomsoni</i>					F	X	X	X	X	X	
<i>Neocumella bicolumnata</i>					F	X	X	X	X	X	
<i>Neothyonidium dearmatum</i>					F	X	X	X	X	X	
TOTAL	15	19	32	7	40	7	37	26	51	45	42

When the above distribution data are considered in terms of provinces and boundaries, there is obviously a strong relationship between The Snares echinoderm fauna and that of southern New Zealand (the Forsterian Province). They have 37 species in common. A definite boundary is apparent with The Snares as the southern limit of 19 of these species. Twenty-one species are shared between The Snares and the islands of the Antipodean Province (Bounty, Antipodes, Auckland, and Campbell Islands) but 18 of these are shared with the mainland. Only 3 of the 10 species restricted to the Antipodean Province reach The Snares, indicating a very weak faunal relationship between the Antipodean Province and The Snares. Consequently we follow Knox (1975) in describing The Snares as "...an outlier of the Fosterian Province" with weak Antipodean affinities. Fell (1953) and Pawson (1965b) also considered that The Snares' fauna was closely related to the mainland fauna.

This conclusion on the echinoderm faunal relationship of The Snares may change in the future as the different faunas become better known. In particular, knowledge of the quantitative and qualitative distributions of species may alter conclusions, as in the past single specimen occurrences have often been given as much weight as records from localities where a species is abundant (Knox 1975). In this study, for example, only one specimen of *Patriella regularis* was found at The Snares in spite of thorough searching. Such individuals may be considered as vagrants — chance occurrences of a species beyond its normal breeding range.

Similar isolated individuals of species in other phyla have been observed at The Snares; Fenwick (1978) reported only one specimen of the shrimp *Alpheus socialis*, and D. S. Horning found only one live specimen and one shell of the mollusc *Haliotis iris*. The location of The Snares between the northern and southern marine provinces may make it a 'landfall' for isolated specimens from species whose ranges are predominantly to the north or south. More significantly, The Snares may be an ecotone between these two provinces, and, as such, a high diversity of marine fauna can be expected.

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