THE NON-MARINE MOLLUSCA OF THE PARISH OF DALE

By L. W. STRATTON

THE non-marine mollusca have been somewhat neglected at Dale. In October, 1950, Miss U. M. Grigg recorded 23 land and freshwater species, although mostly only individual occurrences. The only published records are by G. J. Goodfield and W. A. C. Bullock (1954) of *Potamopyrgus jenkinsi* (Smith) and *Planorbis* (*Anisus*) *spirorbis* (L.) above Mullock Bridge and *Hydrobia* (*Peringia*) *ulvae* (Pennant) below, and of *Leucophytia bidentata* (Montagu) (Bassindale and Barrett, 1957).

In 1960 and 1963 an extensive survey was made of the non-marine mollusca living in the various habitats within the parish of Dale. As a result, 46 species have now been recorded (see Table 1).

Because the area is predominantly acid it is unlikely that many species remain to be found in it. The more noteworthy species in the different habitats and some records that are of particular ecological interest are discussed below. Over the Dale area as a whole *Helix* (*Cornu*) *aspersa* Müller and *Discus rotundatus* Müller are the commonest species, though *Clausilia bidentata* (Ström) and *Monacha* (*Ashfordia*) *granulata* (Alder) dominate in some habitats.

HABITATS

(1) *Woodlands*

Four areas of woodland were examined. Two of these, Castlebeach Wood and Haygardhay Wood, occupy deep valleys containing streams, the tops of the trees not reaching above the valley rims owing to the strong prevailing winds. Blue Anchor Wood and Point Wood are on north-facing slopes, sheltered by high ground on the southern side. All four woods show considerable differences in character.

In CASTLEBEACH WOOD the northern, or left, bank is precipitous. The stream runs at the bottom of a deep gully. On the southern, or right, bank a path runs along a shelf some ten or fifteen feet above the stream. Beside it is a flush, which in August, 1963, was dry in its upper reaches but filled with water and thick black mud lower down. On this shelf grew nettles (*Urtica dioica*), primroses (*Primula vulgaris*) and harts'-tongue ferns (*Phyllitis scolopendrium*) and much lush grass. Above the flush rises a bank, three or four feet high, from which the wood, sloping gently upwards to the rim, is much drier and is clothed mainly with nettles. In all 18 species were found. The slope produced *Carychium minimum* Müller, *Oxychilus alliarius* (Miller), *Retinella* (*Aegopinella*) *nitidula* (Drapernaud), *Vitrea crystallina* Müller, *Discus rotundatus* and an occasional *Clausilia bidentata*. On the shelf large black specimens of *Arion ater* (L.) were found tucked under fern fronds with *C. bidentata*, *Ashfordia granulata* and *Lauria cylindracea* (da Costa), which also occurred on primrose leaves. On or under logs and dead leaves lived *Oxychilus cellarius* (Müller), *Cochlicopa minima* (Siemaschko) and the slugs

Agriolimax reticulatus (Müller), *Arion intermedius* Normand and *A. hortensis* Férussac. Miss Grigg recorded *Limax maximus* L. up to 35 feet high on trees. In the flush *Potamopyrgus jenkinsi* and a single specimen of *Pisidium casertanum* (Poli) were taken. The mud was slimy and evil-smelling and yet the molluscs, which were well-grown, seemed able to thrive in it.

HAYGARDHAY WOOD is quite different. The slopes on both sides are more gentle; the valley is wider compared with depth and the wood is much more open. On either side of the stream the valley floor is in the main bare or leaf-covered, with some patches of nettles, while the slopes are covered with long grass. There are many fallen trees and branches and a number of very large rhododendron bushes. This was the wood *par excellence* for slugs. *Limax maximus*, both the typical form and a beautiful variety, white with black spots, *Arion subfuscus* (Draparnaud) and *Agriolimax reticulatus* were abundant under logs. The brown form, var. *brunnea*, of *Arion ater* was also present. Mating trails of slugs, probably *L. maximus*, were seen up to ten feet high on the trunks of trees. These trails consisted of irregular areas of glittering mucus some five or six inches across with narrow mucus trails leading to and from the nuptual areas. The Zonitidae were well represented by *Oxychilus cellarius*, *O. alliarius;* all three species of *Retinella*—*R. nitidula*, *R.* (*Aegopinella*) *pura* (Alder) and *R.* (*Perpolita*) *radiatula* (Alder)—and, most significant of all, *Zonitoides excavatus* (Alder). *Discus rotundatus*, *Clausilia bidentata* and *Lauria cylindracea*, although present, were much less in evidence than in the other woods. *Carychium minimum* and *Pupilla muscorum* (L.) were also taken.

BLUE ANCHOR WOOD has very thick undergrowth, with many brambles and nettles, and is quite different from any of the other woods. It yielded sixteen species, being the only place where both species of *Cochlicopa* were found together. It was also the only locus for the slug *Arion circumscriptus* Johnston, a species frequently associated with gardens, and this may be accounted for by the presence of houses along the bottom of the wood. It was also the only wood in which *Hygromia* (*Trichia*) *striolata* (C. Pfeiffer) and the var. *grisea* of *Helix aspersa* (an unflecked yellowish form) lived. Additional species to the woodland fauna were *Hygromia* (*Trichia*) *hispida* (L.) and *Vitrina pellucida* (Müller).

POINT WOOD was notable for the number and large size of the hart's-tongue ferns. At the top of the wood near the road were brambles and nettles; lower down were the ferns with leaf litter between them, this being the home of many *Carychium minimum*. This paucity of ground flora probably accounts for this wood having the least number of species—thirteen. The fact that four species, *Cochlicopa lubrica* (Müller), *Helix aspersa*, *Hygromia hispida* and *Vitrina pellucida*, occur only in Blue Anchor and Point Woods and not in the other two may be because these two woods are separated only by a narrow road.

Four species were found in all four woods, *Lauria cylindracea*, *Clausilia bidentata*, *Discus rotundatus* and *Oxychilus alliarius*, while *Carychium minimum*, *O. cellarius* and *Retinella nitidula* were found in three. All these species will, however, live equally well in other habitats.

(2) *Hedgebanks*

There are few true hedges at Dale. Fields are divided by banks clothed with grass. Roadside banks are frequently grown with brambles and occasional

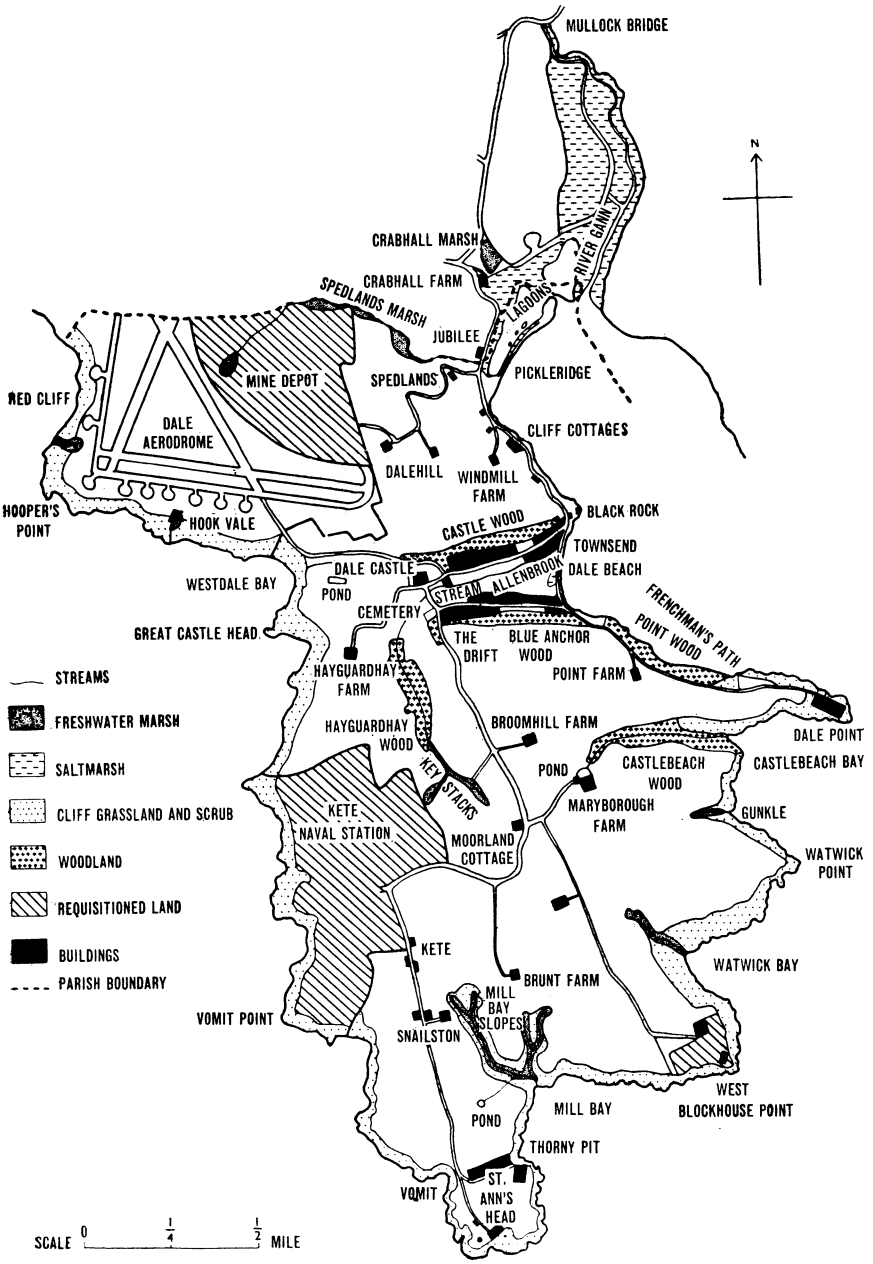

FIG. 1.
The Dale Peninsula—localities and habitats.

Table 1. *Distribution of non-marine Mollusca in the parish of Dale*

Mollusca	Castle Beach Wood	Haygardhay Wood	Blue Anchor Wood	Point Wood	Field hedgebank above Blue Anchor Wood	Hedgebanks at Snailston	Reeds by Kete Corner	Castle Beach	Dale Fort and environs	Walls, village cemetery	West Dale Bay, foot of cliffs	Quarry behind Dale Castle	Cliff top—West Dale Bay	Cliff tops—towards Marloes	Cliff tops—west of the Vomit	Mill Bay area	Castle Beach stream	Hook Vale stream	Haygardhay stream	Cattle pond—West Dale	Pond—Maryborough Farm	Gann—Mullock Bridge area	Marloes stream	Pickleridge marshes
Hydrobia ulvae (Pennant)	X																							
Potamopyrgus jenkinsi (Smith)	X																							
Carychium minimum (Müller)				X				X																
Leucophytia bidentata (Montagu)																								
Ovatella myosotis (Drap.)																								
Lymnaea truncatula (Müller)																					X			
Lymnaea peregra (Müller)																				X		X		
Physa fontinalis (L.)																X								
Planorbis spirorbis (L.)																								
Ancylus fluviatilis (Müller)																X								
Succinea putris (L.)																X								
Succinea pfeifferi Rossmässler																								
Cochlicopa lubrica (Müller)			X	X				X				X		X										
Cochlicopa minima (Siemaschko)	X	X	X					X			X													
Vertigo pygmaea (Drap.)									X	X														
Pupilla muscorum (L.)		X							X															
Lauria cylindracea		X	X	X				X							X									
Vallonia pulchella (Müller)													X											
Clausilia bidentata (Ström)	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X							
Helix nemoralis L.	X		X			X		X	X	X	X	X	X	X	X	X	X							
Helix aspersa Müller			X	X		X		X	X	X	X	X	X	X	X	X	X							
Hygromia striolata (C. Pfeiffer)			X	X		X		X	X	X	X	X	X	X	X	X	X							
Hygromia hispida (L.)			X	X		X		X	X	X	X	X	X	X	X	X	X							

	Monacha granulata (Alder)	Helicella caperata (Mont.)	Helicella virgata (da Costa)	Helicella itala (L.)	Discus rotundatus Müller	Arion intermedius Normand	Arion circumscriptus Johnston	Arion hortensis Férussac	Arion subfuscus (Drap.)	Arion ater (L.)	Vitrea crystallina Müller	Oxychilus draparnaldi (Beck)	Oxychilus cellarius (Müller)	Oxychilus alliarius (Miller)	Retinella radiatula (Alder)	Retinella pura (Alder)	Retinella nitidula (Drap.)	Zonitoides excavatus (Alder)	Vitrina pellucida (Müller)	Limax maximus L.	Agriolimax reticulatus Müller	Pisidium casertanum (Poli)	Pisidium personatum Malm
Pickleridge marshes																							
Marloes stream																							
Gann—Mullock Bridge area																							
Pond—Maryborough Farm																							
Cattle pond—West Dale																							
Haygardhay stream																							
Hook Vale stream																							
Castle Beach stream																							
Mill Bay area	X	X			X																X		
Cliff tops—west of the Vomit		X																					
Cliff tops—towards Marloes	X																						
Cliff top—West Dale Bay			X	X																			
Quarry behind Dale Castle	X				X							X					X						
West Dale Bay, foot of cliffs	X	X	X	X	X												X						
Walls, village cemetery					X					X			X	X					X				
Dale Fort and environs	X	X	X		X					X		X		X							X		
Castle Beach	X				X	X		X	X	X		X	X	X			X		X		X		
Reeds by Kete Corner	X				X					X		X					X				X		
Hedgebanks at Snailston	X	X			X																X		
Field hedgebank above Blue Anchor Wood																							
Point Wood	X				X	X		X			X			X					X				
Blue Anchor Wood	X				X		X				X		X	X			X		X				
Haygardhay Wood					X				X	X			X	X	X	X	X			X	X		
Castle Beach Wood	X				X	X		X		X	X		X	X			X			X	X	X	

blackthorn (*Prunus spinosa*). Such roadside banks were examined at Snailston: a place with such a name could not be overlooked. The most abundant snails on either side of the road were *Helix aspersa* and *H.* (*Cepaea*) *nemoralis* L., with *Agriolimax reticulatus* present in numbers. Deep in the herbage bordering the fields were *Hygromia hispida*, *Monacha granulata*, *Clausilia bidentata*, *Discus rotundatus* and *Helicella* (*Candidula*) *caperata* (Montagu) in small and varying numbers.

By the St. Ann's road, between Moorland Cottage and Kete Corner, the bank and ditch are thickly grown with reeds (*Phragmites communis*), yet the ground beneath was much less damp than might be expected. *Helix nemoralis* and *Arion ater* were found on the reeds, with *C. bidentata*, *M. granulata*, *D. rotundatus*, *Retinella nitidula*, *Agriolimax reticulatus* and, most unexpected, a fine specimen of *Oxychilus draparnaldi* (Beck).

Clumps of hogweed (*Heracleum sphondylium*) along the edges of fields yielded large, well-coloured specimens of *Helix aspersa* and *H. nemoralis*.

(3) *Cliff Tops*

The cliff tops investigated were notable rather for the absence of expected species than for those present. The small form *maritima* Jeffreys of *Helicella* (*Cernuella*) *virgata* (da Costa) is a very common coastal form in the west, yet despite the large areas of short-cropped turf it was surprisingly found only at West Dale. *Hygromia* (*Ponentina*) *subvirescens* (Bellamy), which is entirely south-western and maritime in distribution and has been found at St. Bride's Haven (Lloyd-Evans, 1960), was carefully searched for, but none was found.

In a small quarry west of the Vomit *Lauria cylindracea*, *Helix aspersa*, *H. nemoralis*, fine large specimens of *Helicella caperata* var. *ornata* and *Agriolimax reticulatus* were found in grass and under loose pieces of rock. *H. aspersa* and *H. nemoralis* lived in long grass at the cliff edge a mile to the westward, the shells being considerably weathered. On the cliff tops between West Dale Bay and Marloes *H. nemoralis*, *Monacha granulata* and *Cochlicopa lubrica* were found in large clumps of heather (*Calluna vulgaris*).

(4) *West Dale Bay*

On fifty yards of screes southwards from the bottom of the path ten species were found. The most abundant were *Helicella itala* (L.) and *Monacha granulata*. The former were fine large shells, and included the handsome form var. *leucozona*. Unbanded shells were entirely absent. *Helix nemoralis* was fairly common with large well-marked shells which included both yellows and pinks. Other species found were *Helix aspersa*, *Helicella virgata*, both banded and var. *lutescens*, *H. caperata*, *Clausilia bidentata*, *Cochlicopa minima*, *Discus rotundatus* and *Retinella nitidula*. Most of the snails were found among bird's foot trefoil (*Lotus corniculatus*) and kidney vetch (*Anthyllis vulneraria*), though several were under an ancient cigarette packet. North of the cliff path a few *Helix aspersa* and immature *Helicella itala* occurred amongst restharrow (*Ononis repens*). Shells of two of the former had been cracked completely across the body whorl and repaired. Considering that the cliff foot is regularly drenched in salt water during gales the abundance of snails is remarkable.

At the top of the cliff, immediately above, *H. virgata* was abundant near the

cliff edge on knapweed (*Centaurea nigra*). Both banded shells and var. *lutescens* were equally common and generally larger than those at the cliff foot. On the other hand, the few *H. itala* that lived there were smaller than those below, were less heavily banded, and higher spired with narrower umbilicus, approaching the form *charpentieri*.

Back from the cliff edge *H. aspersa* and *C. bidentata* were common on walls. On short sward on the cliff top to the north of the path to the beach *H. virgata* form *maritima* was abundant, and was more to be expected than the larger form. The presence of this species and of *H. itala* at West Dale Bay is discussed later.

(5) *Castle Beach*

At Castle Beach an area from just above high water mark to the lime kiln proved to be one of the most rewarding in Dale. Just above the beach grow nettles, hogweed and grass with a jumble of large moss-grown boulders higher up below the walls of the kiln, and from here twenty species were recorded. *Clausilia bidentata* occurred in profusion and *Monacha granulata* was almost as plentiful. Here again *Cochlicopa lubrica* and *C. minima* lived together and *Vertigo pygmaea* (Draparnaud) was discovered. Other species which occurred in varying numbers were *Lauria cylindracea*, *Helix aspersa*, *H. nemoralis*, *Hygromia hispida*, *Discus rotundatus*, *Arion intermedius*, *A. hortensis*, *A. subfuscus*, *A. ater* (black, grey and brown), *Oxychilus cellarius*, *O. alliarius*, *Retinella nitidula*, *Vitrina pellucida*, *Agriolimax reticulatus* and *O. draparnaldi* under boulders. Boycott (1934) writes, "*Hyalinia lucida* (= *O. draparnaldi*) . . . is wild only in Devon and Cornwall and possibly in Glamorgan. Elsewhere in Britain it lives along with man in and near gardens." The limekiln was last burnt before 1914, so that the Castle Beach record, taken with the find in the reed bed on the St. Ann's road, suggests that it also occurs wild in Pembrokeshire.

(6) *Mill Bay*

Despite its very few land snails, the small area above Mill Bay has a very interesting diversity of habitat. The sedges on the north-eastern side were carefully seached, but only *Monacha granulata* and *Discus rotundatus* were found. *Helix aspersa* and *H. nemoralis* lived on the sides of the gully of the stream just above the point where it debouches on to the beach. The most interesting find was *Succinea putris* (L.), both young in a clump of watercress (*Nasturtium officinale*) in the stream above the bridge and several adults on rocks below the waterfall. This species was found nowhere else in Dale. The identity was verified by dissection. Miss Grigg recorded *Physa fontinalis* (L.) for this stream, but it was not found in 1960.

(7) *Dale Fort*

On a damp evening snails are prominent within the Fort itself, and in all thirteen species have been found. Fine specimens of *Arion ater* crawled about on the lawns, and ivy on the rock faces abounded with *Helix aspersa* and *H. nemoralis*. *Oxychilus draparnaldi* was also found, in this case associated with man. Other species were *Pupilla muscorum*, *Clausilia bidentata*, *Helicella caperata* *Hygromia striolata*, *H. hispida*, *Monacha granulata*, *Discus rotundatus*, *Oxychilus*

alliarius and the ubiquitous slug *Agriolimax reticulatus*. *H. nemoralis* was also abundant with *H. aspersa* on the top of the Fort. The shells of the former are notable for two things, their thinness and their depth of colour; indeed, the richness of the colour of many of them is probably due to the passage of light through the translucent shells.

In *H. nemoralis* the majority of shells are banded, though self-colours are not infrequent. Banded shells usually have a ground colour of yellow or pink; in unbanded shells other colours occur. The banding of the shells is very variable. To facilitate description of these variations a formula has been devised (e.g. Goodhart, 1962). A typical shell has up to five dark bands on the body whorl and these are numbered 12345 as shown in Fig. 2. Two or more bands may be fused and these are indicated in parenthesis. Bands may also be absent, these being shown by a nought. In and around the Fort both yellow and pinks were present; absence of bands was more common than fusion of bands. There was a proportion of unbanded shells, and another common form had a single peripheral band, 00300. Only in the pinks were typical five-banded, 12345, shells found. In both colours there were shells having either the first two bands missing, 00345, or the first three, 00045. Other bandings were 10345, 023(45), 003(45), 00(345) and (12345) in which all the bands were fused.

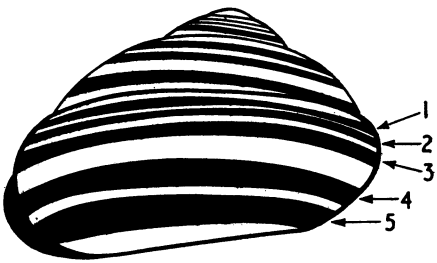

FIG. 2.

(8) *Quarry*

A small quarry on Watery Lane behind Dale Castle was noteworthy as the only place of its kind examined in Dale. Deeply overshadowed by trees, it contained large lumps of rock and much debris. Ten species were found there, and it was one of the few places in which *Hygromia striolata* occurred. Other species were *Clausilia bidentata*, *Cochlicopa lubrica*, *Helix aspersa*, *H. nemoralis*, *Hygromia hispida*, *Monacha granulata*, *Discus rotundatus*, *Oxychilus cellarius* and *Retinella nitidula*. Comparing this list with others above provides some idea of the diversity of places in which a single species of snail will live.

GENERAL REMARKS

Land Molluscs. In considering the land mollusca of any area, the availability of lime and shelter is of primary importance (Boycott, 1934). Shelter means not only places in which molluscs may hide to escape drought and cold and to lay their eggs, but also places with a high humidity, as moisture is essential to their well-being. While snails have a certain resistance to drought, e.g. by sealing the shell with an epiphragm in dry weather, this resistance is limited, and slugs have none at all. All molluscs dislike wind because of its drying effect, and in a windy place like Dale good shelter is particularly necessary even though the parish, with an average humidity exceeding 80% (Oliver, 1959), has a damp

atmosphere except in very exposed places. Dampness is necessary to a mollusc if it is to avoid dehydration: on it also depends the length of time available for feeding and breeding. It may be the prevalence of high winds and the lack of shelter on the cliffs at Dale, particularly on the short turf, which reduces the number of snails. The woods, on the other hand, are well sheltered and all are damp.

Boycott (*op. cit.*) considers the presence or absence of lime to be the most important factor in the distribution of mollusca. He gives *Pomatias elegans* (Müller) as "our clearest obligatory calcicole . . . which is never found except on highly calcareous soil", while at the opposite extreme he puts *Zonitoides excavatus* as "our only species which is definitely calcifuge". Between these extremes he has several groups requiring more or less lime. It is interesting to compare the snails found at Dale with these groups. The presence of the calcifuge *Z. excavatus*, which is a woodland species, in Haygardhay Wood is probably accounted for by the boulder clay in and above the wood. Indeed, generally speaking the whole parish is more or less acid, so that the presence of certain calcicole species needs explanation.

In addition to *Pomatias elegans*, which does not occur at Dale, Boycott lists eight further species as obligatory calcicoles "though they do not need such highly calcareous soil as *P. elegans*". Of these eight, *Helicella virgata* and *H. itala* live at West Dale Bay. While the former occurs in some numbers both at the top and bottom of the cliff, the latter is a rarity at the top, though plentiful at the bottom. The site on the screes at the bottom is not very far above high water mark and is, as has been said already, frequently saturated with salt. Undoubtedly over the years sand has been blown from the shore or has been carried there by the waves. Sea sand is frequently rich in calcium, due to broken fragments of shells, and thus a lime rich habitat would have been created. Across the Bristol Channel at Woolacombe in North Devon *H. virgata* lives in thousands on the grassed sand dunes. Some windblown sand has certainly reached the top of the cliff at West Dale. North of the path *H. virgata* form *maritima* lives in short turf. At St. Ann's Head *H. virgata* was not found; the cliffs are higher and there is no sand at the bottom.

Of the eleven British species said by Boycott (*op. cit.*) to be "nearly always found in calcareous places" and "all more or less southern or maritime in distribution" four are found at Dale: *Helicella caperata*, *Hygromia striolata*, *Helix aspersa* and *Pupilla muscorum*. *H. aspersa* is common and abundant, but the shells tend to be thin owing to lack of calcium. It is a species most frequently associated with man and this may account for its widespread distribution at Dale. The other three species are small or very small, and in any case, though well scattered, are very few in numbers.

There follows in Boycott's paper a list of sixteen species "which prefer a calcareous habitat . . . but are also found sometimes, and generally in small numbers, in non-calcareous places". Seven of these have been found at Dale: *Carychium minimum*, *Lauria cylindracea*, *Vallonia pulchella* (Müller), *Helix nemoralis*, *Hygromia hispida*, *Oxychilus cellarius* and *Retinella pura*. Miss Grigg recorded a single specimen of *V. pulchella* in 1950. *C. minimum*, which is very small, lives in two of the woods (a usual habitat) and at Castle Beach. It is not common and has to be searched for, whereas in a beechwood on chalk in Hertfordshire it has

been found in great numbers under leaves. *H. hispida* has a wide distribution in Dale, including even the salt marsh at Pickleridge, but like all except *H. nemoralis* the numbers were small. This last species is the most interesting. It was as widely scattered as *H. aspersa*, and indeed frequently lived with it. However its numbers were not as great except in three loci. At West Dale Bay it lived on the screes with *Helicella virgata* and *H. itala*, and the thick opaque shells confirm the presence of lime there. It was also found abundantly on hogweed above Blue Anchor Wood and, as has already been mentioned, in and around Dale Fort. In both these loci the shells were thin, indicating non-calcareous habitats. Its cogenor, *Helix* (*Cepaea*) *hortensis* Müller, appears to be absent from the area.

The rest of the snails found at Dale are said by Boycott to be "indifferent to lime in the sense that they may occur freely in both acid and calcareous loci".

The distribution of *Hygromia granulata* at Dale is unusual. In the south and east of England it is found only in very damp, often wet, places—in marshes, by streams and rivers, frequently right down to the water's edge. In September, 1963 it was found in Hertfordshire under reed trash at the bottom of a nearly dry lake. In such places it is often colonial. In the west, however, where it extends from Devon and Cornwall into Scotland, it is often found in dry hedgerows, living with xerophiles. Boycott includes it in a list of snails which do not live in woods. At Dale it lives in every sort of place, including three of the four woods investigated. In all three it was abundant. In Castle Beach Wood it inhabits the wettest parts, and, of course, the humidity is high in the others. It lives in hedgerows at Snailston, in the reed bed on the St. Ann's road, sedge beds at Mill Bay and is frequent around the Fort. It is abundant in the salt-drenched habitat at West Dale Bay, lives in the quarry behind Dale Castle and was found in clumps of heather on the cliffs towards Marloes, as dry a habitat as could be found in the area.

Clausilia bidentata has much the same distribution, although it was not found on cliff tops, except at West Dale Bay, where it occurred on stone walls, a favourite habitat at Malham in Yorkshire. In one or two places it was the most abundant snail.

Freshwater Molluscs. The number of freshwater habitats in the Dale area is very limited. The River Gann is fresh above Mullock Bridge, and from that part of the river *Potamopyrgus jenkinsi*, *Lymnaea* (*Radix*) *peregra* (Müller) and *Planorbis spirorbis* have been recorded.

The stream running into Castle Beach contained *P. jenkinsi* and *Ancylus fluviatilis* Müller, but these lived only in a small area between the shingle and the wood. The latter sits on stones, as does the former when there is no aquatic vegetation, and there are few or no stones above this point and no vegetation at all. These two species also occurred together in great profusion on stones at the lower part of the Mill Bay stream, extending right down to the shingle at the top of the beach. Higher up *P. jenkinsi* was found in the weed, as well as on stones with *A. fluviatilis*. *P. jenkinsi* and *A. fluviatilis* also lived together on stones in the Haygardhay stream where it issues from the wood, but did not extend as far as the road, where *Lymnaea peregra* was found. *P. jenkinsi* lived alone in the Hook Vale stream and in the stream running into the south end of the Pickleridge lagoons. Others have recorded *Succinea pfeifferi* Rossmässler in a Marloes

stream with *A. fluviatilis*. As the Succineidae can only be satisfactorily identified by dissection, this record needs confirmation.

Ponds are few, and include those at Maryborough Farm, the waters of which are used for irrigation, and the cattle pond at West Dale Bay. *Lymnaea peregra* has been recorded from the latter for many years, in spite of the poorness of the locus. In 1960 the water was scarce and foul, but snails were plentiful and in good condition. In 1963 they could be seen only as small lumps beneath the duckweed. The only vegetation in the Maryborough ponds was floating grass growing round the edges. This was teeming with *Potamopyrgus jenkinsi*, over 250 being taken in the first dip with a five-inch scoop. *Planorbis spirorbis* was present in fair numbers with a few *Lymnaea* (*Galba*) *truncatula* (Müller). At the very edge of the pond *Pisidium casertanum* and *P. personatum* Malm were taken, the former being the more plentiful. *L. truncatula* was much more abundant in marshy ground on the other side of the road, this being a more usual habitat. It will be interesting to see if *P. jenkinsi* persists in such numbers in the pond. This species is very unpredictable, often occurring in great profusion one year and difficult to find at all the following year.

Brackish Water Molluscs. The Pickleridge lagoon area provides some interesting species. The lagoons and drains are flooded by the sea at spring tides, so that the salinity must be fairly high and can vary little. *Leucophytia bidentata* lives sparingly under stones round the lagoons with *Littorina saxatilis jugosa* (Montagu). It also occurs in similar situations in the Gann estuary and at Slip Pier Beach. Both in 1960 and 1963 hundreds of small bivalve shells, up to an inch long, were found washed up all round the lagoons, many having the dead animals still in them. They proved to be young *Mya arenaria* L., adults of which live in the Gann estuary to within 600 yards of Mullock Bridge.

When visited in 1960 and 1963 the drains and salt pans at the southern end were dry or nearly dry. *Hydrobia ulvae* was found in some numbers on the mud. Miss J. Royston said that she had found *Ovatella myosotis* (Drap.) in 1962 on sea purslane (*Halimione portulacoides*) and in July, 1963 on thrift (*Armeria maritima*). In August it was found at the roots of sea arrowgrass (*Triglochin maritimum*) along the sides of the drains. Numbers were small, in contrast to similar situations at Southwold, Suffolk, where it was found in vast numbers in 1962.

A little further north *H. ulvae* was found in a rather stony drain with *Potamopyrgus jenkinsi* and *L. saxatilis jugosa*. The occurrence of *P. jenkinsi* in a salt drain is of particular interest. Until the end of the nineteenth century this small snail was confined to brackish water in the south-east of England. Since 1893 it has spread all over England, Wales, Ireland and parts of Scotland in fresh water. One of the reasons for this rapid spread is that this snail is parthenogenetic. At the northern end of the salt marshes *H. ulvae* lives in drains and salt pans in vast numbers, many growing up to 10 mm. in length. It also lives along the Gann stream from 400 yards below Mullock Bridge, where occur such marine species as *Mya arenaria*, *Scrobicularia plana* (da Costa) and *Cardium edule* L.

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APPENDIX

IDENTIFICATION

There is no standard work covering all the British non-marine molluscs. *British Snails*, A. E. Ellis, 1926, is out of print and difficult to obtain.

The following recent works are readily available. All are illustrated.

A Key to the Land Snails of the Flatford Area, Suffolk, J. E. Morton and J. Machin, 1959, Field Studies, Vol. 1 (1). Price 1s. 10d.

A Key to the British Fresh- and Brackish-water Gastropods, T. T. Macan and R. Douglas Cooper, 1949. Freshwater Biological Association, Ferry House, Far Sawrey, Westmorland. Price 2s.

Slugs, H. E. Quick, 1949. Synopses of the British Fauna, No. 8. Linnean Society of London, Burlington House, Piccadilly, W.1. Price 2s. 6d.

British Slugs, H. E. Quick, 1960. Bulletin of the British Museum (Natural History), Vol. 6, No. 3. Price 40s.

British Freshwater Bivalve Molluscs, A. E. Ellis, 1962. Synopses of the British Fauna, No. 13, Linnean Society of London. Price 20s.