

The marine malacofauna of Skokholm Island

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With the aim of studying the local malacofauna, the authors visited Skokholm Island (Pembrokeshire, Wales, UK) in 1990 and 1991. In this paper, known data are supplemented by the results of the authors' fieldwork. A total of 114 species were recorded; 49 are new records for Skokholm Island, of which four are also new for the Bristol Channel region. On the basis of the current results a marine reserve status for Skokholm is recommended.

De mariene malacofauna van Skokholm eiland - De auteurs bezochten in 1990 en 1991 Skokholm Island (Pembrokeshire, Wales, UK) teneinde een beeld te krijgen van de locale malacofauna. Bestaande gegevens werden aangevuld met veldwaarnemingen van de auteurs. In totaal werden 114 soorten geregistreerd, waarvan 49 nieuw voor het eiland, vier hiervan bleken tevens nieuw voor de Bristol Channel regio te zijn. De auteurs concluderen op basis van de resultaten van het onderzoek, dat Skokholm voor de status 'mariene reservaat' in aanmerking dient te komen.

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INTRODUCTION AND METHODS

In 1987 E.J.O. Kompanje conducted biometrical studies on seabird populations on Skokholm Island. On his recommendation the authors visited the island between 16th and 23rd June 1990 and 10th and 17th August 1991 to study the malacofauna. The following localities were investigated: North Haven, Peters Bay, South Haven, Hog Bay and Crab Bay (Fig. 1). An inventory was made of all available data on marine molluscs in the cardfile system, stored in the Laboratory of the Bird Observatory on Skokholm Island (see Table 1). Many of these early records were previously published by Crothers (1966). This inventory gave us a good impression of the collecting sites and of the species recorded from the island before our survey. All previous records of marine molluscs were taken between 1947 and 1977; no later records could be traced.

Apart from the five localities studied, the following sites were occasionally mentioned in the cardfile system: The Stack, Little Bay, Head Bay, Wild Goose Bay, Dumbell Bay, Ravens Gully, Mad Bay Point, East Bay, Frank's Bay and The Quarry. Most of these localities are very exposed, not easily accessible, and according to the available data, not very interesting; therefore we did not sample these localities ourselves.

Collecting was done by searching the solid rock surface and by turning stones embedded in sand, or in rockpools. In addition algae were collected and washed in fresh water in search for living micromolluscs. Collecting methods did not include snorkeling, SCUBA-diving or dredging, therefore the search-range was limited from the supra-littoral zone down to just beneath the lowest low water mark.

The results of our research on the different sites were influenced by tide level, windforce and direction. In North Haven and Crab Bay shell grit was collected in which many dead micromolluscs and juvenile specimens of larger species were found. Many of these species occur in the shallow subtidal zone. In 1991 a low water of spring tides enabled us to extend our search-range by approximately 0.65 m compared to the previous year.

Systematics and nomenclature were used according to Fretter & Graham (1977), Graham (1988), Jones & Baxter (1987), Tebble (1976) and Thompson (1988). Some material was preserved for definite identification and is now stored in the Natuurmuseum Rotterdam and in the private collections of the authors.

TOPOGRAPHY

Skokholm (Fig. 1) is a flat-topped island of Old Red Sandstone, lying 3 kilometers south of Skomer Island and 3 kilometers west of the mainland cliffs of Marloes in Pembrokeshire, Wales, United Kingdom ($51^{\circ}42'N$, $05^{\circ}16'W$).

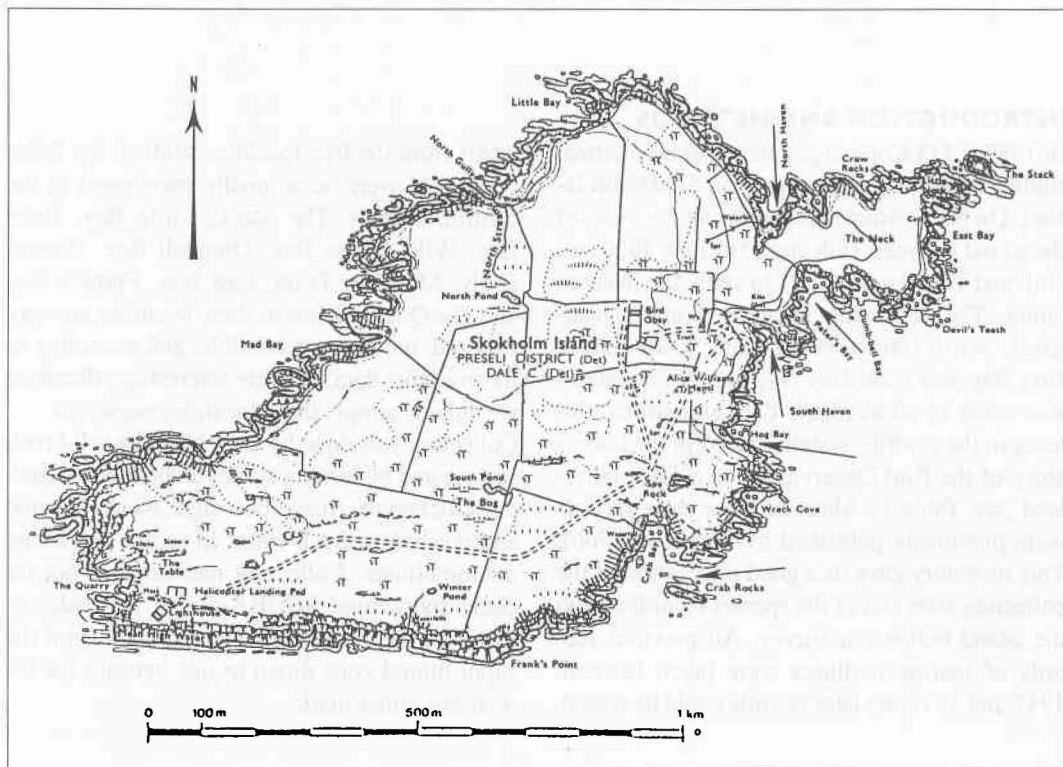
Skokholm lies within sea area boundary 21 (Bristol Channel) as defined by Seaward (1982, 1990). The island is 800 m wide with a maximum length of 1.9 km and has about 9.6 km of rugged coastline. Skokholm slopes very gently from an altitude of 50 m at the western end to 20 m at the cliff tops in the east. Most of the circumference is precipitous but access to the shoreline is possible in several places and two coves provide sheltered landings.

DESCRIPTION OF LOCALITIES

North Haven (Fig. 2) is one of the two coves which provide sheltered landings and features the only sandy beach on Skokholm. This beach, surrounded by steep cliffs, consists of coarse sand and boulders and is only accessible at low tide.

Peters Bay (Fig. 3), south of The Neck, is the least accessible locality we have studied. In the littoral zone large boulders dominate. The splashzone contains a relatively large cave (Spider Cave).

Figure 1 Skokholm Island; the five investigated localities are indicated by arrows



South Haven (Fig. 4) is the other cove that provides sheltered landings, and is the landing-stage for the service boat from the mainland. The little harbour, with its concrete landing, is surrounded by sheltering cliffs. The bottom consists of a reddish layer of sandstone, derived particles and small stones.

Hog Bay (Fig. 5) is the smallest of the five localities studied. It has a boulder beach, with few small stones.

Crab Bay (Fig. 6) is the most sheltered locality, mainly because of a group of large rocks (Crab Rocks) in front of the bay. The channel between the island and Crab Rocks is only accessible at LWST and scattered with many small to medium sized stones, overgrown with *Laminaria* and *Saccorhiza*.

ABBREVIATIONS

In the systematic survey the records may be followed by abbreviations (between brackets) of the recorders who preceded us. Their names are listed in Tabel 1. The years refer to the period(s) the persons and institutions made their observations.

Tabel 1 Abbreviations of earlier recorders used in the systematic survey, and of tide indications (below)

AD	A. Davies (1955)
BSB	B.S. Brookes (1965)
BW	B.K. Whittaker (1948 - 1949)
CM	C. Mettam (1977)
CRT	C.R. Thorne (1956)
HAGS	High Arcal Grammar School (1966-1969)
HJM	H.J. Moore (1954)
HJMB	H.J.M. Bowen (1948 & 1950)
HJT	H.J. Thiel (1957)
JG	J. Green (1955)
JHB	J.H. Barret (1948)
JRP	J.R. Povey (1965)
KST	K.S. Thomson (1955)
MEB	M.E. Blytheway (1955)
MJA	M.J. Askew (1969 & 1972-1973)
MPH	M.P. Harris (1964)
NDP	N.D. Purcher (1971-972)
PDB	P. de Brant (1952)
RBSS	R.B. Slone School (1963)
UHW	U.H. Williams (1950)
LWM	Low water mark
LWST	Low water of spring tides

Figure 2 Beach at North Haven with large boulders; only accessible at low tide





Figure 3 Peters Bay, the least accessible locality

Figure 4 South Haven at low tide showing the concrete landing on the left





Figure 5 Hog Bay, the smallest locality studied, at low tide



Figure 6 Crab Bay and Crab Rocks at low tide

SYSTEMATICAL SURVEY OF RECORDED SPECIES

The following classification of abundancy is used to indicate the 1990 and 1991 recordings:

rare	< 10 specimens
scarce	10 - 25 specimens
common	25 - 100 specimens
abundant	> 100 specimens

If less than 10 specimens were recorded, the exact number is given in most cases.

Habitat notes are only given when live specimens were observed and are strictly related to conditions on Skokholm Island. The authors' observations are preceded by an asterisk (*).

Class Polyplacophora

Order Neoloricata

Suborder Lepidopleurina

Family Leptochitonidae

Genus *Leptochiton* Gray, 1847

Leptochiton asellus (Gmelin, 1791)

No previous records from Skokholm. * North Haven, 1990, 1 valve in shell-grit; North Haven, 1991, 1 valve in shell-grit.

Suborder Ischnochitonina

Family Ischnochitonidae

Genus *Lepidochitona* Gray, 1821

Lepidochitona cinerea (Linnaeus, 1767)

Hog Bay, 9.VII.1968, 1 specimen (HAGS); North Haven, 10.VII. 1969, 1 specimen (HAGS). * Crab Bay, 1991, 1 juvenile specimen; Peters Bay, 1991, 3 specimens.

Habitat: LWM under stones embedded in sand.

Genus *Tonicella* Carpenter, 1873

Tonicella rubra (Linnaeus, 1767)

No previous records from Skokholm. * Peters Bay, 1991, 1 specimen.

Habitat: LWM on solid rock, sheltered by overhanging cliffs.

Suborder Acanthochitonina

Family Acanthochitonidae

Genus *Acanthochitona* Gray, 1821

Acanthochitona crinita (Pennant, 1777)

North Haven, 29.VII.1963, 1 specimen; South Haven, 29.VII. 1963, 1 specimen; South Haven, 9.VIII.1964, 2 specimens; North Haven, 8.VII.1968, occasional specimens (HAGS); North Haven, 10.VII.1969, 1 specimen (HAGS). * South Haven, 1990, 5 specimens; North Haven, 1990, 1 specimen; Crab Bay, 1991, 1 specimen; Peters Bay, 1991, 1 juvenile specimen.

Habitat: Intertidal on solid rock, occasionally under stones.

Acanthochitona fascicularis (Linnaeus, 1767)

South Haven, 2.VII.1967, 1 specimen (HAGS); North Haven, 23.VII.1971, 3 specimens.

Remarks: Most likely these records represent misidentified *A. crinita* as they were found on overhanging rocks; a habitat preferred by *A. crinita* but not by *A. fascicularis*.

Class Gastropoda

Subclass Prosobranchia

Order Archaeogastropoda

Family Fissurellidae

Genus *Emarginula* Lamarck, 1801

Emarginula fissura (Linnaeus, 1758)

No previous records from Skokholm. * North Haven, 1990, 1 specimen in shell-grit; Crab Bay, 1991, 4 specimens in shell-grit.

Genus *Diodora* Gray, 1821

Diodora graeca (Linnaeus, 1758)

South Haven, 3.VIII.1950, 1 specimen on *Laminaria*-roots (HJMB); Crab Bay, 18.IV.1965, 1 specimen under rock at LWST (BSB); Crab Bay, 12.VII.1968, 1 specimen under stone (HAGS); North Haven, 28.VIII.1969, 1 specimen at LWST. * North Haven, 1990, 1 specimen in shell-grit.

Family Acmaeidae

Genus *Acmaea* Eschscholtz, 1833

Acmaea virginea (Müller, 1776)

Crab Bay, 2.VIII.1950, 1 dead specimen (HJMB & UHW); Peters Bay, 2.VIII.1950, 1 dead

specimen (HJMB & UHW). * North Haven, 1990, 1 specimen in shell-grit; Crab Bay, 1991, 1 live specimen.

Habitat: Under well embedded stone at LWST.

Family Patellidae

Genus *Patella* Linnaeus, 1758

***Patella vulgata* Linnaeus, 1758**

Regularly recorded between 1947 and 1973. *

Abundant at all localities in 1990 and 1991.

Habitat: On solid rock and large stones in inter-tidal zone.

***Patella depressa* Pennant, 1777**

Regularly recorded between 1947 and 1969. *

Abundant at all localities in 1990 and 1991.

Habitat: As *P. vulgata* but rarely above mid-tide level.

***Patella aspera* Röding, 1798**

North Haven, Peters Bay, South Haven and Hog Bay, 1949-1968, frequent-common; Crab Bay, V.1962, few specimens. * North Haven, Peters Bay, South Haven and Hog Bay, 1990-1991, abundant; Crab Bay, 1990-1991, scarce.

Habitat: As *P. depressa* but in more exposed areas around low-tide level.

Genus *Helcion* Montfort, 1810

***Helcion pellucidum* (Linnaeus, 1758)**

North Haven, South Haven, Crab Bay, Hog Bay and Peters Bay, 1947-1969, abundant. * North Haven, South Haven, Crab Bay and Hog Bay, 1990-1991, abundant; Peters Bay, 1990, scarce; Peters Bay, 1991, common.

Habitat: Mainly on *Laminaria* and other large brown algae. Often found in *Laminaria*-hold-fasts (forma *laevis*). Rarely living under stones.

Family Trochidae

Genus *Gibbula* Risso, 1826

***Gibbula cineraria* (Linnaeus, 1758)**

North Haven, South Haven, Crab Bay, Hog Bay and Peters Bay, 1947-1968, common. * North

Haven, South Haven, Crab Bay, Hog Bay and Peters Bay, 1990-1991, abundant.

Habitat: Always at or near LWM or in pools.

Remarks: Absent in Head Bay, Frank's Bay, Mad Bay Point and Ravens Gully according to observations from 23 to 30.VIII.1969. Probably these localities are too exposed for this species.

***Gibbula umbilicalis* (Da Costa, 1778)**

North Haven, South Haven, Crab Bay, Hog Bay and Peters Bay, 1948-1969, common. * North Haven, South Haven, Crab Bay, Hog Bay and Peters Bay, 1990-1991, abundant.

Habitat: From mid-tide to low-tide level; sometimes higher in rock pools.

Remarks: Absent in the same localities as the preceding species.

***Gibbula tumida* (Montagu, 1803)**

No previous records from Skokholm. * North Haven, 1990, 5 specimens in shell-grit; Crab Bay, 1991, 2 specimens in shell-grit.

Genus *Monodonta* Lamarck, 1799

***Monodonta lineata* (Da Costa, 1778)**

North Haven, South Haven, Crab Bay, Hog Bay and Peters Bay, 1947-1968, scarce; South Haven, 6.VII.1950, narrow zone of large specimens in mid-tide region (CM); South Haven, 1959-1962, common (Stanbury, 1974). * South Haven, 1990, scarce; Peters Bay, 1990, 1 specimen; Hog Bay, 1991, 2 specimens; South Haven, 1991, 7 specimens; Peters Bay, 1991, 3 specimens; North Haven, 1991, 3 specimens.

Habitat: Prefers sheltered areas around mid-littoral level.

Remarks: Absent in the same localities as *G. cineraria* and *G. umbilicalis*. An extensive study on a population of *M. lineata* in South Haven was conducted by D.J. Stanbury (1974).

Genus *Calliostoma* Swainson, 1840

***Calliostoma zizyphinum* (Linnaeus, 1758)**

Hog Bay, Crab Bay, Peters Bay, Little Neck Point and The Stack, 1947-1969, only 1 or 2

specimens. * Crab Bay, 1990, 1 juvenile specimen; Crab Bay, 1991, 2 juvenile specimens; South Haven, 1991, 1 juvenile specimen.

Habitat: Normally, adult specimens occur in the lowest littoral zone on rocks. The juveniles were found under stones.

Family Skeneidae

Genus *Skenea* Fleming, 1825

***Skenea serpuloides* (Montagu, 1808)**

Plate I, fig. 1.

No previous records from Skokholm and the Bristol Channel Area. * North Haven, 1990, 1 specimen in shell-grit.

Remarks: The species is easily overlooked because of its small size, or regarded as a juvenile of another trochoid species.

***Skenea nitens* (Philippi, 1844)**

Plate I, fig. 2.

No previous records from Skokholm. No live records from the Bristol Channel Area. * Crab Bay, 1990, 3 live specimens; North Haven, 1990, 1 specimen in shell-grit.

Habitat: Under stones at LWST.

Remarks: Like the former species *S. nitens* is also easily overlooked.

Family Tricoliidae

Genus *Tricolia* Risso, 1826

***Tricolia pullus* (Linnaeus, 1758)**

Peters Bay, Crab Bay and South Haven, 1949-1969, occasional records; North Haven, 31.VII.1950, common on *Enteromorpha* just below LWST (HJMB & UHW). * North Haven, South Haven and Crab Bay, 1991, abundant; Hog Bay and Peters Bay, 1991, scarce.

Habitat: Mainly on *Gigartina stellata* and *Ceramium* sp. near LWST; occasionally under rocks.

Order Caenogastropoda

Family Lacunidae

Genus *Lacuna* Turton, 1827

***Lacuna vineta* (Montagu, 1803)**

No previous records from Skokholm. * South Haven, 1991, common; Peters Bay, 1991, scarce; Crab Bay and Hog Bay, 1991, rare.

Habitat: Near LWST, mainly on *Gigartina stellata* and *Ceramium* sp.

***Lacuna pallidula* (Da Costa, 1778)**

Crab Bay and Peters Bay, 5-12.IV.1948, few specimens (BW); Peters Bay, 1.VIII.1950, not uncommon (HJMB & UHW). * Crab Bay, 1991, 8 specimens; Hog Bay and North Haven, 1991, common; South Haven and Peters Bay, 1991, abundant.

Habitat: Near LWST, mainly on *Gigartina stellata*.

Family Littorinidae

Genus *Littorina* Férussac, 1822

***Littorina littorea* (Linnaeus, 1758)**

Hog Bay and Peters Bay, 1947-1969, rare; Crab Bay and North Haven, 1955-1977, scarce; South Haven, 1962, abundant. * Hog Bay, 1990-1991, scarce; Peters Bay, 1991, scarce; South Haven, 1990-1991, common; North Haven, 1991, common.

Habitat: Mid-littoral on rocks and stones.

***Littorina neritoides* (Linnaeus, 1758)**

Peters Bay, 11.IX.1949, abundant (GO); Peters Bay, VII.1968, common (HAGS); Hog Bay, 26.IX.1951, common (CED); North Haven and South Haven, 1966-1968, frequent-common (HAGS); Crab Bay, 1966-1968, abundant (HAGS). * North Haven, South Haven, Crab Bay, Peters Bay and Hog Bay, 1990-1991, abundant.

Habitat: Upper littoral and splash zone.

***Littorina obtusata* (Linnaeus, 1758)**

North Haven, South Haven, Crab Bay, Peters Bay and Hog Bay, 1950-1973, few specimens. * Crab Bay, 1991, scarce; Hog Bay, 1991, common; South Haven, 1990, 3 specimens; Peters Bay, 1990, 3 specimens; Peters Bay, 1991, 8 specimens; North Haven, 1990, 1 specimen; North Haven, 1991, abundant.

Remarks: Only small specimens of the olive green variety were found in the littoral zone, particularly on *Fucus*.

***Littorina nigrolineata* Gray, 1839**

North Haven, VII.1977, generally common in the *Pelvetia*-zone, especially common among upper *Fucoids* (CM). * North Haven, South Haven, Crab Bay, Peters Bay and Hog Bay, 1990-1991, abundant.

Habitat: On rocks in the high littoral zone.

***Littorina neglecta* Bean, 1844**

North Haven, South Haven, Crab Bay, Peters Bay and Hog Bay, VII.1977, abundant in the *Balanus*-zone, often extending beyond the *Chthamalus*-zone (CM). * South Haven, 1991, 7 specimens; Peters Bay, 1991, common; North Haven, 1991, abundant.

Habitat: High littoral zone, often in empty barnacle shells.

***Littorina saxatilis* (Olivi, 1792)**

North Haven, South Haven, Peters Bay, Crab Bay and Hog Bay, 1950-1973, common to abundant. * This was confirmed by our findings in 1990 and 1991.

Habitat: In high littoral zone.

Family Hydrobiidae

Genus *Hydrobia* Hartmann, 1821

***Hydrobia ulvae* (Pennant, 1777)**

South Haven, 12.VIII.1969, 2 specimens (MJA); Hog Bay, 26.VIII.1969, 1 specimen (MJA).

Remarks: We did not find it in both 1990 and 1991. As there is no suitable habitat for this species on Skokholm, we believe these two records to be very doubtful.

Family Rissoidae

Genus *Rissoa* Desmarest, 1814

***Rissoa parva* (Da Costa, 1778)**

North Haven, 31.VII.1950, not uncommon (HJMB & UHW); Peters Bay, 1.VIII.1950, not uncommon at LWM (HJMB & UHW). * Crab Bay, 1991, scarce; Hog Bay, 1991, 2 specimens; South Haven, 1990, 2 specimens;

South Haven and North Haven, 1991, common; Peters Bay, 1991, abundant.

Habitat: *R. parva* as well as the smooth-shelled *R. parva* forma *interrupta* (Adams, 1798) live among red algae in the lower littoral zone.

Genus *Alvania* Risso, 1826

***Alvania semistriata* (Montagu, 1808)**

North Haven and Peters Bay, 1-3.VIII.1950, not uncommon below LWM (HJMB & UHW); Crab Bay, 2.VIII.1950, 1 specimen (HJMB & UHW). * North Haven, South Haven, Peters Bay and Hog Bay, 1990-1991, rare to scarce; Crab Bay, 1990, abundant; Crab Bay, 1991, scarce; North Haven, 1990-1991, dead specimens common in shell-grit.

Habitat: Lower littoral zone, under stones.

***Alvania punctura* (Montagu, 1803)**

No previous records from Skokholm. * North Haven, 1990, 9 specimens in shell-grit; Crab Bay, 1991, 18 specimens in shell-grit; North Haven, 1991, 3 specimens in shell-grit.

***Alvania cancellata* (Da Costa, 1778)**

No previous records from Skokholm. * North Haven, 1990, 1 specimen in shell-grit; Crab Bay, 1991, 2 specimens in shell-grit.

Genus *Manzonina* Brusina, 1870

***Manzonina crassa* (Kanmacher, 1798)**

No previous records from Skokholm. * North Haven, 1990, common in shell-grit; Crab Bay, 1991, 6 specimens in shell-grit; North Haven, 1991, 6 specimens in shell-grit.

Genus *Cingula* Fleming, 1828

***Cingula trifasciata* (J.Adams, 1800)**

Peters Bay, 1.VIII.1950, 1 live specimen (HJMB & UHW); South Haven, 3.VIII.1950, 1 dead specimen (HJMB & UHW). * Crab Bay, 1990, 3 specimens; Crab Bay, 1991, common; Hog Bay, 1990, common; Hog Bay, 1991, abundant; South Haven, 1990, 7 specimens; Peters Bay, 1990, 4 specimens; North Haven, 1991, 1 specimen; North Haven, 1990, 2 dead specimens in shell-grit.

Habitat: Mid to low littoral zone, under stones.

Genus *Onoba* H. & A. Adams, 1852

***Onoba semicostata* (Montagu, 1803)**

North Haven, 31.VII.1950, 1 live specimen (HJMB & UHW); Crab Bay, 2.VIII.1950, not uncommon in muddy places (HJMB & UHW). * Crab Bay, 1990, scarce; Crab Bay 1991, common; Hog Bay, 1990, 1 specimen; Hog Bay, 1991, common; South Haven, 1990, common; North Haven, 1991, 8 specimens; North Haven, 1990, dead specimens common in shell-grit; Crab Bay, 1991, abundant in shell-grit; North Haven, 1991, 16 specimens in shell-grit.

Habitat: Under stones, on red algae and sometimes in rock pools. Lower littoral zone.

***Onoba aculeus* (Gould, 1841)**

No previous records from Skokholm. * Crab Bay, 1991, 2 specimens; Hog Bay, 1990, 9 specimens; Hog Bay, 1991, 4 specimens; South Haven, 1991, 1 specimen; Peters Bay, 1991, 3 specimens; North Haven, 1990, 2 specimens in shell-grit; Crab Bay, 1991, 9 specimens in shell-grit.

Habitat: As *O. semicostata*.

Family Barleeidae

Genus *Barleeia* W. Clark, 1855

***Barleeia unifasciata* (Montagu, 1803)**

No previous records from Skokholm. * Hog Bay, 1990, 1 specimen; South Haven, 1990, 1 specimen; Peters Bay, 1990, 8 specimens.

Habitat: Living on *Ceramium* sp. and other red algae in the lower littoral zone.

Family Cingulopsidae

Genus *Cingulopsis* Fretter & Patil, 1958

***Cingulopsis fulgida* (J. Adams, 1797)**

Peters Bay, 17.VIII.1948, rare (JHB); Peters Bay, 1.VIII.1950, a small specimen (HJMB & UHW). * Peters Bay and Hog Bay, 1991, common; South Haven, 1991, 8 specimens.

Habitat: On red algae in the lower littoral zone.

Family Rissoellidae

Genus *Rissoella* Gray, 1847

***Rissoella diaphana* (Alder, 1848)**

Plate I, figs. 3 & 4

No previous records from Skokholm. * Crab Bay, Hog Bay, South Haven and Peters Bay, 1991, abundant; North Haven, 1991, scarce.

Habitat: On red algae in the lower littoral zone.

Family Omalogyridae

Genus *Omalogyra* Jeffreys, 1860

***Omalogyra atomus* (Philippi, 1841)**

No previous records from Skokholm. * Hog Bay, 1991, 4 specimens.

Habitat: On red algae in the lower littoral zone.

Family Skeneopsidae

Genus *Skeneopsis* Iredale, 1915

***Skeneopsis planorbis* (Fabricius, 1780)**

North Haven, 20.VIII.1955, abundant on *Coralina* and frequent but less abundant on *Lomentaria articulata* (JG); North Haven, 17.VII.1972, 1 specimen in barnacle (NDP). * Crab Bay, 1990, 3 specimens; Crab Bay, 1991, abundant; Hog Bay 1990, 5 specimens; Hog Bay, 1991, abundant; South Haven, 1990, 5 specimen; South Haven, 1991, 1 specimen; Peters Bay, 1990, 7 specimens; Peters Bay, 1991, abundant; North Haven, 1991, abundant.

Habitat: Mostly on red algae in mid and low littoral zone.

Family Tornidae

Genus *Tornus* Turton & Kingston, 1830

***Tornus subcarinatus* (Montagu, 1803)**

No previous records from Skokholm. * North Haven, 1990, 2 specimens in shell-grit; Crab Bay, 1991, 1 specimen in shell-grit.

Family Caecidae

Genus *Caecum* Fleming, 1813

***Caecum glabrum* (Montagu, 1803)**

No previous records from Skokholm. * North Haven, 1991, 6 specimens in shell-grit.

Family Cerithiidae

Genus *Bittium* Leach, 1847

***Bittium reticulatum* (Da Costa, 1778)**

South Haven, 31.VII.1950, live specimens on *Halichondria* (HJMB & UHW); Crab Bay, 18.IV.1965, at LWST (JRP); Peters Bay, 27.VII.1971, 1 specimen. * Crab Bay, 1991, 4 specimens in shell-grit.

Remarks: Previous live records probably refer to *Cerithiopsis tubercularis* (Montagu, 1803) as this species feeds on the sponge *Halichondria*.

Family Capulidae

Genus *Capulus* Montfort, 1810

***Capulus ungaricus* (Linnaeus, 1758)**

No previous records from Skokholm. * North Haven, 1990, 1 juvenile specimen in shell-grit.

Family Eratoidae

Genus *Trivia* Gray, 1837

***Trivia monacha* (Da Costa, 1778)**

Crab Bay, 12.VII.1968, 2 specimens under stones at LWST (HAGS); North Haven, 2.VIII.1969, 1 specimen (MJA); Crab Bay, 14.VIII.1969, 1 specimen (MJA); North Haven, 28-29.VIII.1969, several under overhanging boulders (MJA). * Crab Bay, 1990, 1 specimen; Crab Bay, 1991, 1 juvenile specimen.

Habitat: Lower littoral zone, under stones and in deep rock pools.

***Trivia arctica* (Pulteney, 1799)**

Hog Bay, 27.III.1952, 1 specimen in *Laminaria*-zone; South Haven, IV.1955, 1 specimen on rocks below quay (AD); Crab Bay, 21.VII.1955, at low tide (KST).

Family Muricidae

Genus *Nucella* Röding, 1798

***Nucella lapillus* (Linnaeus, 1758)**

Previous as well as present records indicate the abundant occurrence of this species on all localities studied.

Habitat: On rocks in the mid-littoral zone.

Genus *Ocenebra* Gray, 1847

***Ocenebra erinacea* (Linnaeus, 1758)**

Crab Bay, 2.VIII.1950, 1 juvenile specimen at LWST (HJMB & UHW).

Family Nassariidae

Genus *Hinia* Leach, 1852

***Hinia reticulata* (Linnaeus, 1758)**

South Haven, 31.VII.1950, 1 very worn washed up specimen (HJMB & UHW).

***Hinia incrassata* (Ström, 1768)**

Crab Bay, 14.IX.1954, 8 specimens under one boulder (HJM); North Haven, 28.VIII.1972, 2 specimens amongst stones at LWST (MJA). * Peters Bay, 1990, 2 specimens; Crab Bay, 1991, 3 specimens in shell-grit.

Habitat: Under overhanging boulders in lower littoral zone.

Family Cerithiopsidae

Genus *Cerithiopsis* Forbes & Hanley, 1849

***Cerithiopsis tubercularis* (Montagu, 1803)**

No previous records from Skokholm, although we assume this species has been erroneously identified as *Bittium reticulatum*. * Crab Bay, 1990, 1 specimen; Hog Bay, 1991, 1 specimen; Peters Bay, 1991, 1 specimen.

Habitat: Lower littoral zone, on rocks and boulders covered with sponges.

Family Triphoridae

Genus *Triphora* Blainville, 1828

***Triphora adversa* (Montagu, 1803)**

No previous records from Skokholm. * Crab Bay, 1991, 3 specimens in shell-grit.

Family Epitoniidae

Genus *Epitonium* Röding, 1798

***Epitonium clathratulum* (Kanmacher, 1798)**

No previous records from Skokholm. * North Haven, 1990, 3 specimens in shell-grit; Crab

Bay, 1991, 2 specimens in shell-grit; North Haven, 1991, 1 specimen in shell-grit.

Family Janthinidae
Genus *Janthina* Röding, 1798

Janthina janthina (Linnaeus, 1758)
Skokholm, 18.VI.1964, 1 specimen with dried up animal in gull-nest (MPH).

Family Eulimidae
Genus *Vitreolina* Monterosato, 1884

Vitreolina philippii (Rayneval & Ponzi, 1854)
No previous records from Skokholm. * Crab Bay, 1991, 2 specimens in shell-grit.

Family Pyramidellidae
Genus *Chrysallida* Carpenter, 1857

Chrysallida obtusa (Brown, 1827)
No previous records from Skokholm. * Crab Bay, 1991, 4 specimens in shell-grit; North Haven, 1991, 3 specimens in shell-grit.

Chrysallida indistincta (Montagu, 1808)
No previous records from Skokholm. * Crab Bay, 1991, 5 specimens in shell-grit.

Genus *Brachystomia* Monterosato, 1884

Brachystomia lukisi (Jeffreys, 1858)
Plate I, figs. 5 & 6
No previous records from Skokholm. * Crab Bay, 1990, rare; Crab Bay, 1991, rare; Hog Bay, 1990, 1 specimen; Hog Bay, 1991, 3 specimens; North Haven, 1990, 3 specimens in shell-grit; North Haven, 1991, 4 specimens in shell-grit; Crab Bay, 1991, 8 specimens in shell-grit.

Habitat: Under stones at LWST.

Genus *Odostomia* Fleming, 1813

Odostomia unidentata (Montagu, 1803)
No previous records from Skokholm. * Peters Bay, 1991, 1 specimen; Crab Bay, 1991, 8 specimens in shell-grit.

Habitat: In *Laminaria*-holdfast at LWST.

Subclass Opisthobranchia
Order Bullomorpha
Family Retusidae
Genus *Retusa* Brown, 1887

Retusa truncatula (Bruguière, 1792)
No previous records from Skokholm. * Crab Bay, 1991, 3 specimens in shell-grit.

Family Runcinidae
Genus *Runcina* Forbes & Hanley, 1853

Runcina coronata (Quatrefages, 1844)
Crab Bay, 22.VII.1955, 1 specimen at low tide (KST); Crab Bay, 27.VI.1956, 1 specimen in rock pool (CRT). * Crab Bay, 1990, abundant; Hog Bay, 1990, 1 specimen; Crab Bay, 1991, 1 specimen; Hog Bay, 1991, 1 specimen.

Habitat: Under stones in pools in the lower littoral zone.

Order Aplysiomorpha
Family Aplysiidae
Genus *Aplysia* Linnaeus, 1767

Aplysia punctata Cuvier, 1803
Peters Bay, 24.IV.1952, 1 specimen attached to a rock at low tide level.

Order Sacoglossa
Family Stilligeridae
Genus *Hermaea* Lovén, 1844

Hermaea dendritica (Alder & Hancock, 1843)
No previous records from Skokholm. * Crab Bay, 1990, 3 specimens.

Habitat: Under stones in rock pools at LWST.

Family Limapontiidae
Genus *Limapontia* Johnston, 1836

Limapontia capitata (Müller, 1774)
Crab Bay, 22.VII.1955, 1 specimen at low tide (MEB). * Crab Bay, 1990, common; Hog Bay, 1990, common.
Habitat: Under stones, often in pools, at low tide level.

Order Nudibranchia

Family Dotidae

Genus *Doto* Oken, 1815

Doto millbayana Lemche, 1976

No previous records from Skokholm. * Crab Bay, 1991, 2 specimens on Hydroids.
Habitat: At low water level under stone.

Family Goniodorididae

Genus *Goniodoris* Forbes & Goodsir, 1845

Goniodoris nodosa (Montagu, 1808)

Crab Bay, 14.IX.1954, 1 specimen (HJM); Crab Bay, 18.V.1969, 2 specimens in rock pool.

Genus *Ancula* Lovén, 1846

Ancula gibbosa (Risso, 1818)

Crab Bay, 24.III.1952, 1 specimen (PDB).

Family Polyceridae

Genus *Polycera* Cuvier, 1817

Polycera faeroensis Lemche, 1929

No previous records from Skokholm. * Crab Bay, 1990, 1 specimen.
Habitat: Under stone in rockpool, lower littoral zone.

Polycera quadrilineata (Müller, 1776)

South Haven, 19.VII.1955, 1 specimen on weed (KST); South Haven, 17.VII.1966, 7 specimens on lower shore (HAGS); South Haven, 7.VII.1968, 1 specimen (HAGS). * Crab Bay, 1991, scarce; South Haven, 1991, 4 specimens; Peters Bay, 1991, 4 specimens.

Habitat: On rocks among red algae in the lower littoral zone.

Genus *Palio* Gray, 1857

Palio dubia (M.Sars, 1829)

No previous records from Skokholm. * Crab Bay, 1990, 2 egg-laying specimens; South Haven, 1990, 2 egg-laying specimens.
Habitat: Under stones in pools in the lower littoral zone.

Remarks: According to the Invertebrate Card File System on Skokholm, *P. dubia* has not

been recorded. We suspect that the single record of *Palio nothus* (Johnston, 1838) was misidentified and actually refers to the present species.

Palio nothus (Johnston, 1838)

Hog Bay, 6.VII.1967, 2 specimens under a rock at low tide (HAGS).

Remarks: See under *P. dubia*.

Genus *Limacia* Müller, 1781

Limacia clavigera (Müller, 1776)

No previous records from Skokholm. * Crab Bay, 1990, 2 specimens; Crab Bay, 1991, 5 specimens; Hog Bay, 1991, 1 specimen.
Habitat: In rock pools under stones at LWST.

Family Archidorididae

Genus *Archidoris* Berch, 1878

Archidoris pseudoargus (Rapp, 1827)

Crab Bay, 1948-1971, scarce; Hog Bay, 23-30.VIII.1969, 1 specimen; South Haven, 22.X.1957, a specimen of 2" (HJT); South Haven, 23-30.VIII.1969, under overhangs on sponge (MJA); Peters Bay, 1962, a male and female in copulation together with strips of eggs; Peters Bay, 20.VII.1971, 1 specimen. North Haven, 23-30.VIII.1969, 1 specimen (MJA); North Haven, 2.VIII.1969, 1 specimen under overhang (HAGS); North Haven, 20.VII.1971, 2 specimens (NDP).

Family Kentrodorididae

Genus *Jorunna* Berch, 1876

Jorunna tomentosa (Cuvier, 1804)

Crab Bay, 1960-1968, rare; North Haven, 2.VIII.1969, 1 specimen (MJA); South Haven, 12.VIII.1969, 1 specimen (MJA).

Family Facelinidae

Genus *Facelina* Alder & Hancock, 1855

Facelina coronata (Forbes & Goodsir, 1839)

There are only two known records from Skokholm. Little Bay, 16.VIII.1950, 1 specimen in rock pool at LWST; Little Bay, 15.VIII.1969, 1 specimen in rock face in shade.

Remarks: This species has never been recorded from the localities we examined.

Family Aeolidiidae

Genus *Aeolidia* Cuvier, 1798

***Aeolidia papillosa* (Linnaeus, 1761)**

South Haven, 12.VIII.1969, 1 specimen in crack at low tide (MJA). * Crab Bay, 1990, 2 specimens; Hog Bay, 1990, 1 specimen.

Habitat: In pools under stones, lower littoral zone.

Genus *Aeolidiella* Berch, 1867

***Aeolidiella glauca* (Alder & Hancock, 1845)**

Crab Bay, 22.VII.1955, 1 specimen at low tide (KST).

Subclass Pulmonata

Order Basommatophora

Family Ellobiidae

Genus *Leucophytia* Winckworth, 1949

***Leucophytia bidentata* (Montagu, 1808)**

No previous records from Skokholm. * Crab Bay, 1990, 4 specimens; South Haven, 1990, 1 dead specimen; Hog Bay, 1991, 1 specimen.

Habitat: Mid-littoral to LWST in dark, wet rock crevices.

Genus *Phytia* Gray, 1828

***Phytia myosotis* (Draparnaud, 1801)**

No previous records from Skokholm. * Crab Bay, 1991, 1 specimen in shell-grit.

Family Otinidae

Genus *Otina* Gray, 1847

***Otina ovata* (Brown, 1827)**

No previous records from Skokholm. South Haven, 1990, common; Hog Bay, 1990, scarce; Crab Bay, 1990, 3 specimens; Peters Bay, 1990, 1 specimen; Hog Bay, 1991, abundant.

Habitat: As *L. bidentata*.

Class Bivalvia

Subclass Protobranchia

Order Nuculoida

Family Nuculidae

Genus *Nucula* Lamarck, 1799

***Nucula nucleus* (Linnaeus, 1767)**

South Haven, 3.VIII.1950, one valve (HJMB & UHW). * Crab Bay, 1990-1991, 11 valves in shell-grit; North Haven, 1990, 5 valves in shell-grit.

Subclass Lamellibranchia

Order Taxodonta

Family Arcidae

Genus *Arca* Linnaeus, 1758

***Arca tetragona* Poli, 1795**

According to Crothers (1966) 1 specimen was dredged at 12 fathoms depth, 100 yards off North Point in 1960. Raven's Gully, 25.VIII.1969, 1 live specimen on *Lithothamnion* in a pool (MJA). * North Haven, 1990, 1 valve in shell-grit; Crab Bay, 1991, 1 valve in shell-grit.

Family Glycymeridae

Genus *Glycymeris* Da Costa, 1778

***Glycymeris glycymeris* (Linnaeus, 1758)**

No previous records from Skokholm. * North Haven, 1990, 1 valve in shell-grit; North Haven, 1991, 1 valve in shell-grit.

Order Anisomyaria

Family Mytilidae

Genus *Rhomboidella* Monterosato, 1884

***Rhomboidella prideauxi* (Leach, 1815)**

No previous records from Skokholm and the Bristol Channel Area. * North Haven, 1990, 1 valve in shell-grit.

Genus *Modiolus* Lamarck, 1799

***Modiolus modiolus* (Linnaeus, 1758)**

South Haven, 2-16.VIII.1969, occasional small specimens (MJA). * North Haven, 1990, 1 juvenile valve in shell-grit.

***Modiolus barbatus* (Linnaeus, 1758)**

Peters Bay, North Haven and South Haven, VIII.1969, occasional specimens (MJA). * Peters Bay, 1991, scarce; Crab Bay, 1991, 1 specimen; North Haven, 1991, 1 specimen; Hog Bay, 1991, 2 specimens.
Habitat: At LWM among red algae.

***Modiolus phaseolinus* (Philippi, 1844)**

Crothers (1966) claims this species dredged off North Point at 12 fathoms depth where it appears to be abundant (1960). Crab Bay, 2.VIII.1950, small valves (HJMB & UHW).

Genus *Musculus* Röding, 1798

***Musculus discors* (Linnaeus, 1758)**

No previous records from Skokholm. * North Haven, 1990, 3 valves in shell-grit; Crab Bay, 1991, 2 specimens; Hog Bay, 1991, 1 specimen; North Haven, 1991, 1 specimen.
Habitat: At LWM among red algae.

Genus *Mytilus* Linnaeus, 1758

***Mytilus edulis* Linnaeus, 1758**

Commonly distributed throughout the Skokholm coastline according to records from 1947-1969. We recorded the species from all five localities in both 1990 and 1991.

Remarks: Probably due to the large populations of breeding gulls on the island, only small specimens were found.

Family Pectinidae

Genus *Camptonectes* Meek, 1864

***Camptonectes tigrinus* (Müller, 1776)**

No previous records from Skokholm. * Crab Bay, 1991, 1 valve in shell-grit.

Genus *Aequipecten* P.Fischer, 1887

***Aequipecten opercularis* (Linnaeus, 1758)**

Dredged off Skokholm Island at 5-10 fathoms (Crothers 1966). One doubtful record from Peters Bay [*Pecten chlamys* (sic)], 21.VI.I.1955, 1 specimen at low tide (KST). * Crab Bay, 1991, 4 valves in shell-grit; North Haven, 1991, 3 valves in shell-grit.

Genus *Chlamys* Röding, 1798

***Chlamys varia* (Linnaeus, 1758)**

Dredged off the north coast of Skokholm at 7-10 fathoms (Crothers). Peters Bay, Crab Bay and North Haven, VII-VIII-1950, 1 small valve and fragments (HJMB & UHW); Crab Bay, 14.IX.1954, 1 white juvenile specimen (HJM). * Crab Bay, 1991, 2 juvenile specimens; North Haven, 1990-1991, 8 valves in shell-grit.

Habitat: Under stones at LWST.

Genus *Hinnites* Defrance, 1821

***Hinnites distortus* (Da Costa, 1778)**

No previous records from Skokholm. * Crab Bay, 1991, 4 valves in shell-grit.

Family Limidae

Genus *Mantellum* Röding, 1784

***Mantellum hians* (Gmelin, 1790)**

Stack Bay, 30.VII.1963, 1 specimen under hold-fast of *Laminaria* (RBSS).

Family Anomiidae

Genus *Anomia* Linnaeus, 1758

***Anomia ephippium* Linnaeus, 1758**

Peters Bay, 11.VIII.1949; Peters Bay, 1.VIII.1950 (HJMB & UHW); North Haven, 29.VII.1950, common (HJMB & UHW); Crab Bay, 2.VIII.1950 (HJMB & UHW); Crab Bay, 14.IX.1954, frequent (HJM); South Haven, North Haven, Hog Bay, 6-13.VII.1968 (HAGS).

Remarks: Most likely the records of *A. ephippium* from all five localities (1949-1969) represent misidentified *H. squamula*.

Genus *Heteranomia* Winckworth, 1922

***Heteranomia squamula* (Linnaeus, 1758)**

Crab Bay, 2.VIII.1950 (HJMB & UHW); North Haven, 23.VII.1950, not uncommon (HJMB & UHW). * Crab Bay, 1990-1991, abundant; Hog Bay, 1990, 4 specimens; Hog Bay, 1991, 3 specimens; South Haven, 1990, 4 specimens; Peters Bay, 1990, 2 specimens; Peters

Bay, 1991, common; North Haven, 1991, abundant. Valves are abundant in shell grit from both Crab Bay (1991) and North Haven (1990 and 1991).

Habitat: Under stones at LWST.

Order Eulamellibranchia
Family Astartidae
Genus *Goodallia* Turton, 1822

***Goodallia triangularis* (Montagu, 1803)**

No previous records from Skokholm. * North Haven, 1990-1991, valves, common in shell-grit.

Family Leptonidae
Genus *Lasaea* Brown, 1827

***Lasaea rubra* (Montagu, 1803)**

Crab Bay, 13.IX.1954, 1 specimen collected, 'likely to be numerous' (HJM). * Crab Bay, 1990, 3 specimens; Crab Bay, 1991, common; Hog Bay, 1990, 4 specimens; Hog Bay, 1991, scarce; South Haven, 1990, 2 specimens; North Haven, 1991, 3 specimens.

Habitat: On rocks and under stones among algae at LWM.

Genus *Kellia* Turton, 1822

***Kellia suborbicularis* (Montagu, 1803)**

No previous records from Skokholm. * Hog Bay, 1990, 2 live specimens; North Haven, 1990, 2 valves in shell-grit.

Habitat: Under stones at LWST.

Genus *Lepton* Turton, 1822

***Lepton nitidum* Turton, 1822**

No previous records from Skokholm and the Bristol Channel Area. * North Haven, 1991, 2 valves in shell-grit.

Family Montacutidae
Genus *Mysella* Angas, 1877

***Mysella bidentata* (Montagu, 1803)**

No previous records from Skokholm. * North Haven, 1990, 2 valves in shell-grit.

Family Cardiidae
Genus *Parvicardium* Monterosato, 1884

***Parvicardium ovale* (Sowerby, 1841)**

No previous records from Skokholm. * Crab Bay, 1991, valves scarce in shell-grit; North Haven, 1990-1991, valves common in shell-grit.

***Parvicardium exiguum* (Gmelin, 1791)**

Crab Bay, 2.VIII.1950, valves (HJMB & UHW).

Genus *Cerastoderma* Mörch, 1853

***Cerastoderma edule* (Linnaeus, 1767)**

South Haven, 31.VII.1950, 1 freshly washed up specimen (HJMB & UHW).

Family Veneridae
Genus *Gouldia* C.B.Adams, 1847

***Gouldia minima* (Montagu, 1803)**

No previous records from Skokholm. * North Haven, 1990-1991, 6 valves in shell-grit; Crab Bay, 1991, 3 valves in shell-grit.

Genus *Chione* Megerle von Mühlfeld, 1811

***Chione ovata* (Pennant, 1777)**

No previous records from Skokholm. * North Haven, 1990-1991, 8 valves in shell-grit.

Genus *Venerupis* Lamarck, 1818

***Venerupis pullastra* (Montagu, 1803)**

No previous records from Skokholm. * Crab Bay, 1991, 1 dead specimen; South Haven, 1991, 2 dead specimens.

Family Sanguinolariidae
Genus *Psammocola* Blainville, 1824

***Psammocola depressa* (Pennant, 1777)**

No previous records from Skokholm. * Crab Bay, 1991, 1 dead specimen.

Family Hiatellidae

Genus *Hiatella* (Daudin in) Bosc, 1801

Hiatella arctica (Linnaeus, 1767)

Various records from all localities from 1949-1969. * Crab Bay, 1990, 3 specimens; Crab Bay, 1991, abundant; Hog Bay, 1990, 1 specimen; Hog Bay, 1991, 1 specimen; North Haven, 1991, common.

Habitat: Under stones or in *Laminaria* holdfasts at LWST.

Hiatella rugosa (Pennant, 1777)

No previous records from Skokholm. * Crab Bay, 1990, 1 specimen.

Habitat: Boring in stone at LWM.

Remarks: *H. rugosa* is often considered only a form of *H. arctica*. We prefer to retain its specific status.

Class Cephalopoda

Order Decapoda

Family Sepiidae

Genus *Sepia* Linnaeus, 1758

Sepia officinalis Linnaeus, 1758

One record, 2.VIII.1950, concerning 2 'bones' of this species by a gullery at Bread Rock (HJMB & UHW). * North Haven, 1991, 1 'bone'.

Order Octopoda

Family Octopodidae

Genus *Eledone* Leach, 1817

Eledone cirrhosa (Lamarck, 1798)

North Haven, 20.IX.1955, 1 specimen caught by a limpet and held to the rock surface by one tentacle. The animal was released and kept alive for several days.

CONCLUSIONS

In total, 114 species of marine molluscs are now recorded from Skokholm. Of this amount, 49 species were newly recorded during our survey. The following species were new records or new live records for the Bristol Channel area (Seaward, 1982 & 1990): *Skenea serpuloides*, *Skenea nitens*, *Rhomboidella prideauxi* and *Lepton nitidum*. Four of the earlier recorded species are probably based on misidentified specimens: *Acanthochitona fascicularis*, *Hydrobia ulvae*, *Palio nothus* and *Anomia ephippium*.

As might be expected from an island with a rocky coastline, bivalves are poorly represented. Even the few bivalve species inhabiting this type of environment occur in relatively small numbers. Although predation by gulls was regularly observed, in our opinion this cannot be the sole cause of this phenomenon.

Skokholm proves a suitable habitat for opisthobranch molluscs of which 18 species are hitherto recorded.

In our opinion the rich gastropod fauna justifies a marine reserve status for Skokholm Island, and inclusion in the recently designated Skomer Marine Nature Reserve should be considered.

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PLATE I (scale bars are 100 μ m)

Figure 1 *Skenea serpuloides* (Montagu, 1808), Skokholm Isl., North Haven, FJAS 4923;

Figure 2 *Skenea nitens* (Philippi, 1844), Skokholm Isl., North Haven, FJAS 4922;

Figure 3 *Rissoella diaphana* (Alder, 1848), Skokholm Isl., Hog Bay, FJAS 6597;

Figure 4 Aperture with operculum, same species as Fig. 3;

Figure 5 *Brachystomia lukisi* (Jeffreys, 1858), Skokholm Isl., Hog Bay, FJAS 6601;

Figure 6 Aperture with operculum, same specimen as Fig.5;

(FJAS = collection F.J.A. Slieker, Schiedam)

PLATE I

