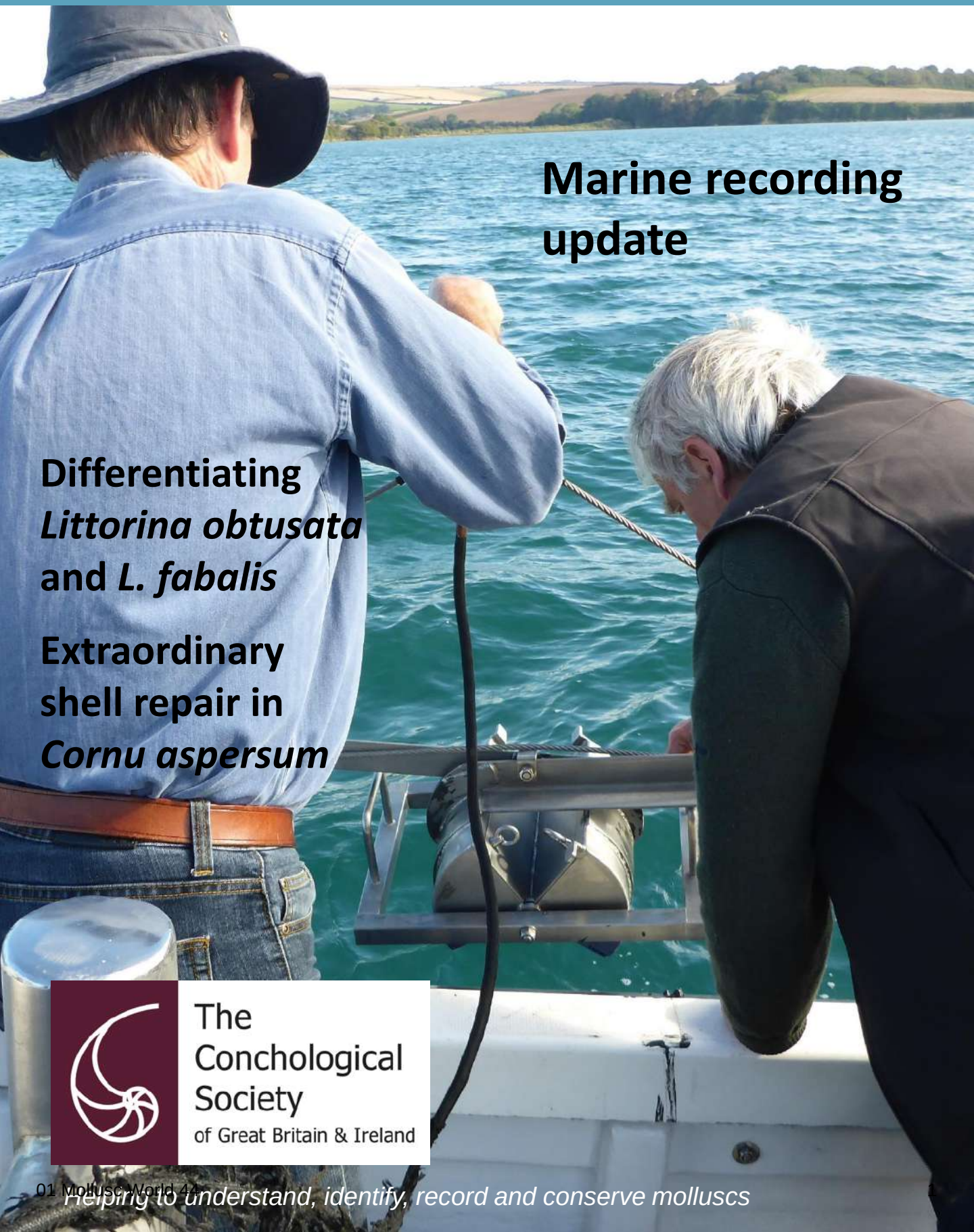
Mollusc World

July 2017 • Issue 44



Marine recording update

Differentiating *Littorina obtusata* and *L. fabalis*

Extraordinary shell repair in *Cornu aspersum*

The Conchological Society of Great Britain & Ireland

Helping to understand, identify, record and conserve molluscs

From the Hon. Editor

This issue begins with an article by Ian Smith, the result of much meticulous work, on ways to differentiate two very similar species of our intertidal *Littorina* periwinkles. Those interested in marine molluscs will hopefully agree that the extra space allocated for this important article has been very much justified.

In a world which seems to draw ever increasingly on our time and resources, it is often difficult to commit to voluntary work for Societies such as ours. I would encourage any of you who may have given a thought about helping to resolve our need for a Treasurer (see issue 43), to contact our current Hon. Treasurer Nick Light (his contact details are on page 31). You may also have noticed that our web site suffered a temporary downtime earlier this year; we are very thankful to Steve Wilkinson in helping to resolve this. Due to other pressures Steve has had to step down as our Webmaster and so we are now looking at ways to move our website forward – any suggestions on this would be welcome.

It has been brought to my attention that belated congratulations are due to our member Robert Burn of Australia, for the award of the OAM in the 2016 Queen's birthday honours, for 'For service to marine science, particularly in the field of malacology.'

On a sad note, we have to record the death earlier this year of Stella Turk, past Hon. President and Marine Recorder and co-founder with her husband Frank of the 'Cornish Biological Record Unit'. An obituary appeared in the Times and is currently available online[1]. Anna Holmes is appealing to members for any memories and stories of Stella for a planned tribute in the *Journal of Conchology* (to contact Anna, see page 31). The deaths of two other long-serving members of the Society, Elizabeth Platts and Hugh Ingram were also reported.

In a news item, recent work by Charlotte Underwood and colleagues at the University of Exeter and the Plymouth Marine Laboratory[2] has shown that dog whelks (*Nucella lapillus*) living in coastal areas affected by artificial lighting increase their time spent foraging, and decrease the time seeking refuge from predators. The authors concluded that such a change in behaviour may have multiple effects – affecting the numbers of their prey but also increasing their own risk of being caught by their predators.

Due to space constraints in this issue, the reports from our Hon. Conservation Officer and Hon. Non-Marine Recorder will appear in the November issue.

Peter Topley

[1]https://www.thetimes.co.uk/article/stella-turk-qsxfbrfm3. (see also: Light, J. (2003) Mollusc World issue 3, 16−17 & 20)

[2]Underwood, C., Davies, T.W., Quierós, A.M. (2017) Artificial light at night alters trophic interactions of intertidal invertebrates. *J. Animal Ecol.* http://onlinelibrary.wiley.com/doi/10.1111/1365-2656.12670/full

Mollusc World

This magazine is intended as a medium for communication between Conchological Society members (and subscribers) on all aspects of molluscs, in addition to the material found on our web site where a number of back copies are available for viewing. Mollusc World will also be of interest to all those enquiring about this subject or the work of the Society.

We welcome all contributions in whatever form they arrive (see page 31 for further details).

Contents

The Conchological Society of Great Britain & Ireland

ISSN 1740–1070

All photographs and drawings featured in articles are by the author unless otherwise indicated. Printed by Short Run Press, Exeter, EX2 7LW.

No representation is made about the accuracy of information included in any articles, which solely constitute the authors' personal views on the subjects covered, and are not necessarily those of the Hon. Editor or the Conchological Society.

Front Cover: Nick Light and Bas Payne lowering the Conchological Society's Van Veen grab sampler from a boat in Salcombe Sound, Devon (June 2016) to collect sediment samples for marine mollusc recording. (photo: Peter Topley)

Differentiating *Littorina obtusata* sensu stricto (Linnaeus, 1758) from *Littorina fabalis* (Turton, 1825)[1]

Ian F. Smith[2]

Abstract
Adult males of *Littorina obtusata* sensu stricto and *L. fabalis* (synonym *L. mariae*) can be reliably differentiated by the forms of the penes on both extracted dead specimens and unsedated intact animals. Differentiation can often be made within a local population on the basis of shell form, size and colour after these features have been correlated with penis forms in a sample of specimens. The shell features can then be used to identify further local specimens, but cannot be relied on at other localities without confirming penis forms there.
Materials, methods, protocols for acquiring experience, environmental associations of phenotypes and some sample sites are described and illustrated.

Contents

1. Preliminary check

Lacuna pallidula has a similar low spire, very similar spawn, and occurs with *L. fabalis* on Fucus serratus. It has a much thinner shell with widely open umbilicus, contrasting with the thick columella of *L. fabalis*. A detailed species account is on Flickr at flic.kr/p/hTnxJa.

2. Taxonomic history of *L. obtusata* and *L. fabalis*.

1758 to 1914: multiple species and varieties named.

1915 to 1965: all species, except Arctic varieties with spires, combined into one species referred to as *Littorina obtusata* (Linnaeus, 1758) or, mainly by British workers, as *L. littoralis,* auct. (figure 1).

1966 to 1988: gradual acceptance of two species, based on penis differences, named *L. obtusata* sensu stricto (Linnaeus, 1758) and *L. fabalis* (Turton, 1825), synonym *L. mariae* Sacchi & Rastelli, 1966. Arctic varieties with pointed spires were included in one or other of the pair on the basis of their penes.

In the following account, any use of '*L. obtusata*' in the now unaccepted sense of including both species has 'sensu lato' or 's.l.' after it. The name with no addition, or sometimes for emphasis with 'sensu stricto' or "s.s.", refers to the now accepted segregated sense.

figure 1: *Theodoxus fluviatilis* (Linnaeus, 1758).
Brackish loch, Orkney. Leg. S. Taylor. The name of a brackish form of this species, littoralis, was mistakenly used in Britain for *L. obtusata* s.l. until the late 20th Century.

3. Identification resources

Differentiation of the two species by penis form was first published in 1966 by Sacchi & Rastelli, but did not appear in many identification guides until the late 1980s. Consequently, most pre-1988 works, apart from post 1966 specialist papers, are of limited use. Some later publications, such as Graham (1988), recognise the two species but provide insufficient information and images for discrimination of the many phenotypes. Hayward & Ryland (1990) and Hayward & Ryland (1995 & reprints to 2009), have images that confuse as the only *L. mariae* shell illustrated has features frequent on juveniles of both species, and the *L. obtusata* image has thick aperture walls more typical of *L. fabalis*. Williams (1990) has useful information on forms and ecology. The authoritative volume *Systematics and evolution of Littorina* by Reid (1996) has fifty A4 pages of detailed description and comparison of all phenotypes and geographical variations of these two species. It is essential reading for those undertaking scientific study of *Littorina* species.

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[1]An online version of this article is available at https://flic.kr/s/aHskPGCpTE . It has larger versions of the images with more detailed captions, and external links to other images and PDFs of some of the references.

[2] Contact: iwanfsmith@gmail.com

4. Penis examination

'...only the characters of the adult reproductive system are unequivocal... . ...identifications using [shell features] should be confirmed by dissection before routine application in the field' (Reid, 1996). A rare ambiguity in penes linked to hybridization has been reported at one site in Portugal (Carvalho et al., 2016). An obvious penis, positioned at the posterior of the head on the right side (figure 2), is present on mature males in all seasons, and can be exposed on dead or living specimens.

figure 2*: Littorina fabalis*, male. Shell height 12.5 mm. A large, obvious penis is at the posterior right of the head.

Dead material

Specimens can be killed instantly by plunging into boiling water, or by leaving in a freezer overnight, or by gradually adding Magnesium chloride or Magnesium sulphate crystals to the water in a small container to first anaesthetize and then kill them. The only dissection required is to carefully crush the shell in a tabletop vice with any rubber protectors removed (figure 3), avoiding damage to the soft parts, and to pick off the broken fragments. This method allows unrestricted view of all the necessary details and is quick and reliable, but requires killing of the specimen and destruction of the shell. Alternatively, if boiled for several minutes, the animal can be extracted with a pin from the unbroken shell. Though the penis as a whole is likely to contract on death, especially if boiled, and will be fixed in one of several possible expansions and positions (figure 4), its glands are often distended and more easily discerned, and it is likely to resemble published images of dead specimens.

figure 3: Table-top vice suitable for controlled breaking of shells without crushing the soft parts.

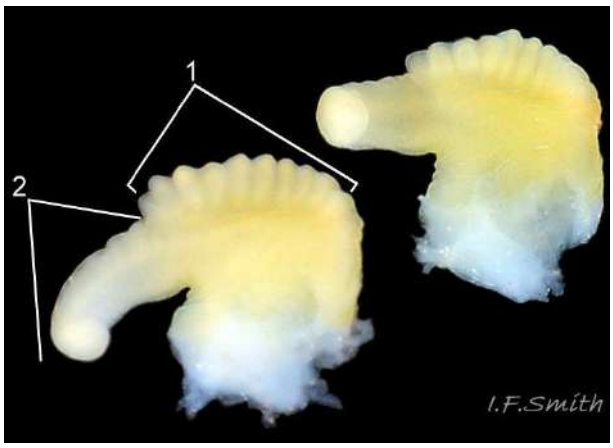

figure 4: Dissected penis from *L. fabalis*. Shell height 9.5 mm. Swanage, Dorset. **1**: ten large mamilliform glands (range 3 – 17). **2**: vermiform filament (contorted).

Living unsedated specimens

Penes can be examined and photographed on live specimens without harm or anaesthesia using the techniques described in Smith (2012 & 2016). While live, the penis can be held in a variety of positions (figure 5) and will often be generally more expanded than on dead material, but the glands are often less prominent than on dissected penes and frequently hidden when held against the body.

figure 5: Four images of the same individual *L. fabalis*. While live, the penis can be held in a variety of positions. The four views show the vermiform filament (glandless tip) variously as 38%, 43%, 30% and 50% of total length of penis; all within the limits for *L. fabalis* of 30% to >60% .

Time and patience will be required as this pair of species may be reluctant to extend from their shells, and several views or images may be needed to accumulate the necessary detail. Best results are obtained if the examination can be within 48 hours of capture.
When not being examined, keep in a refrigerator at about 6°C in tightly closed plastic boxes dampened by, but not awash with, seawater. *L. fabalis* will extend when immersed and restrained (figure 7) as described in Smith (2012 & 2016), but *L. obtusata* s.s. exposes itself more readily when damp than when submerged (figures 8 and 9).

figure 7: Submerged unsedated male *L. fabalis,* shell height 12.5 mm, restrained with aperture facing up. **1**: vermiform filament 42% of penis length. **2**: single row of 14 large mamilliform glands along 58% of penis length.

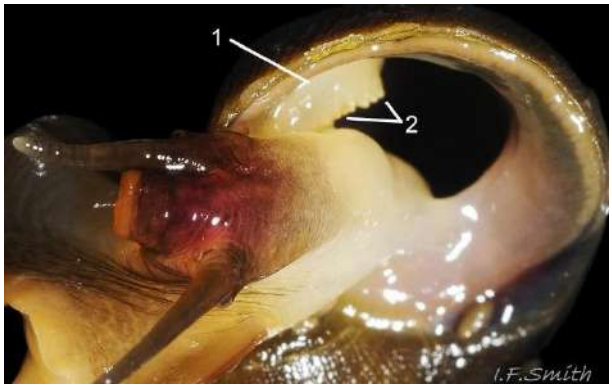

figure 8: Restrained *L. obtusata* in air. The penis (**1**) is adhering to the shell, revealing the numerous small mamilliform glands (**2**) that are concealed when the penis is held against the body.

figure 9: Restrained *L. obtusata* in air. Shell height 10.5 mm. Closely packed mamilliform glands (**1**) along 83% of length of penis, mostly hidden but visible on a small stretch (**2**). Short, stout, triangular filament (**3**) is 17% of length of penis.

5. Differences in penis morphology

Mamilliform penial glands

L. fabalis has 3 to 17 large glands in a single row along 40% to 70% of the ventral edge of its penis (figure 10). The glands are usually visible on live unsedated specimens (figure 7).
L. obtusata has 10 to 54 closely packed small glands, in one or more irregular rows along 75% to 90% of the length of its penis (figure 10) near its ventral edge and on the mesial face usually held against the body (figure 9) ; sometimes multiple rows occupy 60% of the width of the penis. The small glands often do not protrude into view on live unsedated specimens unless the penis is twisted to expose the proximal face (figure 11).

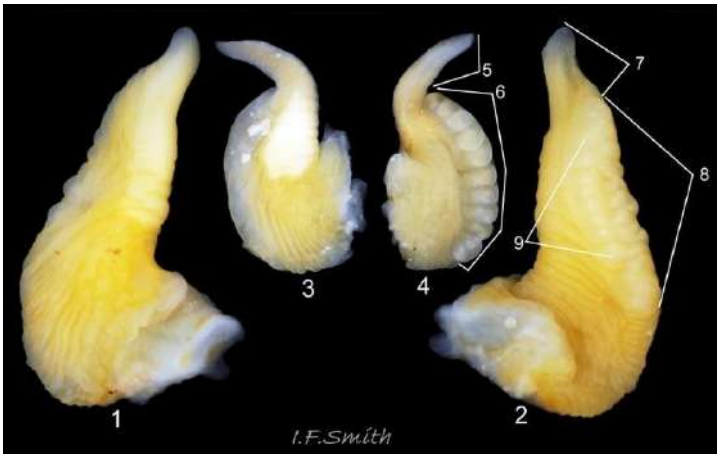

figure 10: Dissected penes. **3** & **4**: *L. fabalis;* mesial face (**4**) with vermiform filament (**5**) 36% of penis length, and single row of 10 large mamilliform glands (**6**).
1 & **2** *L. obtusata,* mesial face (**2**) with triangular filament (**7**) 19% of penis length, and two irregular rows (**8** & **9**) of 12 and 8 indistinct, small, whitish, mamilliform glands.

figure 11: *L. obtusata*. Shell height 12.9 mm. Penis fallen away from body and twisted, so exposing many small mamilliform glands (**1**), enabling limit (**2**) of short, stout, triangular filament (**3**) to be discerned to confirm *L. obtusata* identification.

Filament (glandless tip of penis).
On *L. fabalis*, the filament is long and vermiform. On dead or anaesthetized specimens it is 30% to >60% of the total length of the penis (figure 10). Growth is allometric; small individuals frequently have filaments 30% to 40%, while the largest usually have filaments of 50% to >60% of penis length (figure 6).

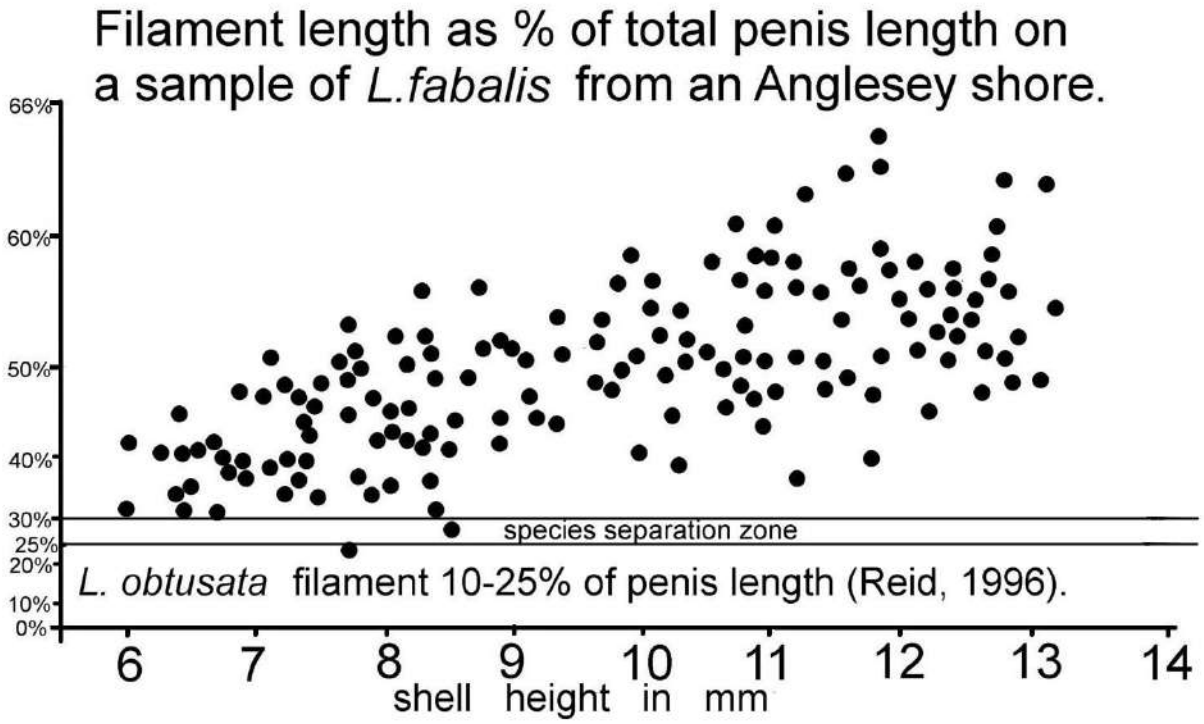

figure 6: With only two exceptions, these *L. fabalis*, despite allometric growth, fit the accepted limits of filament length, 30% to over 60% of penis length, and are distinct from *L. obtusata,* filament 10% to 25% of penis length. (Adapted from figure 4 in Reimchen, T.E. (1981). See figure 53 for different definitions of 'height').

The penis is motile and varies in length on any individual unsedated specimen (figure 5), and the appearance is affected by positioning/angle of view, so it is advisable to take several observations or photographs when examining live specimens.
On *L. obtusata*, the filament is short and triangular. On dead or anaesthetized specimens it is 10% to 25% of the total length of the penis (figure 10) . On live unsedated specimens it may be difficult to discern the precise limit (distal gland) of the filament because the small glands are hidden. However, being short, wide and triangular, it is obviously different (figures 12 and 13) from the vermiform filament of *L. fabalis*.

figure 12: *L. obtusata*. Shell height 12.9 mm. The glands on the mesial face of the penis are hidden against the body, but it is obvious that the end of the penis (**1**) is triangular rather than vermiform, so it is *L. obtusata* and not *L. fabalis*.

figure 13: *L. obtusata*. Shell height 10.5 mm. Most diagnostic features are hidden, but the fat swollen end of the penis (**1**) is not a slender vermiform filament, so it is not *L. fabalis*.

Size of penis depends on the size of the individual male and is not diagnostic of species. On the sheltered Menai Strait, most adult male *L. obtusata* are larger, and so have larger penes, than most male *L. fabalis* . On more exposed shores in North Wales, the sizes of the two species can be almost equal.

6. Difference in female anatomy
The **copulatory bursa**, requires skilled dissection and cannot be examined without killing. It is not illustrated here, see Reid (1996) for details and diagrams.
L. fabalis; half length of jelly gland, not reaching capsule gland.
L. obtusata; extends full length of jelly gland to capsule gland.

The **ovipositor** can be observed on live females restrained as described in Smith (2012 & 2016). Goodwin & Fish (1977) stated that, in 99% of cases examined by them in Wales, its colour is "to varying degrees black pigmented" on *L. obtusata* (figure 14) , while *L. fabalis* "lacks pigmentation" (figure 15) , but this was not my experience in Wales (figure 16) , and Reid (1996) also found it not always so . The colour is often lost on preserved specimens as the surface frequently sloughs off.

To identify females without dissection, the shell forms and shore zone of each species on the same shore need to be ascertained by examination of some penes on males. This information can also be used to find if local ovipositor colours conform with Goodwin and Fish (1977).

figure 14. Shell height 12.6 mm. The ovipositor on this *L. obtusata* female is pigmentless at the posterior (**1**) shading forwards through yellow and orange to dark brown at the anterior (**2**). It does not fit well the 'to varying degrees black pigmented' description by Goodwin & Fish (1977).

figure 15. Shell height 14 mm. The ovipositor on this *L. fabalis* female is pigmentless (**1**) so it matches the 'lacks pigmentation' description by Goodwin & Fish (1977) except for a small patch of yellow at the anterior (**2**). But ovipositor colour is unreliable for identification (Reid, 1996).

7. Differences in shell morphology and colour

No single shell feature is diagnostic in all situations, and some features intergrade. When several features are considered in combination with habitat detail, it is often possible to give a probable identification, but, for certainty, confirmation by examination of penes is required. Some shores, such as in Denmark and from Kent to Dorset, have problematic shell forms, so penis examination is especially necessary (Reid, 1996).

Correlations, validated by penis examination, of species with shell form and colour on specific shores can be found in published previous studies, but should be used with caution as shell form may vary on different parts of the same shore (Reimchen, 1981) and may change from year to year with variation in the climate. Shells of Arctic and subarctic populations differ from those south of the Lofoten Islands; they are less well known and are excluded from this account except where specifically mentioned; further detail in Reid (1996).

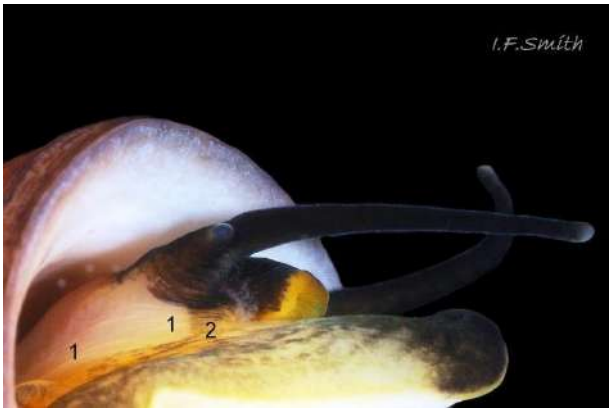

figure 16: Shell height 13.3 mm. Although much of the ovipositor on this *L. fabalis* is pigmentless (**1**) it has some black pigment at the anterior (**2**) which Goodwin & Fish (1977) thought indicated *L. obtusata*.

7a. Shell colours of both species are often classified with the terms below; percentages are of specimens in a large collection of a mixture of both species from across Britain (Smith, 1976, in Reid, 1996). Some authors give slightly different interpretations of a colour term for each species, and it can be difficult to define the limits of fusca, brownish olivacea and faintly marked dark reticulata. Colours are best viewed on live specimens in water as the shell and the periostracum, which often contributes to the colour, erode and fade readily on dead shells (figure 17) .

figure 17: Shell height 7 mm. The same *L. fabalis* specimen live, and weathered after death. Early spire (**1**) preserves juvenile white form that mimics a spirorbid worm case. Much colour is in the periostracum which, when weathered, may fade and peel off (**2**).

Olivacea: 55%. Exterior olive green (figure 18) to olive brown (figure 19), interior often purplish to brownish. Usually the commonest colour form, and almost diagnostic, of *L. obtusata* on shores well sheltered from waves. An algal coating on *L. fabalis* (figure 20) may confuse unless scraped off; true olivacea *L. fabalis* are extremely rare or absent in Britain, but they do exist in at least two places in Galicia, Spain on Zostera.

figure 18: *L. obtusata*. Shell height 16.1 mm. Spire a raised dome. Leg. S. Taylor. Olive green shade of olivacea colour form. Olivacea colouration is almost diagnostic of *L. obtusata* on sheltered shores as it is very rare or absent on *L. fabalis* in Britain.

figure 19: *L. obtusata* (det. by penes) found together on *Ascophyllum nodosum* on a sheltered shore. **1**: receptacle of *Ascophyllum*. **2**: receptacle grazed by *L. obtusata*. **3**: air vesicle of *Ascophyllum*. **4**: olivacea specimen, shade matches *Ascophyllum* in water. **5**: fusca specimen, shade matches dry *Ascophyllum* . Purple or brownish shell interior is frequent on olivacea specimens. **6**: olivacea specimen with green alga , shade resembles receptacle. **7**: citrina colour form, also on nearly all *L. fabalis* on the same shore, but this is much larger than any of them. **8**: citrina juvenile *L. obtusata* is same size as adult citrina *L. fabalis* on the same shore, but distinguished as on *Ascophyllum* and has juvenile thin, spouted lip that doesn't constrict aperture, while adult *L. fabalis* on this shore have thick lips and a constricted aperture.

figure 20: Citrina *L. fabalis* with a coating of algae that could be mistaken for olivacea colour form that is usually confined to *L. obtusata* in Britain. White initial whorls resembling spirorbid case are of the white early juvenile stage.

Reticulata: 33%. Exterior yellow to brown with darker reticulate (figure 21) , chequered (figure 22) or zig zag (figure 23) pattern; interior varied, can be white (figure 21) , sometimes tinted pink or violet, and sometimes with the exterior pattern showing near the rim within the aperture (figure 24) . Usually the commonest colour form of both species on shores exposed to wave action.

figure 21: *L. fabalis*. Height 13.3 mm. Reticulata colour form. Other reticulata variants are chequered and zig zag. White interior can be tinted pink or violet. Usually the commonest colour form of both species on semi exposed shores.

figure 22: *L. fabalis*. Height 6.6 mm. Reticulata colour form; orange brown with darker chequered pattern. Also reticulate, or zig zag.

figure 23: *L. fabalis*. Height 6.6 mm. Reticulata colour form; light brown with darker zig zag pattern. Also chequered and reticulate. The pure white initial whorls are the surviving white juvenile whorls found frequently, but not always, on *L. fabalis* of most colour forms.

figure 24: *L. fabalis*. Height 11.8 mm. Shell interior of reticulata colour form tinted violet with exterior pattern showing within the aperture near the rim.

Citrina: 10%. Exterior yellow (figure 25) grading to white; interior white (fugure 26). Usually the commonest colour of *L. fabalis* on shores well sheltered from waves, but not diagnostic as it also occurs on *L. obtusata* (figure 27) on the same shores.

figure 25: *L. fabalis*. Citrina colour form.

figure 26: *L. fabalis*. Citrina colour form; exterior yellow; interior white.

Figure 27: *L. obtusata*. Citrina colour form; exterior yellow, interior white. Usually the commonest colour of *L. fabalis* on sheltered shores, but not diagnostic as it also occurs commonly on *L. obtusata*, such as this, on the same shores.

Fusca: dark brown to black on *L. obtusata* (figure 19 [5]) dark chestnut brown on *L. fabalis* (Reid, 1996). Rare, generally less than 1%, but 100% of sample of 14 *L. obtusata* s.l. from a site on brackish Isefjord, Denmark (Rasmussen, 1973). A sample of 8 thin shelled, dwarf, *L. fabalis* from exposed cliffs near Aberdeen all appear to be form fusca, but the specimens, in figure 28, were photographed 45 years after death, so the colour may have changed.

figure 28: *L. fabalis* dwarf form; heights 4 mm to 5.5 mm from exposed cliffs, Scotland. Other views of same shells in figures 43 & 51.

Each of following less than 1%.
Aurantia: orange (figure 29)
Rubens: red or brick red (figure 30).
Inversicolor: two broad dark bands (figure 31).
Zonata: single pale band around periphery ("equator") of bodywhorl (figure 33, right specimen).
Alternata: two pale bands. (figure 33, left specimen).

figure 29: Shell height 15.7 mm. Leg. S. Taylor. Aurantia (orange) colour form of *L. obtusata*; identification confirmed by penis.

figure 30: Rubens (red or brick red) colour form on *L. fabalis;* identification confirmed by penis. Rubens form is rare; this was the only one seen among hundreds of citrina *L. fabalis*.

figure 31: Shell height 3. 5mm. Inversicolor (two broad dark bands) colour form. Species uncertain, probably *L. obtusata* as two distinct sets of juveniles on the shore, and this was in the set of larger ones (see figure 32).

figure 32: Shell heights 1.5 mm to 1.7 mm. Reticulata colour form. Species uncertain, probably *L. fabalis* as two distinct sets of juveniles on the shore, and these were in the set of smaller ones (see figure 31).

figure 33. Shell heights 12.7 mm and 14.2 mm. Leg. S. Taylor. On left, alternata (two pale bands), and, on right, zonata (single pale band around periphery of bodywhorl). Penes not checked as collected dead; *L. obtusata* seems the most likely.

On some shores, juvenile *L. fabalis* up to 4 mm diameter are pure white resembling the 3.5 mm diameter spiral tubes of spirorbid worms living on the fronds of *Fucus serratus* frequented by *L. fabalis*. With later growth of another colour, the juvenile shell is preserved as a **pure white early spire** (figures 23 and 34). Care is required as the spire of *L. obtusata* is often eroded to dingy whitish, though careful examination will often show traces of the eroded colour (figure 35). And populations of *L. fabalis* lacking white spirorbid like spires can weather to dingy white with traces of colour in the same way as *L. obtusata* (figure 36).

7b. Shell sizes
On most shores, *L. obtusata* has a larger mean height than *L. fabalis*, but there is usually a large overlap in sizes of the largest *L. fabalis* and young *L. obtusata* (figure 37). The mean size of both species varies greatly with local conditions (figure 44).

7c. Shell spires
In Britain and most of Atlantic Europe, generally, but not consistently enough for reliable differentiation, *L. fabalis* has a flat or very low spire (figure 36) and *L. obtusata* a low (figure 38) or slightly raised domed spire (figure 18), often with an angled shoulder on the body whorl giving a squared or barrel like profile

(figure 38). Juveniles of both species usually have flatter spires than adults (figures 31, 32, 39 and 50). Occasional specimens (figure 40) or local populations have a protruding pointed spire, especially in sheltered brackish conditions, e.g. *L. obtusata* var. *aestuarii* in the tidal River Deben, Suffolk, now scarce or extinct at that locality. On Arctic and subarctic shores north of the Lofoten Islands, and in Greenland and most of Iceland, many of both species have protruding pointed spires. Only *L. obtusata* occurs in Atlantic North America; it often has a developed spire in northern Maine and Canada.

figure 34: On some shores, the white colour of hatchling *L. fabalis* is continued up to 4 mm diameter on juveniles and resembles the 3.5 mm diameter spiral tubes of spirorbid worms. With later growth, the juvenile shell is preserved as a pure white early spire.

figure 35: *L. obtusata* with worn spire that superficially resembles the 'spirorbid' type spire of some *L. fabalis*, but it is dingy white with traces of the previous yellow colour instead of distinctly pure white.

figure 36: Sample of *Littorina fabalis* (penes checked) from population lacking 'spirorbid' pure white early spires. The spires have been eroded to dingy white with traces of colour in the same way as on many *L. obtusata*, see figure 35.

figure 38: *L. obtusata.* **1**: low, domed spire. **2**: angled shoulder on the body whorl gives a squared or barrel like profile. Typical features of some, but not all, adult *L. obtusata*.

figure 39: On *Fucus serratus*. Identification as *L. fabalis* confirmed by penis. Juvenile thin fragile shell could be mistaken for *L. obtusata*. Found at Swanage on 'the south coast of England . . . where discrimination of shells is difficult' (Reid, 1996) so examination of penes is especially necessary for reliable identification.

figure 40: Probable *L. obtusata*. Height 10.7 mm. Single specimen found at innermost end of a shallow landlocked bay in Orkney. Pointed, protruding spire resembles those from brackish water in some Scottish lochs, a tidal river in Suffolk, and those north of the Lofoten Islands.

figure 37: Specimens from a sheltered shore with distinctly different forms of the two species. Adults of *L. obtusata* are all far larger than adult *L. fabalis,* but the size difference is negated when juvenile *L. obtusata* are compared with adult *L. fabalis*.
1 to 4: *L. obtusata* juveniles from distinct *Ascophyllum* zone.
1: thin juvenile lip drawn into a spout; also occurs on the much smaller juveniles of *L. fabalis*.
2: citrina colour form; white interior usually forms with maturity as shell thickens.
3: olivacea colour form (dominant colour of *L. obtusata* on this shore) with purple/brown interior.
4: flat spires are more typical of *L. fabalis* on adults; spire height is unreliable for identification.
5 to 7: *L. fabalis* adults from distinct *Fucus serratus* zone.
5: adult aperture walls thickened and constricting aperture. Not drawn into a distinct spout.
6: citrina colour form with white interior on virtually all adults on this shore; yellow may show on interior before shell fully thickened. Some green algae on shell.
7: low spires are higher than flat spires on the juvenile *L. obtusata*; reversal of more frequent interspecific relationship.

7d. Shell apertures

Aperture size is affected by the physical and biological environment, and juveniles have a less expanded body whorl and aperture. The shell walls thicken with maturity in both species, constricting the aperture internally, generally more markedly in *L. fabalis*, but varying in degree with environment. The most useful measure of shell thickness is that of the lip at the base of the columella (C) divided by the length of the aperture (LA) (figure 41). In a sample of 59 adult shells, including less frequent extreme forms, C/LA was usually less than 0.29 on *L. obtusata* and greater than 0.29 on *L. fabalis*, but only with a 75% accuracy (Reid, 1996). Accuracy was greater if extreme forms were excluded. Juveniles of the two species are often very similar with thin shell walls, a sharp, fragile aperture rim and an unconstricted opening, and often the anterior (base of aperture) is drawn out into a moderate spout. As small juveniles lack penes, identification cannot always be verified. Association with verified adults, and shell size and colour, if on a shore where there is a large interspecific difference in these features, are usually the best guide (figures 31 and 32).

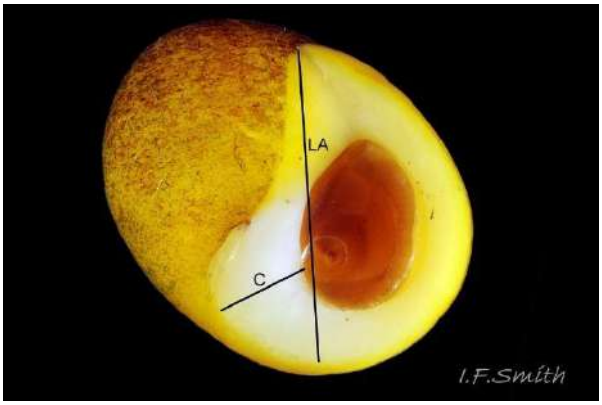

figure 41: The most useful measure of shell thickness is that of the lip at the base of the columella (**C**) divided by the length of the aperture (**LA**). C/LA is usually less than 0.29 on *L. obtusata* and greater than 0.29 on *L. fabalis*, but only with a 75% accuracy (Reid, 1996). On this specimen of *L. fabalis,* C/LA = 0.30

Graham (1988) states that ‘a notch where the outer lip and last whorl meet’ is indicative of young *L. obtusata*, but its presence varies with age/spire development and it is not a reliable predictor of species (D. Reid, in litt.) (figures 42 and 43).

figure 42: *L. obtusata*. Graham (1988) states that ‘a notch where the outer lip and last whorl meet’ (**1**) is indicative of young *L. obtusata*. It diminishes or disappears when the lip drops down the penultimate whorl and a domed spire is formed (**2**). A notch is not a reliable indicator of species (D. Reid, in litt.).

figure 43: Dwarf form, largest 5 mm, of *L.fabalis* from exposed cliff. Graham (1988) states that ‘a notch where the outer lip and last whorl meet’ is indicative of young *L. obtusata*. But, of these, the smallest and largest have no appreciable notch (**2**) while the middle sized one does (**1**). A notch is not a reliable indicator of species (D. Reid, in litt.).

8. Phenotypes of different wave exposures

On British rocky shores that have full marine salinity and fucoid algal growth, shell sizes and dominant colours of *L. obtusata* and *L. fabalis* vary with the degree of wave exposure. Text sections 8a, b and c, below, and figure 44 summarise approximately the most frequent correlations.

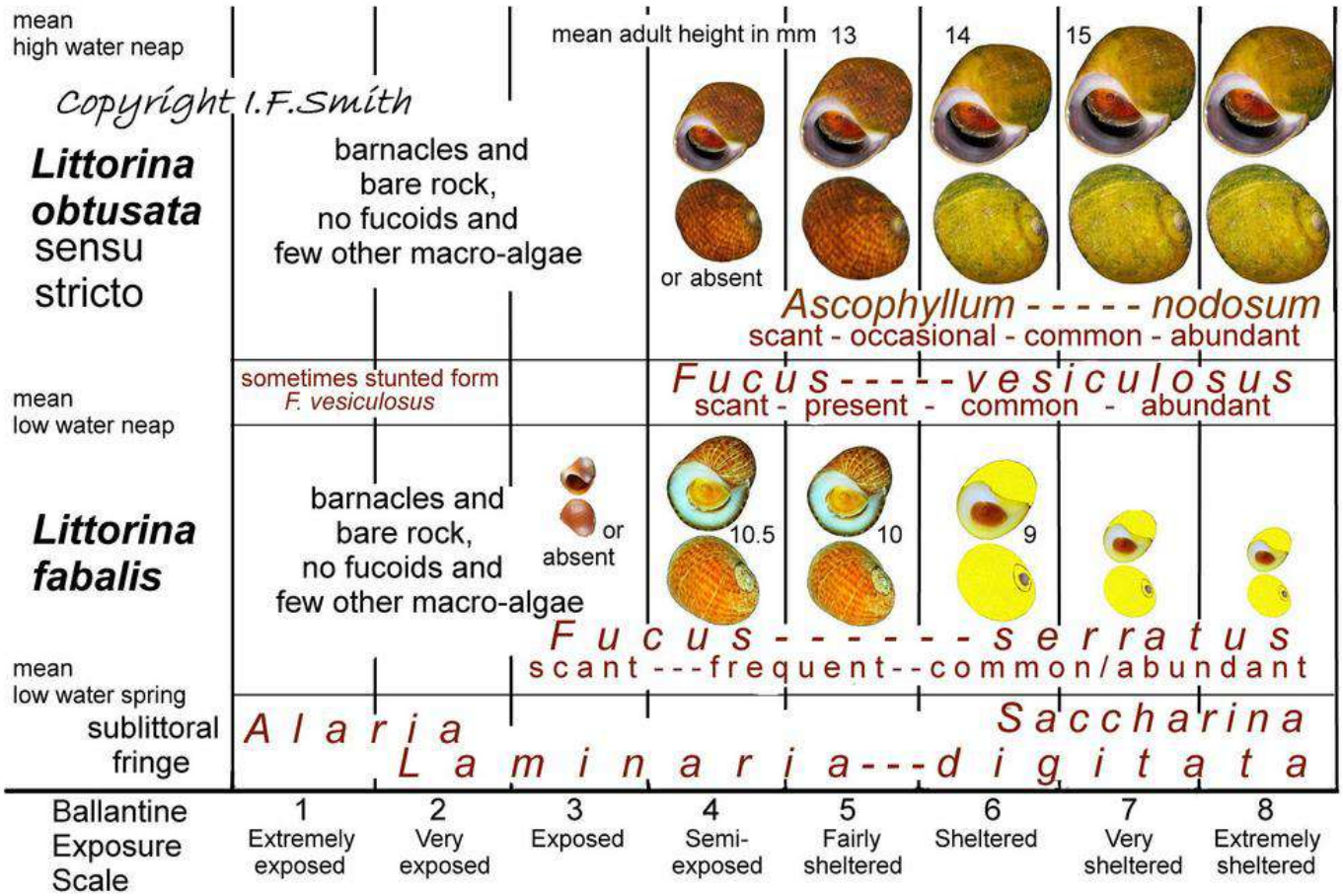

figure 44: Shell sizes and usual dominant colours of *L. obtusata* and *L. fabalis* at different wave exposures on rocky British shores with substantial tidal range, full marine salinity and fucoid algal growth. For a detailed explanation of exposure scale 1 to 8 see Ballantine (1961). ‘*L. obtusata*>’ in Ballantine is sensu lato, it sometimes extends into higher wave exposure than he realized. Shell symbols are all to scale; mm heights are approximate means of thirteen sites, derived from Goodwin & Fish (1977).

figure 45: Algal zones on a very sheltered shore (Ballantine scale 7). Large tidal range, about 10 metres at spring tides, so tidal zones are well defined.
1: as no waves or spray, terrestrial vascular plants grow to high water mark.
2: luxuriant *Ascophyllum nodosum* with large *L. obtusata* s.s.
3: *Fucus vesiculosus* & *Ascophyllum nodosum*, with *L. obtusata* and *L. fabalis* intermingled.
4: abundant *Fucus vesiculosus* with small *L. fabalis*. **5**: abundant *Laminaria digitata*.

figure 46: On sheltered shores on the Menai Strait, citrina *L. fabalis* at its smallest, with thick aperture walls, on the *Fucus serratus* (on left of image) is easily differentiated from olivacea, brown and citrina *L. obtusata* at its largest on the *Ascophyllum*. There is a size overlap of adult (thick lip) *L. fabalis* with juvenile (thin lip) *L. obtusata*.

8 a. Sheltered shores, not estuarine, scale 8, 7 or 6, are the best for initial experience of differentiating the two species, providing the tidal range is sufficient to clearly separate and define a zone of *Ascophyllum nodosum* on the middle/upper shore and a zone of *Fucus serratus* on the lower shore (low spring tide required to expose) (figure 45). Olivacea *L. obtusata* at its largest will probably be on the *Ascophyllum*, and easily differentiated from citrina *L. fabalis* at its smallest with thick aperture walls on the *Fucus serratus* (figure 46). Unbiased samples can be obtained by shaking plants into a bucket. Juveniles of both species may be yellow and have a similar shape with an anterior spout (figure 37), but juveniles from *Ascophyllum* with adult *L. obtusata* will likely be that species and be as large as adult *L. fabalis*, and far larger than tiny juveniles of *L. fabalis*. If findings are as described, the identifications will almost certainly be correct, but examining the penes will add to experience. Sites with phenotypes as described can be found on the narrow inner portion of the Menai Straits between the two bridges, and probably extending to Bangor and Y Felinheli (link to aerial photograph in Flickr account).

L. fabalis does not eat *Fucus serratus*, but uses the flat fronds as suitable feeding platforms for its diet of micro epiphytes and detritus. It is sometimes absent in sheltered situations, despite the presence of *F. serratus*, if excess sediment coats the plants. For example, sediment is a possible cause of the absence of *L. fabalis* from upper reaches of the Severn Estuary (Williams, 1994). Where turbidity and sediment in estuaries (figure 47) or impact of sand laden currents (figure 48) prevent the growth of intertidal fucoid algae, both mollusc species are usually absent or very scarce.

8 b. Semi exposed shores, Ballantine scale 4, will provide experience at the opposite end of the phenotype sequence. *Ascophyllum*, a favoured food of *L. obtusata*, will be absent or present as a few scattered stunted plants, and *L. obtusata* will likewise be absent or subsisting as small or dwarf specimens on scant *Fucus vesiculosus* or other algae. *Fucus serratus* is still usually common at scale 4 and *L. fabalis* usually achieves its largest size here, sometimes equalling or exceeding any *L. obtusata* present. Differentiating the species can be very difficult on such shores because the shell sizes are often similar, the predominant colour form of both species is reticulata, and both tend towards larger apertures with thinner shells. Examination of penes is very necessary. An aerial photograph is available in the Flickr version of this account of this sort of shore open to a fetch across the Irish Sea of 100km to 175km, with a wide wave cut platform and plenty of *F. serratus* but no observed *Ascophyllum.* Large, reticulate *L. fabalis* were common there (penes checked). The aperture lip of adults was strongly thickened and the opening correspondingly narrowed. The interior was white (figure 21), sometimes tinted pink or violet and the exterior pattern often showed within the rim (figure 49). No *L. obtusata* were found because they were absent or not detected among very similar *L. fabalis*. A thin shelled, wide apertured, citrina juvenile *L. fabalis* was initially mistaken for *L. obtusata*, but the white spirorbid-like initial whorls and its presence among adult *L. fabalis* strongly suggested it was *L. fabalis* (figure 50).

figure 47: Except near high water mark, no fucoid algae grow in the turbid Mersey Estuary as there is insufficient light penetration for photosynthesis. Consequently, *Littorina obtusata* and *Littorina fabalis* do not live there.

figure 48: At a few locations in the Menai Strait. such as this, the impact on rocks directly facing the strong current stunts or prevents algal growth, so there are few or no *Littorina obtusata* and *Littorina fabalis*.

figure 49: Specimen of *Littorina fabalis* from a semi-exposed shore (Ballantine 4). The white interior is tinted violet, and the exterior reticulata pattern is visible through the thin rim.

figure 50: Citrina juvenile, shell height 5 mm, from semi exposed shore (Ballantine 4). No adult *L. obtusata* were found on the shore. It is assumed to be *L. fabalis* as it has pure white initial 'spirorbid' whorls that are usually confined to some *L. fabalis*. But no adults found had a citrina shell with well developed 'spirorbid' whorls.

figure 51: Sample of eight dwarf (heights 4 mm to 5.5 mm) *L. fabalis* from cliffs near Aberdeen (Ballantine scale 3). They have relatively large apertures and thin shells. The domed spires of 1, 7 & 8 resemble many adult *L. obtusata* s.s. while 3,4,5 & 6 have flat spires found on juveniles of both species. Other views of same shells in figures 28 & 43.

figure 52: Deformed *L. obtusata*. Height 13.9 mm. Leg. S. Taylor. The deformity of this specimen commences at a break on an early whorl; its probable cause.

8 c. Exposed shores, Ballantine scale 3, 2 & 1, usually lack either species, but *L. fabalis* may occur in dwarf form on scale 3 shores (figures 51 and 28) if sufficiently moist micro habitats exist with secure refuges for dwarfs to retreat into from violent waves. On some Scottish exposed shores with frequent splash and spray, it 'may be found further up on the shore on other fucoids where there is adequate protection from desiccation' (McKay & Smith, 1979). It even sometimes occurs at mean high water neap level on *Fucus spiralis* (Sacchi, 1969 in Reid, 1996). It also occurs in exposed positions on *Mastocarpus stellatus* in Galicia, Spain; *Palmeria palmata* at Grindvik, Iceland; *Devaleraea stellatus* on Achill Island, Ireland; and on red encrusting algae and bare rock in northern Norway (Reid, 1996). On exposed shores, usually, the aperture is larger and the shell thinner than in other situations, and may resemble *L. obtusata* s.s. from moderately exposed shores.

In a sample of eight from a scale 3 site near Aberdeen, (a link to an aerial image of the site is available in the Flickr version of this account), all were fusca dwarfs, height mode 4.2 mm, max. 5.5 mm, with large apertures and thin shells apart from the wide columellar lip (figure 51). The spires varied greatly, some, like many *L. fabalis*, almost flat, others with a large bulging penultimate whorl well proud of the aperture that resembles many *L. obtusata* s.s.

9. Collecting and reliable recording, suggestions.

● Disregard stranded shells; their anatomy cannot be verified, they lack helpful habitat detail, the periostracum containing much colour may be eroded, and the shell may be bleached and weathered (figure 17).

● If possible, start with a sheltered shore and then a semi exposed shore to gain experience.

● An individual specimen may have atypical features (figure 51) or be deformed (figure 52), so examine several; for inspection of penes, eight mature ones give a 99% chance of both sexes if there is a 50:50 ratio.

● To obtain all colours and sizes, collect the sample randomly, e.g. by shaking plants into a bucket. If only the largest are selected by eye, the sample may be biased to females as they are larger than males on average, especially *L. fabalis* on sheltered shores.

● Take separate clearly labelled samples from discrete habitats e.g. *Ascophyllum* and *F. serratus* zones. Be aware that some shores have more than one wave exposure.

● Transport specimens in sealed plastic boxes dampened, but not awash, with seawater.
Store in a fridge at about 6ºC and examine as soon as possible; *L. obtusata* s.s. exposes itself more readily when damp rather than when submerged.

● Check any shell based identification with examination of some penes.

● When submitting records to a recording scheme, make sure to include that the penes were examined so that at a future date your record can be separated from the mass of less reliable records. Check with the scheme organizer that the detail will be included when entered. Records submitted to the Marine Recorder of the Conchological Society of G.B. & Ireland have anatomical notes included and uploaded as integral parts of the record; contact marine@conchsoc.org . Other detail such as shore exposure and algal zone are also helpful and welcomed. Clear photographs of shell aperture and penes, or preserved specimens, are valued by the Marine Recorder.

10. Acknowledgements

I am indebted to Dr David Reid for his careful examination of this account and for his highly-valued advice, but any errors or omissions are my (IFS) responsibility.
I wish to thank Simon Taylor, Marine Recorder for the Conchological Society of G.B. and Ireland, for helpful discussion and the provision of specimens and photographs, and I am grateful to Dr Jan Light for help with literature and specimens.

11. References

The Flickr version of this account, https://flic.kr/s/aHskPGCpTE, has links to PDFs of many of these references.

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12. Glossary

3Dof = Image 3 in Flickr album.
allometric (adj.) = of disproportionate growth of a part or parts of an organism as the whole organism grows.
aperture = mouth of gastropod shell; outlet for head and foot.
coll. = in the collection of (named person or institution; compare with leg.).
columella = solid or hollow axial 'little column' around which gastropod shell spirals; hidden inside shell, except on final whorl next to lower part of inner lip of aperture where hollow ones may end in an umbilicus or siphonal canal.
columellar (adj.) = of or near central axis of coiled gastropod.
columellar lip = lower (abapical) part of inner lip of aperture.
columellar muscle = large muscle connecting foot/head of gastropod to its shell at the columella.
distal = positioned or facing away from midline of body.
epiphyte = an organism growing on a larger plant for support, but not nutrition.
epizooic (adj.) = of non-parasitic organisms living on surface of animals.
filament = a slender threadlike object or fibre in animal or plant structures.
filament (in Reid, 1996) = glandless tip of penis a.k.a. distal tubule. Often not threadlike.
flagellum = threadlike organ or appendage.
height (of gastropod shells) = distance from apex of spire to base of aperture along axis of coiling (see also figure 53).
in litt. (abbreviation of Latin 'in litteris') = in unpublished correspondence.
leg. (abbreviation of legit) = collected/ found by (compare with coll.)
mamilliform = shaped like a nipple.
mesial = facing towards the midline of the body.
mobile = able to move self, e.g. a horse, or to be moved by an agent, e.g. a wave or a cell phone.
motile = moves self spontaneously without volition; applicable to whole animals or to parts of them such as cells, gametes, penes or cilia.
penes (plural of penis) = male copulatory organs.
phenotype = form of a species resulting from influence of particular environmental factors.
proximal = towards the centre of the body or point of attachment.
sensu lato (abbreviation s.l.) = in the wide sense, possibly an aggregate of more than one species.
sensu stricto (abbreviation s.s.) = in the strict sense, excluding species that have been aggregated or confused with it.
spire = all whorls of a gastropod shell, except the final body whorl. But in this account, 'spired shells' are taken to be those with a pointed apex protruding beyond the body whorl rather than the domed spire of some that extends beyond the body whorl.
taxonomic (adj.) = of or relating to taxonomy.
taxonomy = the description, identification, naming, and classification of organisms.
vermiform = shaped like a worm.

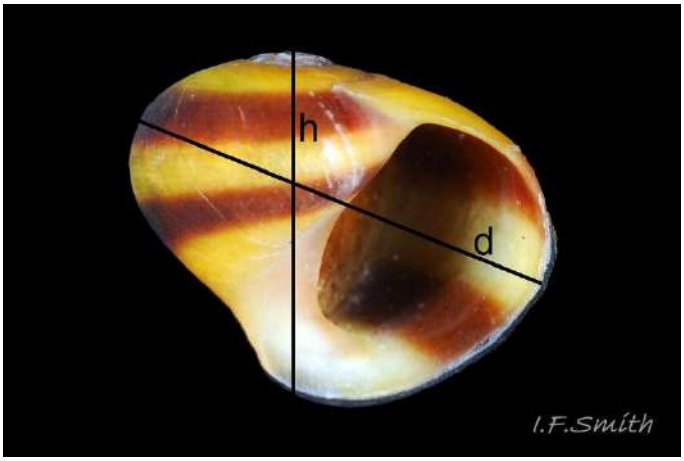

figure 53: 'Shell height' in this account refers to the distance from the apex of the spire to the base of the aperture along/parallel to the axis of coiling (**h**). Some authors, such as Reimchen (see image 6), equate "maximum diameter" (**d**) with height. On many adult shells the two measures are very similar, but they can be quite different, as on this juvenile *Littorina* (h 3.8 mm but d 4.7 mm). Reimchen's graph is of adult *L. fabalis*.

Shell loss and regrowth in *Cornu aspersum*

Ronnie McGuigan

On 8th July 2016, I noticed that a snail (*Cornu aspersum)* in a garden I was working in had fallen off the top of a 1.2 m high recycling bucket and had badly damaged its shell. When I looked more closely I could see that much of its shell was loose and that the vulnerable body was now exposed. I put the animal in the shade and went back to work, coming back occasionally to check.

I 'googled' the internet to find some answers. The first thing I read was to wash the snail with rain or distilled water, and determine how damaged the shell was, because a snail is able to repair some cracks but not much more. There was a bucket in the back garden with water so I washed the snail but in consequence much of the remainder of the shell came away and only the first two whorls or so of shell remained (figures 1 to 3).

figures 1−3: *Cornu aspersum* immediately following loss of shell.

The whole body was now just about translucent and I could see the heart beating; the now unsupported body was hanging to one side (figure 4). I could not just let the snail die, so I decided to try and give it the best snail life that I could!

figure 4: View of snail showing unsupported body.

I adapted a large clear plastic storage box by drilling holes in the box to house the snail. I got leaves from the garden and a cuttlefish bone from a pet shop, together with a small plastic lid with a little water. The snail loved eating the cuttlefish bone and was quite active for the first seven days, before becoming inactive for the next four days, not moving at the top of the tank. I thought it was dying at that point, but I continued to spray the snail with distilled water to keep it moist. I was sure the snail was going to dry out.

Then on about the fourth day it crawled down from the top of the tank and when I looked closely the snail appeared to be forming a coating on the exposed body and was eating, but not moving very easily. On inspection, I could see that a jagged bit of remaining shell was cutting into the body when the snail moved (visible in figure 3 - small piece of shell at bottom of spiral). On cutting this shell off with nail clippers, movement improved.

A few days passed by and there was definitely something happening. I could see improvements in the shell (figures 5 and 6).

figures 5 and 6: *C. aspersum* showing the first signs of shell beginning to form (photos taken 18th and 20th July 2016).

I continued to spray with water to keep the body moist, and fed lettuce, carrot, cuttlefish bone, broccoli and cucumber. I boiled and washed everything in the tank weekly to avoid infection. The snail always 'slept' up on the lid of the container. This was not ideal because of the possibility of falling increasing damage to the snail's body (a fall did occur once).

After another week or so the snail was improving all the time, and I could see a type of shell developing. The snail's body was still soft and I had to make sure it avoided falling again. At this stage, watching the snail moving about, it seemed much better. I continued in the same way keeping the humidity high and ensuring a good food supply. It was now clear that the snail was growing a new shell from the aperture towards the back (figure 7).

figure 7: *C. aspersum*, late July 2016, showing clear signs of shell regrowth from aperture (left) and viewed from above (right).

The snail still retained a malformed shape where the unsupported body had fallen away to the left side. A few more weeks passed.

Figure 8 shows the snail on the 4th August. There was now correct colouration on the re-forming shell, while the earlier whorls of the shell were still not like the original shell in appearance, although hard.

figure 8: Colouration appearing on areas of regrown shell. (photo taken 4th August 2016).

On the 15th of August, I was moving some plant pots, and came across a second (juvenile) snail with a large hole in the shell (figure 9), as well as being covered in mites [probably *Riccardoella* species, which are known to consume snails blood by piercing the lining of the mantle cavity (Cameron, 2016). – Ed.]. I treated this second snail in a similar way to the first one and it grew to full adult, retaining the hole whilst new shell has grown around it (figure 10).

figures 9 and 10: A second *C. aspersum* with damaged shell. Left: Juvenile with damaged shell; right: adult with largely repaired shell.

In November 2016, I arranged a lower plastic tank with drilled holes for air, cleaned it with boiling water, added coconut fibre, earth, sphagnum moss and a few plastic plant pots upside down with a bit cut out so the snails can go in to hide. I then introduced the two snails together, controlling for mites by cleaning the snails and tank every couple of days. Over some winter months the snails were inactive for long periods. As soon as January arrived they were the best of friends (figure 11).

figure 11: Both repaired *C. aspersum* together (January 2017).

With the first snail, the upper whorls are the only part of the shell that has been replaced with crude shell material only (figure 12).

figure 12: First snail showing degrees of shell repair (Jan. 2017).

Both snails have now mated, produced eggs and young (figure 13) and are alive and well at the time of writing (March 2017).

figure 13: *C. aspersum* with juveniles and eggs (insert) (photo, March 2017).

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[Robert Cameron comments on this article that 'the pictures of *C. aspersum* are remarkable. Usually, when there is damage, even extensive damage, the repairs are crude. It looks as if when virtually the whole shell is removed, something different happens'…Ed.]

British Shell Collectors' Club

Saturday 19th August 2016
Chatsworth Shell Fayre
Cavendish Hall, Chatsworth House,
Derbyshire, DE45 1PJ.
Open from 9am to 4pm. Admission Free.

Sat. 28th October 2017 Shell Show
Theydon Bois Community Centre,
Coppice Row, Theydon Bois, CM16 7ER.
Open from 9am to 5pm. Admission free.

Please check web site for up to date and further information: www.britishshellclub.org

Sinistral shells from image reversal: can we believe it?

June Chatfield

Designers so often inverse an image of a snail because, pictorially, it is crawling the wrong way to convey the eye along the intended path through the picture: image reversal is easy to do with modern computer software. To those who know their molluscs it is so obvious a mistake, not so to the uninitiated. This happened on the original dust jacket for Alan Solem's book *Shell Makers* (Solem, 1974). A malacologist from the Field Museum of Natural History in Chicago, USA, Alan was on field work in Australia when the book was going through the press but prior to departure he had selected a striking image of the colourful Cuban land snail *Polymita picta* for the dust jacket. Imagine his horror, when on return to Chicago, he saw copies of his new book with the snail image reversed. In those days (1970s) it would have been done from a transparency which had been loaded the wrong side up. New jackets had to be done and my copy, bought in the American Museum of Natural History bookshop in New York, USA in 1976, has the dextral Cuban land snail the right way around.

Another example of image reversal goes back to engravings of the late eighteenth/early nineteenth century. An artist would make the original drawing and this would be engraved by a craftsman to a plate used to make the print. To preserve the original view of a geographical location or a coiled shell, the engraving would have had to be made as a mirror image of the original drawing to render a correct orientation on the final print. This requires some skill – think writing backwards - so was only done when really necessary. I came across an example of an engraving with two sinistral slugs when checking the proofs of illustrations for *The Illustrated Natural History of Selborne* by Gilbert White produced and edited by Ronnie Davidson Houston for Webb and Bower in 1981 and subsequent editions under Thames and Hudson (figure 1).

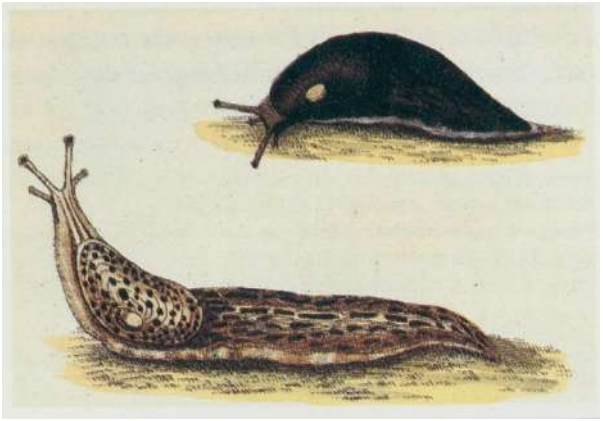

figure 1: Two sinistral slugs, a result of image reversal, from *The Illustrated Natural History of Selborne.*

Accompanying Letter 35 to Daines Barrington that refers to: *myriads of small shell-less snails, called slugs....* is, on page 182, an engraving of two slugs taken from *The Naturalist's Miscellany* by George Shaw (1789-1813). The lower one is the Leopard Slug *Limax maximus* and the upper, dark one, *Arion ater* agg.; both of them show the breathing pore on the left side. As sinistral slugs are rarely found, two sinistral species is likely to be an error, particularly in a general book not about sinistrality. The engraver clearly did not know that slugs are not strictly bilaterally symmetrical and saw no need to engrave in reverse. A relic from the coil-shelled ancestors, the breathing and reproductive pores are on one side only, the right. When I pointed this out, Ronnie, who is a very meticulous editor, checked against the original source of the illustration in the British Library in London, and there it was, two sinistral slugs. The Gilbert White letter referred to above carries a further footnote on slugs: 'Farmer Young of Norton-farm, says that this spring (1777) about four acres of his wheat in one field was entirely destroyed by slugs, which swarmed on the blades of corn, and devoured it as fast as it sprang'. Lord Selborne (pers. comm.) told me of a similar experience with slugs in one of his fields of wheat at Blackmoor Estate, also in the Selborne area, during the 1980s. I suspect that these would have been the common grey field slug (*Deroceras reticulatum*).

Sinistral examples of normally dextral gastropods do occasionally occur and were very popular items to collect in Victorian and Edwardian times because of their essential rarity. Whilst working on the E. W. Swanton reference collection of British shells at Haslemere Educational Museum I came across the shell of a real sinistral Roman snail (*Helix pomatia*) from Dorking, Surrey and suspect that this would have come from nearby Box Hill or the downs at Ranmore, where the Roman snail lives on the chalk of the North Downs of Surrey. It is reproduced here and the readable inscription on the label shows that this is a genuine sinistral snail.

figure 2: A genuine sinistral Roman snail from the collections at Haslemere Educational Museum.

References

Solem, A. (1974) *The Shell Makers Introducing Mollusks*, John Wiley & Sons, New York, USA.

White, G. (Davidson Houston, R. (Ed.) (1981) *The Illustrated Natural History of Selborne*, Webb and Bower, Exeter.

Honorary Treasurer's Report on the Financial Statements to 31st December 2016

Conchological Society regional meeting, NMW Cardiff, November 2016. (photo: Peter Topley)

The Society has had a very satisfactory year with a small surplus of income over expenditure of £131. This reflects a reduction of £632 in fees and subscriptions and reduced sales of periodicals of £306 and a drop of £980 in donations. Publication costs were up by £1690 largely due to the publication of a large issue of the Journal in the spring with a higher than normal colour content. Sundry expenses contains the £600 cost of a marine grab for sampling mainly for use by members on field trips. We have provided £1000 for a grant, but await a formal decision on this.

Our investments are producing lower returns and we have been warned that these will fall further in 2017. However, the equities have increased in value sharply following the devaluation of the pound and we have seen an increase in value of £7933 in the year. At the year-end, our investment portfolio had increased in value to £118,740.

With our total funds at £120,181 we appear to be very illiquid. However, we can sell our investments easily and at short notice, so this is not a cause for concern. If our cash flow gets tight at the end of 2017 we anticipate selling up to £10,000 of investments to maintain our liquidity.

My thanks again to our members and to Circa who manage our subscriptions. With their combined efforts, we have received 50% of 2017 subscriptions by 14th January. This makes a significant reduction in effort for those of us who have to chase payment and a cost saving to the Society and an improvement in our cash flow. All are very much appreciated.

We are still considering how best to publish the Journal and Mollusc World in electronic form to attract the widest possible audience. This could have a significant effect on our finances, initially to cover the digitisation of past issues. Thereafter we can probably achieve savings on publishing and distribution but with a corresponding loss of income from some subscribers. Once we have successfully made this change we will review subscriptions. In the meantime, the Society is financially in a strong position where we can continue to meet our charitable objectives, without the need to consider a change in membership subscription rates.

Nick Light Honorary Treasurer, 14th Jan. 2017

FINANCIAL STATEMENTS
FOR THE YEAR ENDED 31 DECEMBER 2016
Statement of Financial Activities

	Note	2016	2015
Incoming resources			
Fees and subscriptions		£13,492	£14,114
Investment income	1	£4,750	£5,011
Interest Income		£0	£9
Income from activities for generating funds		£585	£891
Donations and legacies		£169	£1,149
Total incoming resources		**£18,996**	**£21,174**
Expenditure			
Publications costs		£14,632	£12,942
Stationery, postage and advertising		£389	£630
Meetings costs		£383	£379
Sundry expenses and fees		£1375	£386
Membership Services		£1,086	£1,458
Grants	2	£1,000	£1,107
Total expenditure		**£18,865**	**£16,902**
Net incoming resources		**£131**	**£4,272**
Gains on revaluation		£7,933	-£1,974
Net movement in funds		**£8,064**	**£2,298**
Fund balances brought forward		**£112,117**	**£109,819**
Fund balances carried forward		**£120,181**	**£112,117**

Balance Sheet at 31st December 2016

		2016	2015
Fixed Assets			
Investments at market value	3	£118,740	£110,807
Total fixed assets		**£118,740**	**£110,807**
Current Assets			
Debtors	4	£1,195	£1,151
Cash at bank and in hand		£6,843	£6,109
Total current assets		**£8,038**	**£7,260**
Short term creditors	5	**£6,597**	**£5,950**
Net current assets		**£1,441**	**£1,310**
Total assets less current liabilities		**£120,181**	**£112,117**
Unrestricted income funds		**£120,181**	**£112,117**

Notes to the financial statements

Note 1. Investment income from:	**2016**	**2015**
Stock listed on recognised stock exchange	£4,750	£5,011
Total	£4,750	£5,011

Note 2. Grants awarded:		
2016 award Not yet allocated	£1,000	
2015 award Leonardo de Souza		£500
2015 award Timothy Whitton		£615
2015 award Maurício Fernandes		£500
2015 award Theo Tamblyn		£500
2014 award - Chong Chen		£8
2013 award – Paul Chambers, project cancelled		£1,000
Total	£1,000	£1,107

Note 3. Investments:		
Market value at beginning of year	£110,807	£112,781
Net gain/(loss) on revaluation	£7,933	-£1,974
Market value at end of year	£118740	£110,807

Note 4. Analysis of debtors:		
Tax recoverable – Gift Aid	£1,195	£1,151

Note 5. Analysis of creditors and accruals:		
Publications accruals	£1,000	£1,000
Grants	£1,000	£1,115
Subscriptions in advance	£4,597	£3,835
Total	£6,597	£5,950

The Marine Mollusca of West Scotland and the North Coast of Ireland: a web site by Shelagh Smith and Julia Nunn

Julia Nunn

This brief article is an introduction to a new web site (http://www.ccmap.co.uk/nmws_atlas/index_scottish_molluscs_atlas.htm) (figure 1) which publishes the results of many years of fieldwork as a Checklist and Atlas of distribution for the marine Mollusca of the west coast of Scotland. By the choice of area (rectangular), this also includes part of the north coast of the island of Ireland.

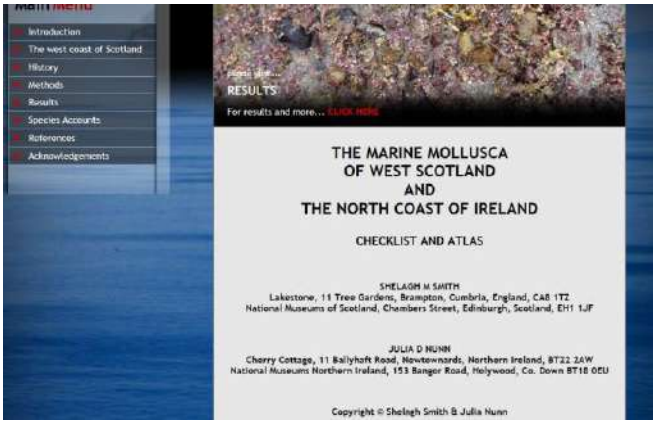

figure 1: Homepage of the *Marine Mollusca of West Scotland and the North Coast of Ireland* web site. A menu enables access to the various aspects of the information.

The project was began in 1979 by Shelagh Smith, with fieldwork continuing to date (most intensively in the 1980s & 1990s). Additional records from the 18th century to the present (from literature and museum collections) are incorporated into the maps. Those records prior to 1950 and of dead shells only are kept separate. With few records between 1950 and 1970, for practical purposes, records noted as being post-1950 can be regarded as post-1970.

The main menu

Introduction: A basic introduction to the Atlas.
The west coast of Scotland: A description of the area of interest including depth range, hydrography, habitats, water quality, commercial developments.
History: A description of the history of recording Mollusca on the west coast of Scotland.
Methods: This section describes the rationale for the area chosen; the sources for historical and more recent additional records, and the fieldwork for the Atlas. Mapping is on a 6' of latitude by 12' of longitude (close to a 10 x 10 km square) (figure 2).
Results: This section gives an overview of the species recorded (700+), and describes recording effort, important sites, significant species, diversity of species (figure 3) and brief comments on conservation.
Species Accounts: The most important section of the web site is the Species Accounts (figure 4). The information available on each species page is explained: taxonomy (each species links to the relevant WoRMS (World Register of Marine Species) page through its unique Aphia ID code), illustrations, photographs, biology, date status, location of voucher specimens, and links to other web sites for more information. Species pages can be accessed either through the Alphabetic List, or the Taxonomic List.

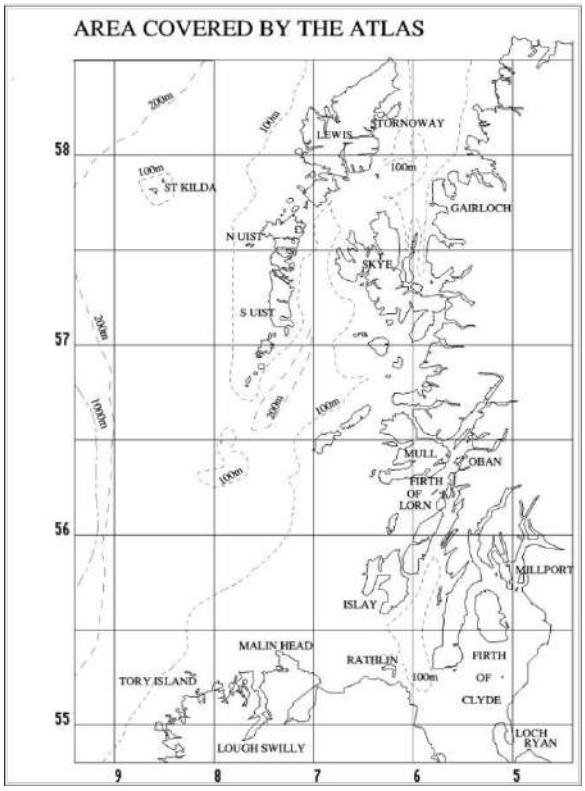

figure 2: The area covered by the atlas (http://www.ccmap.co.uk/nmws_atlas/methods.htm).

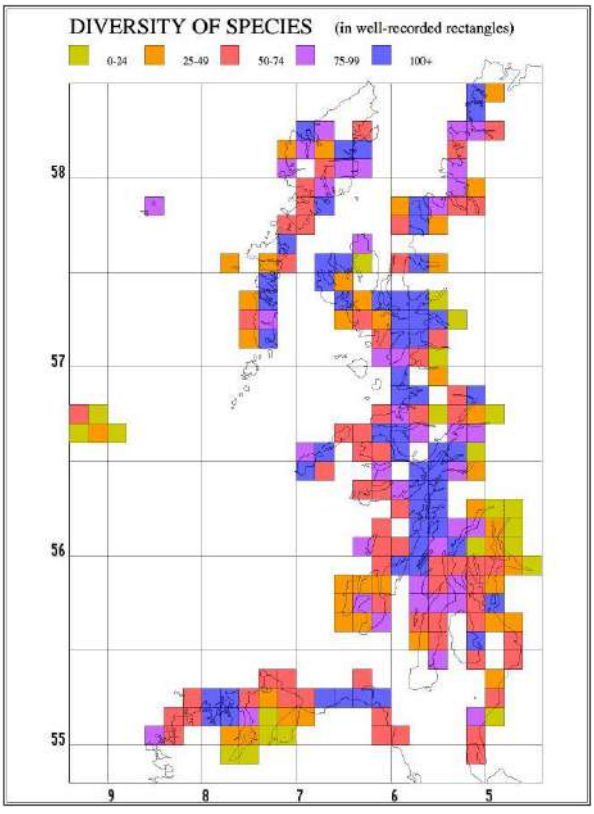

figure 3: Diversity of species map (http://www.ccmap.co.uk/nmws_atlas/results.htm).

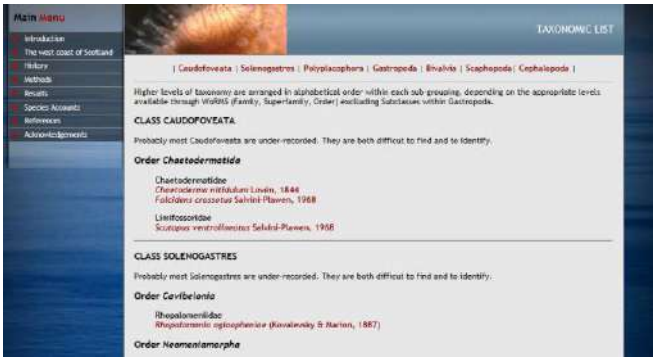

figure 4: Species accounts: taxonomic list (http://www.ccmap.co.uk/nmws_atlas/taxonomic_list.html).

Two distribution maps are displayed – a static map generated by the authors using verified records, including fieldwork for the project; and originally the current map using data stored on the NBN Gateway (figure 5), however the entire NBN dataset has been transferred to a new platform: the NBN Atlas. The code for links to mapping for this new Atlas have not yet been made available so that these maps may not currently work.

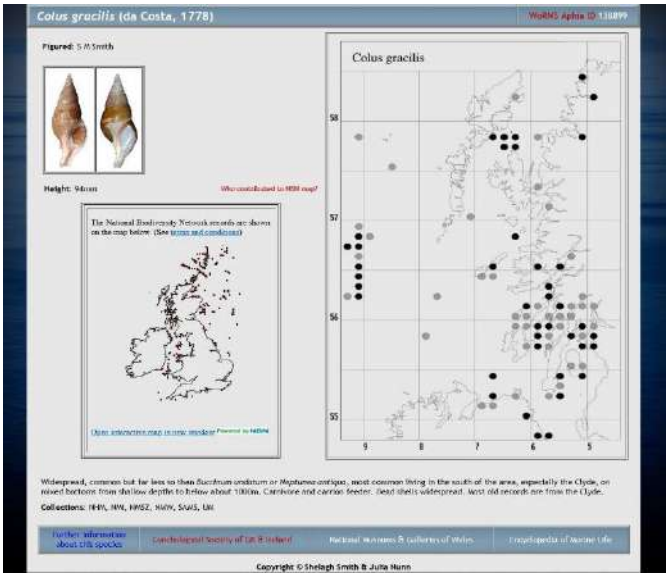

figure 5: Distribution maps: *Colus gracilis* (http://www.ccmap.co.uk/nmws_atlas/species_accounts/colgra.htm)

References: The roughly 600 references listed here are those which refer to any aspect of marine Mollusca (including brackish species) on the west coast of Scotland and the north of Ireland. The topics include molluscs, geology, illustrations and miscellaneous other refs. **(**http://www.ccmap.co.uk/ nmws_atlas/references.htm).

The authors hope that this web site will be a useful resource for anyone interested in marine Mollusca. They welcome comments, or additional records/references which could enhance the site.

Polygyra plana – even more occurrences in Cyprus

Adrian Brokenshire

During yet another winter break in Cyprus (February 2017), this time at the southwest end of the island staying in the Coral Bay area, this non-native land snail was yet again discovered at several localities (Brokenshire, 2016). These included a large terracotta planter in the grounds of the Coral Bay Resort hotel, in abundance, also in the entrance garden and grounds of the Thalassa Hotel on the Maa Peninsula, Coral Bay, where again it was abundant.

I looked for it again on several visits to the sea front esplanade at Paphos where it has been first reported (Ridout-Sharpe, 2014). The large planters, the site of its early report, are no longer around due to development/extensions to hotels and grounds and a major refurbishment of the coastal area and walkways. I did find it only at one site in small numbers around a large boulder on grass in front of hotels towards and nearer to Moulia from Paphos harbour and centre.

This species is certainly now well spread in Cyprus, not necessarily spreading rapidly, at most sites occuring over a long time. I suspect it is much under recorded and many more sites are likely to show up in the future!

References

Brokenshire, A. (2016) *Polygyra plana* – even more occurrences in Cyprus. *Mollusc World* issue 41: 31.

Ridout-Sharpe, J. (2014) An American in Paphos. *Mollusc World* issue 35:28−29.

Not a slug…

You can call it slow, laid back or ponderous,
Lazy, plodding, hesitant or tedious.
You can call it tardy, bullish or thuggish
But please don't ever call a snail sluggish!

Rev. Richard Clarkson

[Richard is a Church of England curate in Shropshire. Ed.]

Conchological Society members are welcome to attend these YNU marine field meetings in 2017

for more details contact Paula Lightfoot (p.lightfoot@btinternet.com)

Saturday 12th August: South Bay, Scarborough, Yorks.

Sunday 10th September: Runswick Bay, Yorks.

Sunday 8th October: South Landing, Yorks.

Review: www.fisherscollection.com* *Martin Willing*

The recent launch of a new online guide www.fisherscollection.com to British and Irish marine shells is most welcome. This initiative is the work of Dr John Fisher assisted by Stephane Morin. John, a member of this Society (and a former Council member), produced the site based upon photographs of shells from his personal collection. These have been amassed since 1970 by personal collecting, the purchase of old collections and, for many of the offshore and deep-water species, assistance from friends on trawlers and research vessels. Over 2 years 1,700 photographs have been taken of 547 species; a considerable achievement. What is particularly useful is that, for many species, entries include images of numerous forms and colour variants; image quality is excellent. The site is straightforward to use; the 'species' tab allows individual taxa to be either located by entering their scientific name or finding them by Family. Each of the 135 Families included displays species alphabetically. A click on a specimen then shows an individual image together with additional information including date and location of collection plus shell dimensions. Most species are shown only as adults. After considering which taxonomic system to use John opted for the familiar 'World Register of Marine Species' (WoRMS − www.marinespecies.org). To keep the site uncluttered, synonyms (there are numerous options for many species) are currently not included. The website was set up to provide a pictorial identification guide for amateur and professional use. John and Stephane are to be congratulated for providing such an attractive, interesting and useful resource.

*A version of this review first appeared in *British Wildlife* in 2016.

Winkle Place and Street Names *June Chatfield*

Some years ago the late A. E. Ellis produced lists of mollusc-associated place names for the old Conchologist's Newsletter in its original duplicated form on foolscap or A4 paper, long before our present glossy colour magazine. Here are two more.

Winklebury is a 1960s suburb on the north-west side of Basingstoke in Hampshire. I have seen it on road signs and more recently on a bus and time tables at the bus station (figure 1). The coast is some 45 miles away, so where does the winkle come from? The Place Names of Hampshire (Coates 1989) follows various spellings from 1290 to 'Wincknersbury' in 1579. The 'bury' ending suggests a fort and indeed, shown on the OS Explorer map is a large Iron Age hill fort with the school in the middle. There is also another Winklebury, Berwick St John, 45 miles to the west and that is an Iron Age hill fort too. Another book Know Your Countryside Hampshire (Poore 1983) gives the meaning of the name as 'the fort or camp of the people of Wilton from Wiltshire', so nothing to do with molluscs or the sea.

Rather more on target is Winkle Street, near the Red Funnel quay in Southampton on the Solent (figure 2). In a position like this, winkles could well have been traded there in the past.

figure 1: Bus and timetables featuring Winklebury as a destination, Basingstoke, Hants.

figure 2: Street sign in Southampton.

References

Coates, R. (1989). *The Place Names of Hampshire*. Batsford, London.

Poore, A (1983). *Know Your Countryside: Hampshire*, New Horizon, Bognor Regis, Sussex.

FSC

2017 Field Studies Council Mollusc Courses

Introducing molluscs: Sat 5th August at Epping Forest. £39 non-residential. Tutor Simon Taylor enquiries.jh@field-studies-council.org Tel: 01306 734501. Note Epping bookings are made via Juniper Hall (FSC London Region).

Beachcombing and seashells: Fri 18th – Mon 21th Aug at Margam Park, Port Talbot, south Wales. £323 residential. Tutor June Chatfield enquiries.mp@field-studies-council.org Tel: 01639 895636

Slugs and snails: Sat 19th – Weds 23rd Aug at Orielton, Pembrokeshire. £425 residential. Tutor Ben Rowson enquiries.or@field-studies-council.org Tel: 01646 623920

Marine Recorder's Report 2016

Simon Taylor

The winter of 2015/16 followed the recent trend with some considerable storms crossing the Atlantic, bringing with them a stream of flotsam items which were often colonised by so-called rafting species. Details of such have featured in the reports of the previous two years (Taylor, 2015; Taylor, 2016) but the variety of species and number of specimens grew yet again in early 2016.

Inevitably the western coasts experience the greater share of this bounty and again David Fenwick was at the forefront. Particularly noticeable was a find of a specimen of *Martesia* in a piece of American fishing buoy washed up in Cornwall, the buoy also housing specimens of *Isognomon bicolor* (C. B. Adams, 1845) to further confirm its Gulf of Mexico/SE USA provenance. Close examination of the specimen suggested it was not the 'expected' species *Martesia striata* L., 1758 but instead the rather less well-known *Martesia fragilis* Verrill & Bush, 1898 which, although it has been reported as a vagrant on our shores before, is usually associated with coconuts which have made the transatlantic drift. Indeed, some revisiting of previous *Martesia* records prompted by this work has suggested there may have been some misidentification at species level in the past.

Other 'new' vagrant species encountered in Cornwall in early 2016 were: *Anomia simplex* d'Orbigny, 1853; *Mytilus trossulus* Gould, 1850; and *Brachidontes exustus* (Linnaeus, 1758). There were also further Cornish reports of *Chama congregata* Conrad, 1833 and Cornish and Dorset records, respectively reported by Tracey Williams and Helen Stanko, of *Stramonita floridana* (Conrad, 1837), which is considered a valid species nowadays and so differentiated from *Stramonita haemastoma* (L., 1767).

A further interesting vagrant on an American commercial fishing float was *Crassostrea gigas* (Thunberg, 1793). Of course this species is already firmly established in some of our coastal regions following commercial introduction, indeed it is a serious pest in places and continues to spread. During the summer of 2015 a sudden settlement of very young oysters was noticed on intertidal rocks in Mount's Bay, Cornwall. Their small size made initial identification a little uncertain, with the suggestion from their habit that they may be the south Pacific species *Ostrea chilensis* Philippi, 1844 [= *Tiostrea lutaria* (Hutton, 1873)], which is farmed commercially in parts of the UK, but they were subsequently confirmed as *C. gigas*. This is of some concern due to the detrimental effect dense populations of the species can have on the amenity value of shores and also because it has the potential to form dense reefs which could impact on the wealth of native biodiversity in the area.

Two interesting additions were made to the British and Irish nudibranch fauna in 2016 by taxonomists. One came as no great surprise as workers in the field had for some time been separately recording the two-colour morphs of *Diaphorodoris luteocincta* (M. Sars, 1870), that without the dorsal reddish markings being noted as 'form *alba*', sometimes in the face of academic suggestion that this may be mere intraspecific variation. Detailed work by Furfaro et al. (2016) has demonstrated genetic and morphological (radular) differences confirming specific distinction, making *Diaphorodoris alba* Portmann & Sandmeier, 1960 the valid taxon for the unmarked specimens (figure 1) and *D. luteocincta* s. str. for those with the reddish dorsal markings.

figure 1: *Diaphorodoris alba*. (photo: João Pedro)

Given the recent consistent recording of the two-colour morphs, this does not cause too much of a problem for the Society's dataset. The second new addition does however. Again, there has long been suspicion that the slugs referred to as *Aeolidia papillosa* (L., 1761), with a wide geographical range, actually represent a group of closely related species. Work by Kienberger et al. (2016) has supported this and suggested that in Britain (and possibly Ireland) there are two sympatric species: *A. papillosa* s.str and *A. filomenae* sp.nov.(figure 2). While the species can be readily determined by dissection, the external characteristics appear subtler, with the newly described species having comparatively paler, more flattened and slightly hooked cerata. The authors admit further work is required but the presence of two very similar species in our region rather implies that all old records must be relegated to 'agg.' status and distribution maps for the newly defined species have to begin from scratch, hence anybody encountering '*A. papillosa* agg.' is urged to note and submit the record with detailed photographs and even to preserve voucher specimens for possible internal diagnosis.

figure 2: *Aeolidia filomenae.* (photo: JimAnderson)

A further nudibranch species (indeed a new Genus) was added to the British list in the traditional way when Bernard Picton photographed something that even he did not recognise when with a group of divers in Scilly in September. The NE Atlantic Nudibranchs group on Facebook again quickly proved its usefulness and within days the sighting was accepted as *Thordisa azmanii* Cervera & García-Gómez, 1989 (figure 3). This is another species apparently expanding the northern limits of its range, having only previously been recorded from off northern Iberia. This pattern was further reflected by new records of *Trapaina tartanella* (Ihering, 1886) and *Pruvotfolia pselliotes* (Labbe, 1923) observed and photographed by Terry Griffiths at Shoalstaone, South Devon (figure 4) and yet further records of *Discodoris [Rostanga] rosi* Ortea, 1979 on southwest shores.

figure 3: *Thordisa azmanii*. (photo: Bernard Picton)

figure 4: *Pruvotfolia pselliotes*, Shoalstone, Devon.
(Photo: Terry Griffiths)

These nudibranch records were made by SCUBA divers, the Society having numerous contacts amongst the diving/sublittoral surveying community. Many of these divers are connected with the excellent pan-specific recording efforts of Seasearch (www.seasearch.org.uk) and certain of their ranks have been assisting the Society by collecting sublittoral substrate samples to be processed for microscopic shelled species. In May 2016 they carried out an exploratory survey of the Channel Islands and as well as recording many nudibranch species via their usual photographic methods - notably including *Doris sticta* (Iredale & O'Donoghue, 1923), *Okenia elegans* (Leuckart, 1828) and *Tritonia nilsodhneri* Marcus Ev., 1983 - they supplied the Society with 7 sediment samples from a variety of substrate types, localities and depths which, when analysed, elicited nearly 300 records representing over 100 different taxa including *Pyrgiscus [Turbonilla] jeffreysii* (Jeffreys, 1848) and *Turbonilla pusilla* (Philippi, 1844). Further samples from Scilly are also currently being processed.

Many of these samples are laboriously processed by Society member John Fisher. John made an interesting find himself in the late summer when holidaying on the Sussex coast. While rummaging around in commercial fishing gear sitting on a harbour he discovered a whelk pot full of sediment. Collecting and inspecting this material revealed a good number of fresh dead *Saxicavella jeffreysi* Winkworth, 1930, a species which cropped up in one of the grab samples from the Society's Lleyn trip in 2015. The species is evidently widespread but is sublittoral and seems to occur very patchily.

There was another potential new species recorded for Britain when Peter Barfield, a postgraduate student with the University of Plymouth, found an unusual bivalve while carrying out coastal site assessments in Hampshire. Although subadult and dead, the valves were still articulated and the specimen is almost certainly an *Acanthocardia paucicostata* (G. B. Sowerby II, 1834) (figure 5). Of course, as a dead found specimen, not in situ, the provenance has to remain a mystery but the species is another expanding its range and is established on the other side of the English Channel. Certainly, it is something to look out for on the south coast.

figure 5: *Acanthocardia paucicostata*, Hampshire.

The Society's own marine field excursions, primarily those in South Devon and Normandy, produced a very large volume of records with numerous workers on the shores plus weed washing and shell grit samples being taken and processed. There were also two offshore sampling trips in Devon, albeit within the Sounds at Salcombe and Plymouth, which facilitated the testing of what is now the Society's own Van Veen grab sampler (figure 6 and front cover).

Figure 6: The author and Peter Topley testing what was to become the Society's Van Veen grab sampler, Salcombe Sound, June 2016. (photo: Bas Payne)

The good number of samples taken are still being worked but are producing lots of useful and interesting data and were notable for the relative abundance of *Phaxas pellucidus* (Pennant, 1777) and *Thyasira flexuosa* (Montagu, 1803), plus the occurrence of *Tragula fenestrata* (Jeffreys, 1848), a species being encountered with greater regularity in our sampling these days as we use a grab rather than a dredge and process the muddier samples where they occur. Bas Payne and Adrian Brokenshire have both put in considerable effort to process onshore and offshore samples collected on the trip. Records from the French trip are still trickling in but it has been pleasing to see ticks against species such as *Haliotis tuberculata* L., 1758 and *Gibbula pennanti* (Philippi, 1846) - the latter not recorded in any of the Seasearch material from the Channel Islands - and weed washings produced good numbers of *Setia pulcherrima* (Jeffreys, 1848), a species at the northern limits of its range on the southern side of the English Channel. Some may question the validity of our Society surveying on the French coast but marine species tend to have little respect for national borders, albeit that the relatively narrow English Channel seems to represent a rather more significant barrier to species than might be expected. Thanks are offered to Bas Payne and Jan Light for organising these excellent trips.

David McKay continues his assiduous marine Mollusca surveying, particularly in Scotland and often far out to sea. There were a number of highlights in 2016, most notable being a second site for the recently described deep-water bivalve *Isorropodon mackayi* Oliver & Drewery, 2014. There were also further records for *Volutopsius scotiae* Fraussen, McKay & Drewery, 2013 building a slightly better picture of the distribution of that species. Another first for David were specimens of the Fissurellid species *Cranopsis asturiana* (P. Fischer, 1882) (figure 7), a very nice find from Upper Rockall Bank. Last year's report (Taylor, 2016) noted the puzzling issue of a number of unusual Turrids David had been finding off NW Scotland. 2016 has seen work continuing on these, including a mini workshop organised through the British Shell Collectors' Club with some of their European members and the Turrid specialist Mike Dixon. Although there is still scope for further discussion, it now seems accepted that at least some of David's specimens are *Raphitoma concinna* (Scacchi, 1836).

figure 7: *Cranopsis asturiana*, Upper Rockall Bank.

Finally, the occasional genuine oddity still crops up. There were two of particular note in 2016, both empty shells: a *Lambis* cf. *truncata* (Lightfoot, 1786) found by David Fenwick on the shore in Penzance (very encrusted by native fauna and possibly discarded some years ago by the local shell shop) and, very unusually, a rather fresh looking *Columbella* sp. (figure 8), the origins of which are a complete mystery, found by Paul Higson on the shore of South Ronaldsay in Orkney.

Thanks are extended on behalf of the Society to all those who take the trouble to report their marine records for inclusion in the Society's marine dataset, including some regular contributors not mentioned above but hugely valued nonetheless. If you do any marine surveying at all, even just beachcombing, then do please feel free to report your finds. Equally, if you are keen on processing grit samples then there is nearly always material available which can be provided for your interest just so long as the records are received by return. Similarly, if you are a diver, any offshore substrate samples are always of great interest.

figure 8: The *Columbella* shell found by Paul Higson on the shore of South Ronaldsay in Orkney.

References

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Kienberger K., Carmona L., Pola M., Padula V., Gosliner T.M. & Cervera J.L. (2016) *Aeolidia papillosa* (Linnaeus, 1761) (Mollusca: Heterobranchia: Nudibranchia), single species or a cryptic species complex? A morphological and molecular study. *Zoological Journal of the Linnean Society* **177**: 481−506.

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Taylor S., 2016. Marine Recorder's Report 2015. *Mollusc World* issue 41: 7−11.

STOP PRESS: BBC Midlands recently featured a short film about *Vertigo moulinsiana* in Midlands meres which is currently viewable on their Facebook site at https://m.facebook.com/story.php?story_fbid=1015532936716476 1&id=21263239760&refsrc=https%3A%2F%2Fm.facebook.com%2Fmidlandstoday%2Fvideos%2F10155329367164761%2F.

Thanks go to Mags Cousins for highlighting this. Ed.

Field Meeting at Stanner Rocks NNR, Radnorshire 23rd April 2017

Hannah Shaw, Andrew Shaw & Ben Rowson

figure 1: Andrew Shaw introducing Stanner Rocks to the group. (photo: Hannah Shaw)

Stanner Rocks National Nature Reserve protects a spectacular landform and a remarkable set of habitats in mid-Wales. Cliffs and exposed rocky outcrops are set amongst steep wooded slopes that tower over the border with England. The site is also a Site of Special Scientific Interest (SSSI). Despite being very well-botanised, and famous for its rare plants and unusual habitats, there appear to be no mollusc records from the site. The purpose of this field meeting was to record molluscs in a generally under-worked part of central Wales, and to compile a first species list for the site.

It proved to be popular with thirteen attendees, including five Conchological Society members. Imogen Cavadino and Rosemary Hill provided much appreciated assistance with identification. Imogen has just completed a Natural Talent traineeship in molluscs at the National Museum of Wales with Ben, who brought with him a suction sampler or 'snail hoover'. Ideal for surveying short grassland in dry conditions, this allowed us to record several small species we might not have found without it. The weather was pleasant without rain and occasional sunny spells which, safety-wise, meant that it was not slippery underfoot.

Stanner Rocks is a Precambrian dolerite and gabbro rock outcrop which comprises exposed rocky outcrops and skeletal soils that support a number of rare plant species found nowhere else in the UK. There are also areas of ancient woodland. It is one of the most important botanical sites in Wales following discoveries of national rarities in the 19th, 20th and even 21st centuries (Shaw, 2014).

Andrew, the voluntary warden, led the meeting and was able to guide us along the narrow steep footpaths up through the woodland and on to the dry grassy summit of the rock outcrop and back down through the bluebell dominated woodlands on the south-eastern slopes.

Prior to commencing our searches Andrew explained the botanical interest of the site and pointed out sensitive botanical areas to avoid (a misplaced foot on one of the outcrops could easily wipe-out a nationally rare moss!) (figure 1).

Our first area of search was the old quarry floor (now species rich grassland with exposed rocky outcrops). Nineteen species of molluscs were recorded in this area including *Candidula intersecta, Nesovitrea hammonis, Arion circumscriptus silvaticus, Arion intermedius*, and with the aid of the snail hoover, *Punctum pygmaeum* and *Vertigo pygmaea*. None of these species were recorded elsewhere during the day. As the plant communities and geology might suggest, this is a curious mixture of species typical of poor acid habitats (*N. hammonis, A. intermedius*) and those that, at least in Wales, are common mainly in more neutral or calcareous areas (*C. intersecta, V. pygmaea*). Also striking was the abundance of living and empty *Cepaea nemoralis* shells, and their co-occurrence with a few *C. hortensis*. *Cochlodina laminata* was also found living on the rock faces.

Next, we trailed single-file up through the woodland to an exposed grassy outcrop above the quarry floor. Andrew used the snail hoover to search the dry grassy areas whilst the rest of the group searched in the woodland. Seventeen species were taken here with *Cochlicopa cf. lubricella* being taken with the aid of the snail hoover (figure 2).

figure 2: Andrew Shaw using the 'snail hoover' in Wales with England in the background. (photo: Hannah Shaw)

After ascending further up the rocky slopes through woodland, Andrew led us to an open grassy area on top of an exposed rock outcrop where we could sit and eat our lunch looking from our location in Wales straight into the English airspace where we were treated to a flypast by the resident pair of peregrine falcons and a goshawk.

We then moved up onto the grassy top of Stanner Rocks which was cleared of conifers in 2001, and is now lightly grazed by sheep and ponies. This area was very dry with patches of heather and quick manual searches revealed no molluscs, however, the snail hoover again turned up two new species for the list, *Columella aspera* and *Euconulus cf. fulvus.* Both are common in exposed, acid uplands in Wales, and even in standing conifer plantations (figure 3).

figure 3: Sorting through the sieved material collected by the 'snail hoover' from the surrounding dry grassy heath.
(photo: Hannah Shaw)

Then we wound our way back down through oak, ash and beech woodland with a wonderful thick carpet of bluebells on either side. Our searches here added a further five species to the list including *Zenobiella subrufescens.* Sieving 6 litres of leaf litter from the woods also produced a further two species; *Carychium minimum* and *Acanthinula aculeata.*(figures 4 and 5)

figure 2: A selection of snails from the bluebell woodland, including a juvenile *Cochlodina laminata* (upper left) that hasn't yet developed its adult spindle-shaped shell. (photo: Hannah Shaw)

figure 5: Imogen demonstrating the technique of sifting through the sieved material for tiny snails.
(photo: Hannah Shaw)

Although we weren't exhaustive in our searches, a good total of 35 species were recorded, comprising 24 snails and 11 slugs. The site is evidently a hospitable one for molluscs and one that would repay further investigation. None were new vice-county records, but *Cochlodina laminata* and *Columella aspera* have not been widely recorded in Mid Wales. The former probably is genuinely uncommon there, while the latter is likely under-recorded given its size. There was a notable lack of non-native species at the site, despite the presence of *Boettgerilla pallens* and *Cornu aspersum* in the habitats at the base of Stanner Rocks.

References

Shaw, A. 2014. Reserve Focus: Stanner Rocks NNR. *British Wildlife* (December 2014): 99-105.

Size of snail shells – request for specimens

Some years ago, it seemed to me that the size of shells of snails in Scotland tended to be noticeably less than published figures. Since then I have made measurements on *Cepaea* spp. and *Cornu aspersum*, and the results tend to confirm my original impression. Recently I was able to visit Cheddar Gorge, a limestone site in the south of England. Curiously, shells of Cornu aspersum didn't appear noticeably different in size from Scottish specimens. On the other hand, shells of Cepaea spp. at Cheddar were not only larger than Scottish ones, but proportionately wider. This may or may not be a chance finding, and I should really like to measure samples of shells from a variety of sites in Britain. I need about 20 shells of a particular species from a site – not live animals, but pickled ones will do, and some idea of the habitat, in particular whether it is limey or not. If you feel you would be able to help, please contact me at adriantsumner@btinternet.com.

Adrian Sumner

Ken Hill (1924-2016)

June Chatfield

figure 1: Left − On the sand-dunes at Crantock, Cornwall in 2010; Right − Ken wearing his service medals at the 70th anniversary commemoration of the victory over Japan (2016) (photo from Order of Service at Ken Hill's funeral).

Ken Hill (figure 1) joined the Conch Soc in 1990 and I first met him that year when he attended a field weekend at the then King's College Rogate study centre in West Sussex where he was quick to see the scope that land snails offered in ecology. Living in Essex, he attended London meetings of the Society until poor health intervened. A lifelong keen naturalist, after a working life with British Rail mostly as a booking clerk at Grays, Essex and family commitments (he had five children), Ken enrolled with the Open University and in 1991 obtained a BA in Ecology and Conservation during his retirement. With a background of long interest in general natural history, he was also into botany and was a member of the South London Botanical Institute at Tulse Hill in south-east London. Here he took a special interest in plant galls (a member also of the British Plant Gall Society) and lichens and was a member of a small group working on lichens who met regularly at the Institute to work on the lichen herbarium and help each other with identification. One of this group, Bob Francis, attended his funeral and provided an obituary for the *SLBI Gazette*, January 2017.

Ken attended two of the SLBI residential field weeks that I ran, the first staying at the Chichester Guest House in Newquay, Cornwall in 2010, known to some Conch Soc members for their Interest Weeks (figure 2), and finally to Portland in 2011 when he was 87 (figure 3). His interest in molluscs focused on British non-marine species and in Newquay we took an interest in them along with the plants on the sand-dunes of Crantock and at Fistrel Bay where the Sandhill Snail *Theba pisana* had become abundant and also the Girdled Snail *Hygromia cinctella*, as we walked back to Newquay. Ken attended some indoor meetings of this Society but in his later years he became a fulltime carer for his wife who predeceased him, by which time his own health was in decline. Natural History, Open University studies, molluscs, isopods, plant galls and lichens together with membership of the respective societies gave an active and rewarding retirement.

figure 2: With the group from SLBI 2010 at the Chichester Guest House with Sheila Harper proprietor (blue top) next to Ken Hill.

figure 3: Always something interesting to look at – on the limestone shore at Portland Bill, Dorset 2011.

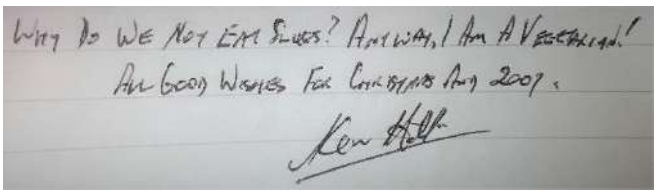

figure 4: letter from Ken sent in 2007 which ends 'Why do we not eat slugs? Anyway, I am a vegetarian!'. (photo: Peter Topley)

Reference

Francis, B. (2017). Obituary: Ken Hill 1924-2016, *SLBI Gazette* Series 2 no. 25, 11-12.

About the Conchological Society

The Conchological Society of Great Britain and Ireland is one of the oldest societies devoted to the study of molluscs. It was founded in 1876 and has around 300 members and subscribers worldwide. Members receive two publications: Journal of Conchology which specialises in Molluscan Biogeography, Taxonomy and Conservation and this magazine. New members are always welcome to attend field meetings and indoor meetings before joining.

Some key contacts (see web site [http://www.conchsoc.org/pages/contacts.php] and 2016 membership list for additional contact details)

HON. PRESIDENT/EDITOR OF MOLLUSC WORLD: Peter Topley
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please apply to:
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For general membership enquiries please contact: -
HON. MEMBERSHIP LIAISON OFFICER: Briony Eastabrook
Rock cottage, Chapel Street, Stow on the Wold, Glos., GL54 1DA
E mail: membership@conchsoc.org

How to become a member

Subscriptions are payable in January each year, and run for the period 1st January to 31st December. Members joining later in the year will receive all publications issued during the relevant calendar year. • Ordinary membership £33 • Family/Joint membership £35 • Under 18 (receiving Mollusc World only) £5 • Student membership £15 • Institutional subscriptions £47
In view of the high cost of overseas postage, members living in Europe will be asked to pay an additional postage charge of £8, and members living in the Rest of the World an additional postage charge of £17. See website for further details.
Payments in sterling only, to Carolyn Postgate, CIRCA Subscriptions, 13-17 Sturton Street, Cambridge, CB1 2SN, (shellmember@gmail.com). For UK residents we suggest payment by standing order, and if a UK tax payer, please sign a short statement indicating that you wish the subscription to be treated as Gift Aid. Another simple and secure way of paying for both UK and overseas members is by credit card online via PayPal from http://www.conchsoc.org/join. Overseas members may also pay using Western Union, but a named person has to be nominated, so please use the Hon Treasurer's name, Nick Light.

How to submit articles to Mollusc World

Copy (via e mail, typed or handwritten) should be sent to the Hon. Magazine Editor (contact details above). If sending copy using e-mail please include a subject line 'Mollusc World submission'. When emailing several large file attachments, such as photos, please divide your submission up into separate emails referencing the original article to ensure receipt. Electronic submission is preferred in Microsoft Word. Images and Artwork may be digitised, but we recommend that a digital image size 200Kb- 3Mb (JPEG preferred) be sent with your submission. All originals will be treated with care and returned by post if requested. Authors should note that issues of the magazine may be posted retrospectively on the Conchological Society's web site. Copy intended for the November 2017 issue should be with the Hon. Editor prior to 1st October 2017; inclusion in a particular issue is at the Hon. Editor's discretion and depends upon the space available but contributions are always welcome at any time.

Advertisements in Mollusc World

We are pleased to invite advertisements, provided they are in line with the Conchological Society's charitable objectives and responsibilities. Advertisements of shells for sale from commercial shell dealers will generally not be accepted. Please contact the magazine Editor for further details.

Membership update

The following Conchological Society member has not previously been included in either this column of Mollusc World or in the latest edition of the Members' Guide (2016). Please note that to be included here members must sign a data protection consent form. If you have not been included and now wish to be please contact Carolyn Postgate at CIRCA subscriptions (details above).

(names and contact details removed)

Conchological Society of Great Britain and Ireland
Diary of Meetings

Please check the website (www.conchsoc.org) for further details and any updates, including other meetings arranged at shorter notice.

Saturday 1st July 2017: FIELD MEETING (non-marine): Wombwell Wood, Dearne Valley, Yorks.
Leader: Robert Cameron (01142 686675, radc@blueyonder.co.uk). Joint meeting with Sorby NHS and the Dearne Valley Landscape Partnership. Ancient woodland site on Coal Measures. Meet at 10:30: For more details see website or contact leader.

Saturday 12th August 2017: FIELD MEETING (non-marine): Oswestry Uplands, Shropshire
Leader: Mags Cousins (mags.cousins@naturalengland.org.uk; 07791 505641). Two SSSIs on Carboniferous Limestone, one with old record for *Vertigo lilljeborgi*. Parking space limited: please contact leader in advance.
Meet at 10:30 at Sweeney Fen SSSI, Shropshire Wildlife Trust reserve (SJ 274/249).

Sunday 13th August 2017: FIELD MEETING (non-marine): Churchyard and Rectory garden Bioblitz, All Saints Church, Clifton, Beds. Leader Peter Topley (01462 615499, president@conchsoc.org). Joint meeting with the Bedfordshire Invertebrate Group and Clifton PCC. Churchyard, mature garden and other local habitats.
Meet at 10:30 at churchyard (TL 166/392); parking or lift from Arlesey Station by prior arrangement.

Wednesday 6th September - Sunday 10th September: FIELD MEETING (marine) Cullercoats, Tyne and Wear.
Porcupine Marine Natural History Society meeting, includes shore visits, diving and grab sampling.
Information from Paula Lightfoot (p.lightfoot@btinternet.com), or Frances Dipper (frances.dipper@sustenergy.co.uk).

Friday 8th September 2017: FIELD MEETING (non-marine) Llangorse Lake SSSI, Brecon.
Leaders: Hannah Shaw (hshaw@freshwaterhabitats.org.uk) and Ben Rowson. Joint meeting with Freshwater Habitats Trust.
A natural eutrophic lake of glacial origin with good marginal vegetation, aquatic vegetation, reedbed, wet grassland, and a stream.
Meet at 10.30 at Llangorse Lake car park (SO 129/272).

Sunday 17th September: FIELD MEETING (non-marine): East Devon.
Leader: Keith Alexander (keith.alexander@waitrose.com; 01392 413092) Looking for *Malacolimax tenellus*.
Meet at 10.30 in Car Park for Blackbury Camp (SY188923), in Blackdown Hills AONB between Honiton and Sidmouth.

Friday 6th October – Thursday 12th October: FIELD MEETING (marine): Gower Peninsula, S. Wales.
Leader: Rosemary Hill (01189 665160, rosemaryhi@lineone.net). Initial meeting point provisionally at 11:00 at Port-Eynon car park (SS 467/852) on Friday 6th October. Further details from the leader or see website.

Sunday 8th October: SLUG DENTIFICATION WORKSHOP: Elsecar Heritage Centre, Barnsley South Yorkshire.
Leader: Robert Cameron. Sorby Invertebrate Group / Dearne Valley Landscape Partnership event. Free to CS members**; advance booking essential**. Contact Derek Whiteley (invertebrates@sorby.org.uk). 10:30 – 16:00.

Saturday 14th October – Sunday 15th October 2015: FIELD MEETING (non-marine): Knepp Castle Estate, Horsham, Sussex.
Leader: Martin Willing (martinjwilling@gmail.com; 01730 814790) Recording molluscs from a 3000-acre rewilding area. Further details tba.

Saturday 21st October 2017: INDOOR MEETING: Demonstrations, exhibits, and lecture. Guest Speaker: t.b.a.
14:00 – 17:00: Angela Marmont Centre, Natural History Museum, London SW7 5BD. (There will be a Council meeting before this meeting.)

Saturday 11th November 2017*: REGIONAL INDOOR MEETING: Museum of Zoology, Cambridge.
Organiser: Richard Preece (rcp1001@cam.ac.uk). A day of talks, exhibits & discussion, including a tour of the mollusc collection.
Full details will be posted on the website. * note change of date from that advertised in Mollusc World issue 43.

Saturday 25th November 2017: WORKSHOP MEETING: Woking, Surrey.
10:00 – 17:00: by kind invitation of Judith Nelson at Hilbre House, Pembroke Road, Woking, Surrey GU22 7ED.
The annual workshop offers members the opportunity to receive tuition and share problems and experiences.
Those who wish to come should ring Judith (01483 761210) in advance for more details and to reserve a place.
A fee of £5 will be charged to cover expenses. Please note that Hilbre House is a non-smoking property.

Saturday 9th December 2017: INDOOR MEETING: A Christmas miscellany
14:00 – 17:30: Angela Marmont Centre, Natural History Museum.
As usual, a meeting made up of a series of short presentations (5-20 minutes) by members: these can be anything mollusc–related, with or without exhibits. This will be followed by a glass of Christmas wine (free!); and then by supper at a nearby restaurant (pay your share …).
If you would like to make a presentation, or want a place at the restaurant, please get in touch with Bas.
(Council members please note that there will be a Council meeting before this meeting.)

Please note the following dates in 2018 for your diary:

Saturday 20th January 2018: INDOOR MEETING 14:00 (preceded by Council meeting).
Saturday 24th February 2018: INDOOR MEETING 11:00; talk at 14:00
Saturday 14th April 2018: ANNUAL GENERAL MEETING 14:00 (preceded by Council meeting)
Saturday 20th October 2018: INDOOR MEETING 14:00 (preceded by Council meeting)
Saturday 8th December 2018: INDOOR MEETING 14:00 (preceded by Council meeting)

If you intend to attend a **field meeting,** please remember to inform the leader beforehand, and if, on the day, you are held up in traffic or your public transport is delayed, please try to contact the meeting leader if possible.
Indoor meetings at the Natural History Museum take place in the Angela Marmont Centre for UK Biodiversity, Darwin Building. ***Please bring plenty of exhibits and demonstration material.***
We are always happy to receive any suggestions for speakers for indoor meetings, or offers to lead field meetings, and also any suggestions about Society participation in the meetings of local and other societies.
Programme Secretary: *Bas Payne, The Mill House, Clifford Bridge, Drewsteignton, Exeter EX6 6QE; 01647 24515,* programme@conchsoc.org