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ECHINODERMS OF THE MONTEBELLO ISLANDS

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Summary

The echinoderm fauna of the Montebello Islands includes species characteristic of the coastal and shelf fauna together with widespread Indo-West Pacific coral reef species. The diversity of habitats and hydrological conditions provided by the geographical complexity of the island group also contribute to the faunal richness of the islands. A total of 170 species is recorded from the present study and the Western Australian Museum collections. This total is comparable to that recorded from the Houtman Abrolhos, where the fauna is a mixture of tropical and temperate species and close to that of Ashmore Reef, which also has elements of "mainland" and "reef" species besides being closer to the central Indo-west Pacific area of greatest species richness. Ashmore Reef, with 178 species recorded, has the most speciose echinoderm fauna of any area of Western Australia. Several species found at the Montebellos are believed to be new records for Australia and a few may represent undescribed species.

Introduction

There has been no previous study of the echinoderms of the Montebello Islands apart from a brief visit by the author in 1979 during which 26 species were recorded. During the present survey 164 species were found, including all but six of those taken in 1979, making a total of 170 species recorded for the islands.

Methods

Samples were collected from as many habitats as possible, by SCUBA, snorkelling, low tide collecting from reefs and sand flats and by dredging where practicable, a total of 45 stations. These are listed in Table 1 and are indicated on Figure 1. Species readily identified underwater were not collected and are listed as visual records (V), specimens in the Western Australian Museum collection, not recorded in 1993, are indicated by M.

Results and Discussion

The echinoderm fauna of the Montebello Islands is rich in species (Tables 5 and 6), compared with most other areas in Western Australia and is numerically comparable to that of the Houtman Abrolhos (Marsh, 1994), and close to that of Ashmore Reef (Marsh *et al.*, 1993) where the species richness is highest of any area studied in Western Australia. A comparison of species numbers for the five classes of echinoderms at the Montebellos with those recorded from other coral reef areas in Western Australia is given in Table 5. The Barrow Island data is based on results of the Western Australian Museum-USNM Barrow Island Expedition (1966), collections made by Dr L. Hammond in 1974 and from surveys of the intertidal (Marsh, 1997). The Barrow Island fauna is less rich than that of the Montebellos probably because of the lack of extensive coral reefs and the less diverse habitats provided by the less complex geography of the island. Most of the species are in common with the Montebellos. Data from the Rowley Shoals and Scott Reef is from Marsh (1986) while the Ningaloo figures are from Marsh (unpublished data).

For comparison, the Royal Society-Universities of Queensland Expedition to the Northern Region of the Great Barrier Reef, Queensland, which sampled coral reefs, sand flats, and dredged to a depth of *c.* 60 metres found only 140 species of echinoderms (Gibbs *et al.*, 1976). The geographical complexity of the Montebellos Islands and reefs and the range of environmental conditions from high energy coral reefs, channels between the islands subjected to strong tidal currents to totally sheltered conditions in enclosed lagoons provides a diversity of habitats and substrate types unmatched in any other island group in Western Australia. The fauna is further enhanced by the geographical position of the islands giving it elements of "mainland" and "reef" species.

The Houtman Abrolhos islands are somewhat comparable in habitat complexity to the Montebellos but lack the strong tidal currents between islands. The Abrolhos fauna, comparable in species numbers with that of the Montebellos, is enhanced by the overlap of tropical and temperate species in its marginal position at the southern limit of coral reefs.

The Montebellos echinoderm fauna is composed entirely of tropical species although some of these range into temperate waters. More extensive sampling of the intertidal coral reef platforms off

Table 5 A comparison of the number of echinoderm species recorded from the Montebello Islands with those from other coral reef areas in Western Australia.

Taxa	Montebello Islands	Barrow Island	Ashmore Reef	Rowley Shoals/ Scott Reef	Ningaloo Reef	Houtman Abrolhos Islands
Crinoidea	26	12	38	17	16	28
Asteroidea	22	20	28	23	22	45
Ophiuroidea	54	24	42	42	26	40
Echinoidea	28	16	23	22	18	26
Holothuroidea	40	31	47	28	22	33
Total	170	103	178	132	104	172

the western side of the islands may reveal more coral reef species of all echinoderm classes.

Comments on the five echinoderm classes follow.

Crinoidea. Feather stars were common in most habitats with species of *Comanthus, Comatula* and *Stephanometra* predominating on reef flats, the robust black *Tropiometra afra* on high energy outer reef slopes and the large multi-armed *Comanthina* spp. on more sheltered outer reef areas and inter island channels.

Small colobometrids and antedonids are mostly commensal on sponges, algae and gorgonians.

Asteroidea. Sand substrates, both intertidal and deeper are characterised by *Luidia, Astropecten* and *Archaster,* all of which bury themselves under the surface. The large oreasterid, *Protoreaster nodulosus* is found on slightly deeper sandy areas while the goniasterid *Stellaster* favours muddy sand.

The blue *Linckia laevigata,* common on most tropical reefs, was only seen at three sites. This species is common on Ningaloo Reef but is not found at Dampier, apparently favouring clear water reefs. *Nardoa galatheae* was the most commonly seen reef species, also found on sand among reefs. *Tamaria tumescens* and *Thromidia catalai,* both regarded as continental shelf species, were found outside the reefs.

An unidentified species of *Asterina,* probably undescribed, was found among mangroves in one of the inner lagoons. The coral predator, *Acanthaster planci* is not common at the Montebellos and was seen at only five of the 45 sites.

Ophiuroidea. Relatively few coral reef species were recorded. This may be due in part to lack of sampling of the intertidal outer reef flats and reef crests which is the preferred habitat of a number of species. The rich brittle-star fauna includes many sand dwelling species and species commensal with other echinoderms, gorgonians, sponges and algae. A number of species remain to be determined and some may be undescribed. A small ophiurid, *Dictenophiura stellata,* was common at four of the nine dredge sites on clean sand substrates.

Echinoidea. Common coral reef species such as *Echinometra mathaei, Tripneustes gratilla, Diadema* spp. and *Echinothrix* spp. were not as common on the Montebello reefs as on other coral reefs in Western Australia. A rich fauna of sand dwelling species (sand dollars and heart urchins) was found, including a rare species, *Pseudomaretia interrupta,* endemic to north-western Australia.

Holothuroidea. Typical coral reef species such as *Actinopyga* and *Bohadschia* spp. were not common but *Holothuria atra* and *H. cinerascens* were found at most sites. No *Holothuria* (*Microthele*) species (teat fish) or *Thelenota* spp. were found. These are favoured commercial species on northern reefs.

Several species may represent new records for Australia, but their identity remains to be confirmed.

Overall the echinoderm fauna of the Montebello Islands includes elements of the endemic north-western Australian coastal and shelf fauna together with some of the offshore reef species, widespread through the Indo-West Pacific.

Management and Conservation

The Montebello Islands and reefs are periodically subjected to severe environmental perturbations from cyclones, while anecdotal evidence suggests there has also been severe predation of corals by the crown-of-thorns starfish (*Acanthaster planci*) in the past, probably early in the 1970s.

All five of the sites where *A. planci* was found in 1993 are in the southern part of the Montebellos and four of these, where most of the individuals were seen, were on the chain of reefs east of the south end of Hermite Island (stations 24, 30, 31 and 35). Numbers observed on one dive by one diver ranged from four (station 30) to 16 (station 31). While these numbers are fairly low there is potential for a population explosion on the southern reefs.

Areas less likely to be disturbed by natural events are the lagoons and channels between the islands. These contain the most interesting faunal elements, including many species commensal with sponges and gorgonians. It is recommended that these areas be protected from trawling or any other activity that may disturb the habitat.

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Table 6 List of echinoderms collected at the Montebello Islands.

Species	Station Number
CRINOIDEA	
COMASTERIDAE	
Comanthina nobilis (Carpenter, 1884)	32a
Comanthina variabilis (Bell, 1882)	2,9,10,23
Comanthina sp.	6
Comanthus gisleni Rowe *et al.*, 1986	3,23,27,31,32a
Comanthus parvicirrus (Müller, 1841)	1,6,9,24,27,30,33,35V
Comanthus wahlbergi (Müller, 1843)	4b,9,23,27
Clarkcomanthus littoralis (Carpenter, 1888)	1,3,6,10
Comatella maculata (Carpenter, 1888)	1,4b,20,23
Comatella stelligera (Carpenter, 1880)	20
Comatula purpurea (Müller, 1843)	4b,9,20,33
HIMEROMETRIDAE	
Himerometra robustipinna (Carpenter, 1881)	32a
Himerometra magnipinna A.H. Clark, 1908	28a
MARIAMETRIDAE	
Lamprometra palmata (Müller, 1841)	12,14c,22,28a
Lamprometra klunzingeri (Hartlaub, 1890)	12
Stephanometra indica (Smith, 1876)	1,2,6,20
Stephanometra spicata (Carpenter, 1881)	1,2,6,7,20
COLOBOMETRIDAE	
Oligometra carpenteri (Bell, 1884)	9,33
Oligometrides adeonae (Lamarck, 1816)	5,21,28a,32b,36a
Petasometra clarae (Hartlaub, 1890)	32a,33,35
TROPIOMETRIDAE	
Tropiometra afra (Hartlaub, 1890)	3,9,23V,27
ANTEDONIDAE	
Dorometra nana (Hartlaub, 1890)	27,30
Dorometra parvicirra (Carpenter, 1888)	32a
Dorometra mauritiana (A.H. Clark, 1909)	30
Dorometra cf. *aegyptica* (A.H. Clark, 1911)	32a
Antedon sp.	M
ASTEROIDEA	
LUIDIIDAE	
Luidia maculata Müller and Troschel, 1842	5,14c,21,32bV
ASTROPECTINIDAE	
Astropecten vappa Müller and Troschel, 1843	14a,14c,22,32b,36a,36bV
ARCHASTERIDAE	
Archaster angulatus Müller and Troschel, 1842	12,14cV,15a,15b,22V,32bV,36a

Table 6 (cont.)

Species	Station Number
GONIASTERIDAE	
Stellaster equestris (Retzius, 1805)	8,32b
Goniodiscaster sp.	M
OREASTERIDAE	
Culcita schmideliana (Retzius, 1805)	2V,6V,9V,20,29V,31V,33V,37V
Gymnanthenea globigera (Döderlein, 1915)	2V,13,27,29V
Protoreaster nodulosus (Perrier, 1876)	5,6V,17V
OPHIDIASTERIDAE	
Fromia indica (Perrier, 1869)	1,6V,9,20,24V,27V,30V,31V
Hacelia helicosticha (Sladen, 1889)	M
Linckia guildingi Gray, 1840	2V,6V,25V,29V
Linckia laevigata (Linnaeus, 1758)	19V,20V,23
Linckia multifora (Lamarck, 1816)	1,2V,4aV,4bV,6V,9,27V,30V
Nardoa galatheae (Lütken, 1864)	1,2V,3V,4aV,4bV,6V,9,10V,19V,20V,24,25V,29V,35V
Ophidiaster granifer (Lütken, 1872)	20
Tamaria tumescens (Koehler, 1910)	9,23
MITHRODIIDAE	
Thromidia catalai Pope and Rowe, 1977	9
ASTERINIDAE	
Asterina n. sp.	13
Nepanthia belcheri (Perrier, 1875)	32b
ACANTHASTERIDAE	
Acanthaster planci (Linnaeus, 1758)	24V,30V,31V,35V
ECHINASTERIDAE	
Echinaster luzonicus (Gray, 1840)	1,2V,4aV,4bV,6V,7V,9V,19V,20V,30V,31V
Echinaster varicolor H.L. Clark, 1938	2V,10V,30V,33,35V
OPHIUROIDEA	
OPHIOMYXIDAE	
Ophiomyxa australis Lütken, 1869	2,27
AMPHIURIDAE	
Amphioplus (*Unioplus*) cf *repositus* Koehler, 1905	16
Amphioplus (*Unioplus*) sp.	22
Amphipholis squamata (Delle Chiaje, 1828)	14b,17,24
cf. *Amphipholis* sp.	22
Amphiura leucaspis H.L. Clark, 1938	1,8,12
Amphiura septemspinosa H.L. Clark, 1915	27
Amphiura (*Fellaria*) *octacantha* H.L. Clark, 1915	8,9,12,15a,15b
Amphiura sp.	8,11,16,22
Ophiocentrus sp.	11
OPHIACTIDAE	
Ophiactis maculosa Von Martens, 1870	11
Ophiactis savignyi (Müller and Troschel, 1842)	1,2,4b,6,7,9,11,16,17,22,24,27,35
Ophiactis sp. 1	16
Ophiactis sp. 2	1,9,11,22,28a
Ophiactis sp. 3	8
Ophiactis sp. 4	17
OPHIOTRICHIDAE	
Gymnolophus obscura (Ljungman, 1867)	23,27,32a
Macrophiothrix caenosa Hoggett, 1991	2,4b,9,20,25,27
Macrophiothrix callizona H.L. Clark, 1938	4b
Macrophiothrix megapoma H.L. Clark, 1938	4b,7,9,20
Macrophiothrix paucispina Hoggett, 1991	13,14a,14c,29
Macrophiothrix cf. *variabilis* (Duncan, 1887)	25
Ophiothrix ciliaris (Lamarck, 1816)	2,4b,6,7,9,10,12,14a,17,24,26,30,32a,33
Ophiothrix exigua Lyman, 1874	1,2,7,8,9,11,17,22,24,27,28a
Ophiothrix cf. *echinotecta* Balinsky, 1957	1,9,11,17

Table 6 (cont.)

Species	Station Number
Ophiothrix miles Koehler, 1905	1
Ophiothrix sp. aff. *miles* Koehler, 1905	1,7,9,14a,17,26,32a,33
Ophiothrix spp.	1,9,11,14a,17,24
Ophiothrix (Keystonea) martensi Lyman, 1874	4b,8,9,10,23,24,25,28a,29,30,33
Ophiothrix (Keystonea) smaragdina Studer, 1883	1,7,8,9,10,28
Ophiothrix (Placophiothrix) lineocaerulea H.L. Clark, 1928	9,22,33
Ophiothrix (Placophiothrix) melanosticta (Grube, 1868)	8,9,28a
Ophiogymna elegans Ljungman, 1867	30
Ophiothela danae Verrill, 1869	1,6,7,17,28a,32a,33
Ophiomaza cacaotica Lyman, 1871	6,10,23,32a
OPHIOCOMIDAE	
Ophiocoma dentata Müller and Troschel, 1842	2,3,4b,10,20,27,28b,29
Ophiocoma pusilla (Brock, 1888)	27
Ophiomastix mixta Lütken, 1869	2,4b,20,24,27,29,30,31,35
Ophiomastix variabilis Koehler, 1905	2
OPHIONEREIDIDAE	
Ophionereis dubia (Müller and Troschel, 1842)	5,6,14c,17,29,32b
Ophionereis semoni (Döderlein, 1896)	11,16,22,29
Ophionereis intermedia A.M. Clark, 1953	4b,8,16,20,25
Ophionereis sp.	4b,10
OPHIODERMATIDAE	
Ophiarachna affinis Lütken, 1869	1,2
Ophiarachnella gorgonia (Müller and Troschel, 1842)	2,4b,6,9,20,23,27,29
Ophiarachnella infernalis (Müller and Troschel, 1842)	6
Ophiochasma stellatum (Ljungman, 1867)	5,8,18,32b
Ophiopeza spinosa (Ljungman, 1867)	20
Ophioconis cincta Brock, 1888	9,33,35
Cryptopelta granulifera H.L. Clark, 1909	20
OPHIURIDAE	
Dictenophiura stellata (Studer, 1882)	5,8,12,18,22,28a
Ophiolepis unicolor H.L. Clark, 1938	4b,9
Ophioplocus imbricatus (Müller and Troschel, 1842)	2,3,10,14a,25,29
Ophiuroid family indet.	22,32a
ECHINOIDEA	
CIDARIDAE	
Phyllacanthus longispinus (Mortensen, 1918)	1V,6V,17V,24V,27,30,31V,35V,37V
Prionocidaris baculosa (Lamarck, 1816)	9
DIADEMATIDAE	
Diadema savignyi Michelin, 1845	1V,2V,6V,19V,35V,37V
Diadema setosum (Leske, 1778)	1V,2V,19V,24V,29V,30V,31V,35V
Echinothrix calamaris (Pallas, 1774)	1V,20V,27
ECHINOTHURIIDAE	
Paraphormosoma sp.	M
TEMNOPLEURIDAE	
Salmacis sphaeroides (Linnaeus, 1758)	M
Temnotrema bothryoides L. Agassiz, 1846	8,12,18
TOXOPNEUSTIDAE	
Nudechinus darnleyensis (Tenison Woods 1878)	10,18,21,22,36a
Nudechinus scotiopremnus H.L. Clark, 1912	4b,8,12,14b,14d,15b,16,18
Tripneustes gratilla (Linnaeus, 1758)	1V,2V,3V,5V,20V,23V,25V,29V,30V
ECHINOMETRIDAE	
Echinometra mathaei (de Blainville, 1825)	20,25V,29V
Echinostrephus molaris (de Blainville, 1825)	1V,2V,24V,25V,29V,35V
Heterocentrotus mammillatus (Linnaeus, 1758)	1
ECHINONEIDAE	
Echinoneus cyclostomus Leske, 1778	4b,17,25

Table 6 (cont.)

Species	Station Number
CLYPEASTERIDAE	
Clypeaster telurus H.L. Clark, 1914	36a
ARACHNOIDIDAE	
Arachnoides tenuis H.L. Clark, 1938	21
FIBULARIIDAE	
Echinocyamus planissimus H.L. Clark, 1938	9,12,15b,36a
Fibularia sp.	M
LAGANIDAE	
Peronella lesueuri (Agassiz, 1841)	32b
Peronella orbicularis (Leske, 1778)	5,8,10,12,13,14a,14b,14c,15a,15b,17,18,19,22,28a,32b,36a
Peronella tuberculata Mortensen, 1918	5,8,14a,14b,14c,15,18,22,28a,32b,36a,36b,37
ASTRICLYPEIDAE	
Echinodiscus auritus Leske, 1778	22
ECHINOLAMPADIDAE	
Echinolampas ovata (Leske, 1778)	22,36a
SPATANGIDAE	
Pseudomaretia cf. *interrupta* (Studer, 1880)	23
LOVENIIDAE	
Breynia desorii Gray, 1851	5,8,12,15a,15b,18,22,28a, 32b,36a
Lovenia elongata (Gray, 1845)	22,36a
BRISSIDAE	
Rhynobrissus hemiasteroides A. Agassiz, 1879	28a
HOLOTHUROIDEA	
HOLOTHURIIDAE	
Actinopyga echinites (Jaeger, 1833)	2V,6V,10V,14dV,20V,25V,29V,32bV
Actinopyga mauritiana (Quoy and Gaimard, 1833)	20
Actinopyga sp.	2
Bohadschia argus Jaeger, 1833	19,29V
Bohadschia marmorata Jaeger, 1833	28a
Labidodemas semperianum Selenka, 1867	9,27
Holothuria (*Halodeima*) *atra* Jaeger, 1833	2,3,4bV,5V,6V,9,14dV,17V,19V,20V,23V 25V, 29V,30V,33V,35V,37V
Holothuria (*Halodeima*) *edulis* Lesson, 1830	1V,2,4aV,6V,17V,19V,29V,30V,33V,35V,37V
Holothuria (*Lessonothuria*) *lineata* Ludwig, 1875	13,14a,14b,14d
Holothuria (*Mertensiothuria*) *leucospilota* (Brandt, 1835)	6V,9V,14dV,29V
Holothuria (*Mertensiothuria*) sp.	19
Holothuria (*Metriatyla*) *ocellata* Jaeger, 1833	12
Holothuria (*Metriatyla*) *scabra* Jaeger, 1833	1,6,10
Holothuria (*Platyperona*) *difficilis* Semper, 1868	6,20
Holothuria (*Semperothuria*) *cinerascens* (Brandt, 1835)	4a,4bV,6,14b
Holothuria (*Stauropora*) *fuscocinerea* Jaeger, 1833	7
cf. *Holoturia* (*Stauropora*) *imitans* Ludwig, 1875	6,20
Holothuria (*Thymiosycia*) *arenicola* Semper, 1868	4a
Holothuria (*Thymiosycia*) *hilla* Lesson, 1830	1V,2V,6V,27V,29V,30V
Holothuria (*Thymiosycia*) *impatiens* (Forskal, 1775)	2,4b,6,14a,14b,14d,20,33,36b
Holothuria (*Thymiosycia*) sp.	2,20,30
Holothuria (*Theelothuria*) *michaelseni* Erwe, 1913	8,15b,36aV
STICHOPODIDAE	
Stichopus chloronotus Brandt, 1835	2,4bV,5V,6V,10V,20V,25V,29V
Stichopus horrens Selenka, 1867	1,2,4a,7
Stichopus variegatus Sempter, 1868	1V,2V,4aV,6V,17,19V,33V
Stichopus sp.	2,37
CUCUMARIIDAE	
Cercodemas anceps (Selenka, 1867)	28a
Plesiocolochirus cf. *australis* (Ludwig, 1875)	16

Table 6 (cont.)

Species	Station Number
Colochirus crassus Ekman, 1918	22
Colochirus sp.	33
Pseudocolochirus violaceus (Théel, 1886)	32a
Staurothyone distincta H.L. Clark, 1938	2,29
PHYLLOPHORIDAE	
Stolus buccalis (Stimpson, 1855)	33
SYNAPTIDAE	
Protankyra sp.	12
Synapta maculata (Chamisso and Eysenhardt, 1821)	19
Synaptula Sp. 1	30
Synaptula Sp. 2	28a, 30
Synaptula Sp. 3	14b,14c
SCLERODACTYLIDAE	
Afrocucumis africana (Semper, 1868)	29
Cladolabes aciculus (Semper, 1868)	25
cf. *Ohshimella ehrenbergi* (Selenka, 1867)	6