

THE NATURAL HISTORY OF SLAPTON LEY NATURE RESERVE: V NON-MARINE MOLLUSCA

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INTRODUCTION

THIS paper gives an introduction to the study of the non-marine Mollusca of Slapton Ley Nature Reserve together with a provisional species list. Nearly all of the records are based on living specimens, although very freshly dead shells were taken into account in some cases. Field work was undertaken in July 1970 and February 1971.

Slapton Ley is situated to the south of Dartmoor in South Devon and the Reserve consists of a variety of rock types including Dartmouth slate, Meadfoot Beds, Permo-Triassic breccia, Pleistocene head deposit, alluvium and beach gravel. There is a varied topography in the area of the Reserve from sea level to 325 ft. (Mercer, 1966). The rocks weather to give acid soils in the range of pH 5-6.5. The Reserve includes habitats of different character such as woodlands, shingle, grass turf, marsh, open water and edge habitats, whilst man's activities have provided walls and scattered bricks and logs which are also colonized by molluscs.

The climate at Slapton is warm and damp, characteristics which are evident when weather data from the Reserve are compared with similar data from S.E. England (Brooks and Burns, 1969). Apart from the climate of South Devon as a whole, aspect, topography, vegetation cover and proximity to the seashore give further variation in microclimates on the Reserve. Strong winds blow on the shingle ridge and across the Leys, whilst Slapton Wood is sheltered from on-shore winds.

COLLECTION AND IDENTIFICATION

Land snails and slugs were collected by careful searching under logs, among grass roots, on the surface of the soil and in the vegetation. Some of the species, e.g. *Vitrea crystallina* are small (2-3 mm. shell diameter) and such habitats need close scrutiny and the use of fine forceps. *V. crystallina* amongst some other small snails have a white shell and may be conspicuous on brown leaf litter in spite of their size, but in contrast other small species e.g. *Punctum pygmaeum* (1-2 mm. shell diameter) are brown and likely to be overlooked in the field. For these, samples of leaf litter or turf were taken in large polythene bags. After an initial examination for slugs, the litter was air-dried in trays and sieved. The resulting fine material passing through the sieve was then scanned in a petri dish under a binocular microscope and the small snails removed. Sifting leaf litter can be time-consuming, but it does result in a more complete list from the study area.

Freshwater snails were collected using either a pond net (for those amongst aquatic vegetation) or a flour sieve of 2 mm. mesh (for the fauna of the mud). The latter technique is especially successful for small bivalves (*Pisidium* spp.) when the sieve is skimmed along the top centimetre of fine substratum.

British non-marine Mollusca comprise 178 species and are generally easy to name. Most snails can be identified from shell characters, the following being important: dextrality or sinistrality, size, colour, spire height, relative inflation of the body

whorl, shallow or deep sutures, peripheral keel, width of umbilicus, size of the apex, shell ribs or finer striae, shell spines and hairs, teeth in the aperture and the surface shine of the shell (Fig. 1a). Occasionally it is necessary to dissect the animal, in

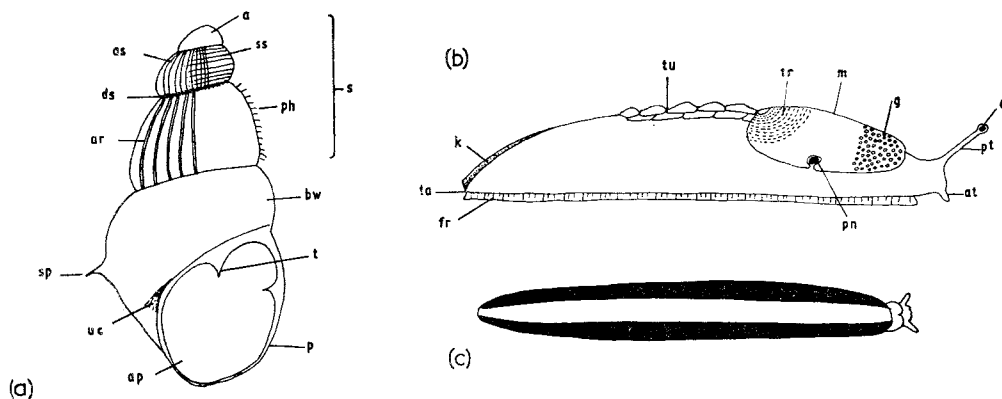


FIG. 1.

(a) Diagram of hypothetical snail shell showing characters used in identification; (b) Hypothetical slug showing characters used in identification; (c) Pigmented tripartite sole of slug viewed ventrally. Key: a, apex; ap, aperture or mouth of shell dextrally situated; ar, axial ribs; as, fine axial striae or growth lines; at, anterior tentacle; bw, body whorl; ds, deep suture; e, eye; fr, foot fringe; g, granular mantle; k, keel; m, mantle; p, peristome or outer lip; ph, periostacal shell hairs; pn, pneumostome or breathing pore; pt, posterior tentacle; s, spire; sp, spine; ss, spiral striae or lines; t, tooth in mouth of shell; ta, tail (either truncate or pointed); tr, concentric thumb-print ridges on mantle; tu, tubercles prominent; uc, umbilical cleft.

particular the reproductive system, to confirm identification; thus the cross section of the dart sac is used to distinguish *Cepaea hortensis* from *C. nemoralis* (Ellis, 1969). Slugs are recognized by the structural pattern on the mantle, the presence and extent of a posterior dorsal keel, presence and colour of a foot fringe, size, colour of the back, colour of the sole, relative size of tubercles and the position of the breathing pore or pneumostome (Fig. 1b-c). Shell plates occur in some slugs, externally in *Testacella* and internally in the mantle of the Limacidae but the shell is represented only by calcareous granules in the Arionidae.

The standard book for identification of non-marine Mollusca is Ellis 1969, recently reprinted, but Janus (1965), Morton and Machin (1959) and McMillan (1968) are also useful: Quick (1961) is the standard monograph on British slugs. The freshwater gastropods are well illustrated in Macan (1960) and the bivalves in Ellis (1962). Apart from the occasional need to confirm by dissection, most species can be identified alive. In the bivalves, notably *Pisidium*, where it is necessary to examine the hinge, the animal may be killed in boiling water when the shell valves open, and the tissue dissolved by further boiling in 5 per cent sodium hydroxide solution.

DESCRIPTION OF THE RESERVE

Mercer (1966) gave a description of the physical features of the Reserve and divided the area into working units: these units are adopted in this paper (Fig. 2). Subsequent work of Brooks and Burns (1969) gives an account of the flowering plants and ferns, again using the same units. The areas studied in the preparation of this paper are as follows:

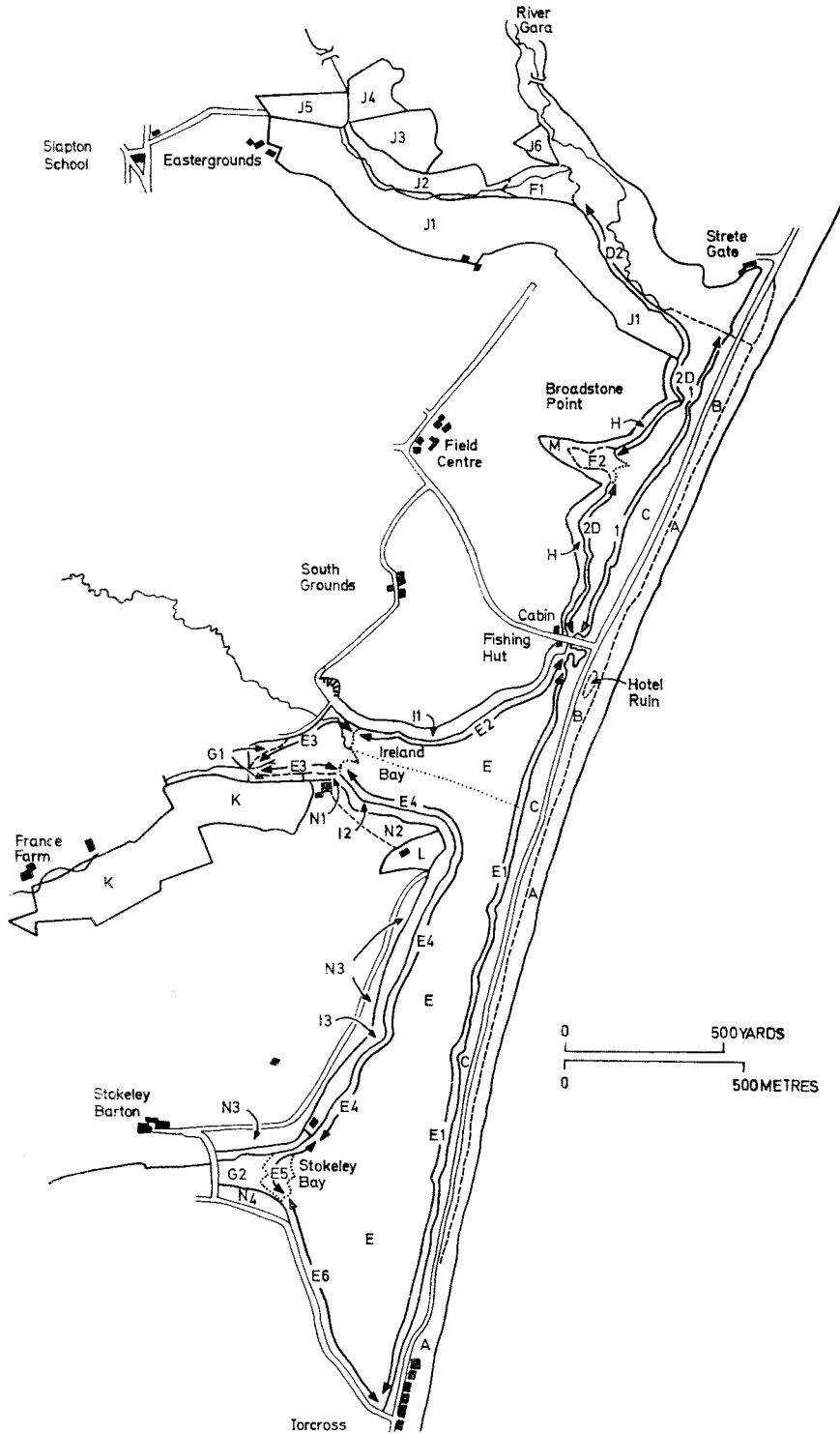


FIG. 2.

Location and delimitation of units of the Reserve. Vegetation boundaries and transitions shown by pecked lines. Shoreline units indicated by long arrows parallel with WWM, units E1 and E2 extend north to Slapton Bridge, E1 including the pool immediately south-east of the bridge. The boundary between N1 and I2 is taken to be the small stream running north from Ireland Farm ruins. *Crown Copyright reserved.*

I. *Shingle Ridge* :

- A. Seaward face.
- B. Crest (Western boundary is road).
- C. Backslope (To Ley Winter Water Mark).

II. *Slapton Ley* :

- D. Higher Ley.
 - 1. Outer shore } (All "shores" defined as Winter Water Mark to summer
 - 2. Inner shore } wading depth.)
- E. Lower Ley:
 - 1. Outer shore.
 - 2. Southgrounds shore.
 - 3. Ireland Bay shore.
 - 6. Torcross west shore.

III. *Marshes* :

- F. Higher Ley Marshes.
 - 2. Little Marsh.
- G. Lower Ley Marshes:
 - 1. France Valley Marsh.
 - 2. Stokeley Marsh.

IV. *Leyside Fringes* (Winter Water Mark to Cliff Top) :

- H. Middlegrounds Cliff.
- I. Lower Ley Cliff.
 - 1. Southgrounds Cliff.

V. *Woodland* :

- J. Slapton Wood Complex.
 - 1. Main Wood.
 - 2. Valley Bottom Scrub.
 - 3. Loworthy Brake.
 - 4. Square Brake.
- K. France Wood.

VI. *Grassland and Arable* :

- M. Little Marsh Field.

VII. *Walls*.I. *SHINGLE RIDGE*

The seaward face, A, is affected by high tide and does not support a terrestrial molluscan fauna. The crest, B, with relatively sparse shingle flora and occasional salt spray supported 2 species, *Helix aspersa* and *Helicella virgata* which were both abundant in local areas where the soil was not consolidated by trampling or by cars. The backslope, C, is more sheltered and there is a denser and more varied vegetation from moss and lichen, through turf of fine-leaved grasses to gorse and bramble scrub with some trees near the bottom of the slope. The abundance of lichens, together with bracken is indicative of an acid soil (*pH* 6). The turf on the backslope was characterized by *Cochlicopa lubricella*, *Vallonia excentrica*, *Hygromia hispida*, *Arion intermedius*, *Vitrea crystallina* s.s., *Retinella radiatula*, *R. nitidula* and *Agriolimax caruanae*: this assemblage of species is typical of slightly acid turf. On more sparse vegetation in the north of area C, more calciphile species, notably *Cepaea hortensis*, *C. nemoralis*, *Helix aspersa*, *Monacha cantiana*, *Helicella virgata* and *H. caperata* were present. These may

obtain their calcium salts from broken sea shells on the ridge. The scrub was more shaded than other plant communities on the backslope and the soil more accessible to molluscs: here the bramble and nettle scrub supported a varied fauna of 17 species of slugs and snails. Close to human settlement at Torcross, bricks, pieces of wood and other human debris were present in area C and these provided habitats for species characteristic of waste areas.

II. SLAPTON LEY

The Higher Ley, D, has relatively little open water close to the shore and large areas are covered by a *Phragmites communis* reed-swamp. The substratum of this part of the Ley consists largely of partly decomposed *Phragmites* together with some mud. During February 1971 there was little evidence of aquatic green plants and relatively few species: *Callitriche* spp. and *Mentha aquatica* were the most common. Part of the inner shore, D2, was trampled where cattle have access to the Ley.

The freshwater Mollusca in the Higher Ley were represented by only a few species tolerant of acid conditions and none were especially numerous. They were *Lymnaea peregra*, *L. palustris*, *Physa fontinalis*, *Planorbis albus*, *Segmentina complanata* and the most abundant species, *Pisidium casertanum* and *P. milium*. Damp ground and vegetation at the shore yielded an assemblage of marsh species including *Carychium minimum*, *Succinea putris*, *S. pfeifferi*, *Monacha granulata*, *Euconulus fulvus*, *Vitrea crystallina* s.s., *Zonitoides nitidus*, *Agriolimax laevis* and *A. caruanae*. The bank and undersides of old logs were especially good habitats for *Zonitoides nitidus* and *Euconulus fulvus*.

The Lower Ley is deeper than the Higher Ley and has a greater expanse of open water with *Phragmites* reed-swamp confined to the edges. Some parts of the shore are devoid of reed and here the stony bottom is not covered by decomposing plant remains. Muddy substrata are associated with the reed-swamp areas. During collecting there was little evidence of pond weed although in summer the Lower Ley supports an intense bloom of phytoplankton. The strong winds and consequent wave action probably has some influence on the habitat and the molluscs.

The Mollusca of the Lower Ley were the same species assemblage as those of the Higher Ley and areas of stony bottom with little or no plant growth were particularly lacking in snails. A marsh fauna was present where the shore was covered by a sufficient layer of plant litter to conserve water and maintain a high relative humidity. *Pisidium casertanum*, *P. nitidum*, *P. milium* and *P. obtusale* were present in pockets of mud, especially in areas of more intensive reed-swamp at Ireland Bay.

III. MARSHES

Three of the marshes were investigated in this survey. They were areas of permanently wet ground situated in small bays where water from streams drains into the Ley. Little Marsh F2 is characterized by large tussocks of *Carex paniculata* and several bushes of *Salix cinerea* with smaller marsh plants between. At France Valley Marsh G1 snails were collected amongst *Iris*, *Carex* spp. and *Juncus* spp. Stokeley Marsh G2 had a rich marsh fauna and was partly drained by small gullies.

The investigation of the Mollusca of these marshes is only a preliminary one and they are worthy of further study. Stokeley Marsh supported the greatest variety of species and in addition to marsh assemblages previously discussed (above) there were several more terrestrial species e.g. *Clausilia bidentata* and *Lauria cylindracea* indicating local differences in soil moisture and vegetation on the marsh. A pool

investigated in February 1971 yielded *Planorbis leucostoma*, an aquatic ramshorn snail which is characteristic of pools likely to dry up in summer.

IV. LEYSIDE FRINGES

The vegetation and nature of the cliffs bordering the west side of the Ley show some variation and in addition, differences in soil water content are probably important in the distribution and range of species of molluscs in this unit. The vegetation varies from managed grassland to heavily overgrown woodland. As a result units H and I supported 25 species of slugs and snails of different habitat characteristics from damp ground through grassland and woodland species.

V. WOODLAND

Slapton Wood, J, consists of 5 main units and 4 of these (J1-J4) were investigated in this survey. The largest of these is the Main Wood, J1, a mixed deciduous wood of sweet chestnut, beech, oak, sycamore and larch situated on a steep north-east facing slope: there is much fallen timber together with a rich bryophyte and fern flora. A sample of soil from the top of the slope gave a pH reading of 6.5 and a sample from the bottom of the valley a pH of 5-5.25. A stream runs at the foot of Slapton Wood which has a swift flow over a stony bottom, although there are mud pockets at the side. As the stream forms the boundary between Slapton Main Wood and Valley Bottom Scrub there are some damp habitats in the valley. Valley Bottom Scrub on the opposite side of the stream is damper than Main Wood and with a pH of 5.5. The trees in J2 include alder, hazel and willow. Further up the slope is Loworthy Brake, J3, which is a mixed wood consisting of pines, beech and chestnut and beyond this is Square Brake, J4, an almost impenetrable scrub of *Prunus spinosa* and *Euonymus europaeus* with pines, sweet chestnut and other trees.

A fairly typical woodland molluscan fauna was collected from Slapton Wood, especially the Main Wood. These included *Acicula fusca*, *Carychium tridentatum*, *Lauria cylindracea*, *Columella edentula* form *aspera*, *Clausilia bidentata*, *Acanthinula aculeata*, *Discus rotundatus*, *Punctum pygmaeum*, *Vitrea crystallina* ss., *Arion* spp., *Euconulus fulvus*, *Oxychilus alliarius*, *Retinella radiatula*, *R. pura*, *R. nitidula* and *Lehmannia marginata*. The stream in the valley yielded *Potamopyrgus jenkinsi* and *Ancylastrum fluviatile* (the river limpet), 2 species characteristic of stony streams. Slapton Main Wood supported the richest molluscan fauna (a total of 30 terrestrial species) compared with 18 species in J2, 9 in J3 and 12 in J4. Furthermore molluscs were more abundant in Slapton Main Wood than in the other areas (Table 1).

Table 1. To show the species present and their abundance in samples of 2 equivalent bags of leaf litter from Slapton Main Wood J1 and Loworthy Brake J2, February 1971

SLAPTON MAIN WOOD		LOWORTHY BRAKE	
Species	Nos.	Species	Nos.
<i>Acicula fusca</i>	3	<i>Discus rotundatus</i>	12
<i>Carychium tridentatum</i>	67	<i>Euconulus fulvus</i>	6
<i>Acanthinula aculeata</i>	2	<i>Oxychilus alliarius</i>	8
<i>Discus rotundatus</i>	31	<i>Retinella radiatula</i>	4
<i>Vitrea crystallina</i>	11	<i>R. pura</i>	2
<i>Retinella pura</i>	15		
<i>R. nitidula</i>	5		
<i>Zonitoides excavatus</i>	2		
<i>Vitrea pellucida</i>	2		
Total number of snails	138	Total number of snails	32
Number of species in sample	9	Number of species in sample	5

France Wood is a long narrow wood on the side of a valley leading inland from Ireland Bay on the Lower Ley. It is a mixed wood where sweet chestnut, oak and ash are common: some pines are also present. Like Valley Bottom Scrub the soil is acid giving a pH reading of 5.2.

The molluscan fauna was not as rich as that of Slapton Main Wood, although some of the 19 species recorded, e.g. *Oxychilus alliarius* and *Arion intermedius* were abundant.

VI. WALLS

Many of the walls in the Slapton area are built of local stone, some of them as dry stone walls, others pointed with cement. With time these walls weather, soil pockets form and wall flowering plants, ferns, mosses and lichens colonize. The cracks in the walls give shelter, and the flora both shelter and food for rupestral animals. At Slapton a characteristic snail fauna of walls, like that outside the Field Centre, included *Helix aspersa*, *Cepaea hortensis*, *Hygromia striolata*, *Clausilia bidentata*, *Discus rotundatus*, *Lauria cylindracea*, *Retinella nitidula* and *Pyramidula rupestris*. The wall to an empty building at the top of Slapton Main Wood also yielded *Balea perversa*. Most of these snails will occur on habitats other than walls, although *Pyramidula rupestris* is restricted to walls and natural rock faces which form a similar habitat.

ANNOTATED SPECIES LIST

Most of the records in this list are the result of field work by the author during 1970 and 1971 although some additional records from the Census Mapping Scheme of the Conchological Society of Great Britain and Ireland are included.

Class GASTROPODA

PROSOBRANCHIA

MESOGASTROPODA

Family Acmidae

Acicula fusca Montagu: In leaf litter from the top of Slapton Main Wood. J1.

Family Hydrobiidae.

Potamopyrgus jenkinsi (Smith): Abundant on stones in a swift flowing stream in the valley at the foot of Slapton Main Wood. Less numerous at the Causeway to the west of Ireland Bay. E3, J1.

PULMONATA

BASOMMATOPHORA

Family Ellobiidae

Carychium minimum Müller: Locally abundant and widespread in the marshy zone around the Upper and Lower Ley. F2, G1, G2, H.

C. tridentatum (Risso): In leaf litter of woods; it was most plentiful in Slapton Main Wood. J1, J2, K.

Family Lymnaeidae

Lymnaea truncatula (Müller): Marshes. F2, G1, G2.

L. palustris (Müller): Marshes and edge of Slapton Ley. D1, D2, G2.

L. peregra (Müller): Upper and Lower Ley. D1, D2, E3.

Family Physidae

Physa fontinalis (L.): Slapton Ley. D2.

Family Planorbidae

Planorbis leucostoma Millet: Abundant in a pool at Stokeley Marsh. G2.

P. albus: Müller: Upper and Lower Ley. D2, E2, E3.

P. crista (L.): "Round Slapton Ley" recorded by Rev. L. W. Grensted, September 1963.

Segmentina complanata (L.): Upper and Lower Ley in vicinity of stream tributaries and marshes. D2, E3.

Family Ancyliidae

Acroloxus lacustris (L.): "Round Slapton Ley", recorded by Rev. L. W. Grensted, September 1963.

Ancylus fluviatilis Müller: Attached to stones in a swift flowing stream in the valley at the foot of Slapton Main Wood. J1.

STYLOMMATOPHORA

Family Succineidae

Succinea putris (L.): Abundant in marshes. F2, G1, G2.

S. pfeifferi Rossmässler: Edge of Slapton Ley. D2.

Family Cochlicopidae

Cochlicopa lubrica (Müller): Amongst moss and

vegetation in damp habitats. C, D2, F2, I1.
Cochlicopa lubricella Porro: Amongst turf. C, G1.
Family Vertiginidae

Pyramidula rupestris (Draparnaud): In crevices on the wall outside Slapton Ley Field Centre.
Columella edentula (Draparnaud) form *aspera*: Waldén regards this as a separate species. On damp ground and in leaf litter from woodland. H, J4.

Vertigo substriata (Jeffreys): From a sample of dead plant material collected at Little Marsh. F2.
Lauria cylindracea (da Costa): In a variety of habitats including logs and walls and grass turf near the sea. C, G1, I1, J1, J2, J4, K.

Family Valloniidae

Acanthinula aculeata (Müller): Woodland, on logs and in leaf litter. J1, J2, K.

Vallonia costata (Müller): Under bricks near Torcross and by the fishing hut. C, I1.

V. excentrica Sterki: In turf. C.

Family Clausiliidae

Clausilia bidentata (Ström): Usually in woodland or on walls, but also to be found at the edge of Stokeley Marsh. G2, I1, J1, J2, J4, K.

Balea perversa (L.): On walls at the top of Slapton Wood. J1.

Family Helicidae

Helix hortensis Müller (= *Cepaea*): Abundant and widely distributed in a variety of habitats. C, H, I1, J1, K.

H. nemoralis L. (= *Cepaea*): Abundant and widely distributed in a variety of habitats. C, G1, G2, H, I1, J1, J2, K.

H. aspersa Müller: Abundant on the crest of the shingle ridge and present elsewhere, especially crevices in walls. B, C, I1, J1, J4, K.

Hygromia limbata (Draparnaud): "At Blackpool" recorded by Mr. M. R. Block, 1965. A possible juvenile of this species was found at Torcross (J.E.C. February 1971). C.

H. subrufescens (Miller): A single freshly dead shell in Stokeley Marsh. G2.

H. striolata (C. Pfeiffer): On wall at the top of Slapton Wood. J1.

H. hispida (L.): Present in a variety of habitats. C, G1, G2, H, I1, J1, K.

H. subvirescens (Bellamy): A colony of several living specimens in turf on the shingle ridge by the Lower Ley. C.

Monacha granulata (Alder): Around the Upper and Lower Ley, locally abundant, especially on damp ground. Also present at the field boundary of Slapton Main Wood. C, G2, H, I1, J1.
M. cantiana (Montagu): On the shingle ridge by the Upper Ley. C.

Helicella caperata (Montagu): On the shingle ridge by the Upper Ley. C.

H. virgata (da Costa): Behind the ridge and also abundant on the crest. B, C.

Cochlicella acuta (Müller): recorded from the Reserve by Rev. L. W. Grensted, September 1963.

Family Endodontidae

Punctum pygmaeum (Draparnaud): In leaf litter and amongst roots of plants. F2, J1, J2.

Discus rotundatus (Müller): An exceptionally abundant snail especially in the woodland areas of the Reserve. C, G2, J1, J2, J3, J4, K.

Family Arionidae

Arion intermedius Normand: Abundant in a variety of habitats. C, F2, G1, I1, J1, J2, J3, J4, K.

Arion circumscriptus agg.: H, J1, K.

A. hortensis Férussac: In woodland. J1, J2, J4.

A. subfuscus (Draparnaud): In woodland. J1, J2, J3, K.

A. ater agg.: In woodland and around the Ley. All those recorded were young and so further work is necessary to identify the segregate species. G1, G2, J1, J2, J3, K.

Family Zonitidae

Euconulus fulvus (Müller): In woodland and marsh, widely distributed. C, D1, F2, G1, H, J2, J3, J4.

Vitrea crystallina (Müller): Abundant, especially in woodland and marsh. Widely distributed. C, F2, H, I1, J1, J2, J3, J4, K.

Oxychilus draparnaldi (Beck): Recorded around Slapton by Rev. L. W. Grensted (1963) and Mrs. E. B. Rands (1968).

O. cellarius (Müller): G2, I1, J1.

O. alliaris (Miller): Abundant in a variety of habitats. C, H, I1, J1, J2, J3, J4, K.

Retinella radiatula (Alder): Abundant and widely distributed. C, F2, G2, H, I1, J2, J3, J4.

R. pura (Alder): Widely distributed. C, G1, H, J1, J2, K.

R. nitidula (Draparnaud): Abundant and widely distributed. C, F2, H, I1, J1, J2, J4, K.

Zonitoides excavatus (Alder): Slapton Main Wood. J1.

Z. nitidus (Müller): Widely distributed and locally abundant on damp ground around Slapton Ley. D1, D2, E2, G1, G2, H, I1.

Family Vitrinidae

Vitrina pellucida (Müller): In a variety of habitats. C, I1, J1, J2, K.

Family Limacidae

Milax gagates (Draparnaud): Strete and Torcross, recorded by Mr. M. R. Block, August 1965.

M. sowerbyi (Férussac): under stones in woodland. J1, K.

Limax maximus L.: "Slapton" recorded by Mrs.

A. Avens, 1961, and at "Blackpool" by Mr. M. R. Block, 1965.

L. flavus L. On a wall in Slapton village.

Lehmannia marginata (Müller): Abundant in woodland during damp weather. J1, J2, K.

Agriolimax reticulatus (Müller): Present on the west of the Upper Ley. H, M.

A. caruanae Pollonera: Abundant in various localities on the Reserve. C, D2, I1, J1, K.

A. laevis (Müller): On marshy ground. C, G2, H.

BIVALVIA

EULAMELLIBRANCHIATA

Family Sphaeriidae

Sphaerium corneum (L.): Near the Fishing Hut. E2.

Pisidium casertanum (Poli): D2, E2, E3.

P. personatum Malm: Marshy ground. F2.

P. obtusale (Lamarck): D1 and the Causeway at E3.

P. milium Held: D1, D2, E2, E3.

P. subtruncatum Malm: D2.

P. nitidum Jenyns: D1, D2, E2, E3.

DISCUSSION

The annotated list above shows a total of 73 species of non-marine Mollusca living in the vicinity of the Slapton Ley Nature Reserve. Of these recorded species some are common and widely distributed occurring in all or nearly all Vice-counties of the British Isles; examples include *Carychium minimum*, *Lymnaea truncatula*, *L. peregra*, *Lauria cylindracea*, *Discus rotundatus* and *Retinella* spp. In addition some of the ubiquitous species are present in a wide variety of habitats from grassland to woodland, e.g. *Retinella nitidula*.

The south-western position of Slapton has some effect on its molluscan fauna. *Hygromia subvirescens* is restricted to grassy slopes near the sea and in the British Isles occurs only in South-West England, Pembrokeshire and the Channel Isles. The national distributions of other Mollusca recorded at Slapton also have a western or south-western bias as shown by *Cochlicella acuta*, *Hygromia subrufescens*, *Acicula fusca*, *Vertigo substriata* and *Pyramidula rupestris*. The abundance of *Monacha granulata*, and especially its presence at the edge of a field away from marshes, may also be associated with a western position and higher rainfall. The south-eastern species *Monacha cantiana* from the shingle ridge at Slapton is approaching the western limit of its distribution (Kerney, 1970). The slug *Agriolimax caruanae* is of interest as the early records came from scattered localities concentrated along the west and particularly south-west of England, Wales and Ireland. Since about 1965, however, its distribution seems to have changed for it is now found abundantly in many localities including inland counties.

The coastal position of Slapton is reflected in the occurrence of *Cochlicella acuta*, *Hygromia subvirescens* and in the abundance of *Pyramidula rupestris*, *Lauria cylindracea* and *Helicella* spp.

The naturally formed soils of the Slapton area are of an acid nature, and chalk-loving or calciphile snails are generally absent. The most calciphile snails recorded were *Vallonia costata*, *Helicella* spp., *Cochlicella acuta* and *Monacha cantiana*, but these were all around the shingle ridge where the lime content of the soil may be increased by coastal shell sand and human debris. A calcifuge snail, *Zonitoides excavatus* was present in Slapton Wood. The freshwater fauna of the Upper and Lower Ley is a characteristic assemblage of species of soft water (Macan, 1958).

In conclusion, the local geology of the area does not support a calcicole land or freshwater molluscan fauna, but the variety of habitats in the Reserve, together with its south-western geographical position, result in an interesting list of species of non-marine Mollusca.

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