Mollusc World

March 2017 • Issue 43

Diadora graeca
A keyhole limpet revealed

Snail farming in Sussex

The Conchological Society of Great Britain & Ireland

Helping to understand, identify, record and conserve molluscs

From the Hon. Editor

I hope that you will enjoy this issue of your magazine and, particularly if you have not yet done so, will consider contributing something that will be of interest to members for a future issue.

The Society's 2016 round of research grant applications led in January to the award of £1000 to Dr Reham Fathey Ali Mohamed, of Cairo University, for her research project on 'Land mollusc diversity in the East Cairo Region in Egypt'. We are working to further encourage applications in the future.

In a study published in the journal Molecular Biology and Evolution[1] in January this year, authors Bernard Degnan *et al.* have begun to disentangle the complex gene networks that control the secretions from the outer layer of cells on the molluscan mantle. From their detailed analyses, they found 'no unique model or common molecular toolkit behind the making of every shell.' Rather, within the organic layer of a shell, each species appears to evolve its own shell 'secretome.' The report of this work in ScienceDaily[2] says that 'With pride, collectors now can possess the knowledge that…each species makes a shell as unique as a fingerprint.'

Other molluscs in the news include the discovery of a 480-million-year-old 'hairy' ancestor of modern molluscs, *Calvapilosa kroegeri*[3], while there was a report in the Guardian[4] of vets in Israel who have 'saved a snail's life' (in this case *Cornu aspersum)* by repairing its shell after it was brought in to them by the person who trod on it! Finally, in February the BBC had a report on a boom in the use of snail slime as a cosmetic[5], with Italian producers claiming a 46% increase in snail slime production in the previous 10 months. Slime is collected by scraping from glass on which the snails have been allowed to crawl.

Peter Topley

[1]10.1093/molbev/msw294
[2]www.sciencedaily.com/
[3]www.nature.com/ nature/journal/vaop/ncurrent/full/nature21055.html
[4]www.telegraph.co.uk/ pets/news-features/vet-saves-snails-life-mending-broken/
[5]www.bbc.co.uk/ programmes/p04s2k44

[photo above: The editor (as Hon. President) chairing a Conch. Soc. meeting at the Natural History Museum, London, with Hon. Secretary Rosemary Hill. (photo: June Chatfield)]

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 35 for further details).

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Front Cover: Above: Keyhole limpet, *Diadora.graeca* (Linnaeus, 1758). L.16.4 mm (see page 27, figure 18). (photo: Ian Smith)
Below: Farmed *Cornu aspersum maximum* (Taylor, 1883) (see page 8) (photo: Helen Howard)

Hon. Treasurer – could you fill this role and help your Society?

The Conchological Society cannot run without the essential and valuable work of a treasurer. If you are concerned about our future and might be interested in supporting us by taking up this voluntary role to become part of the heart of our work, please contact us. Our current Hon. Treasurer, Nick Light has provided a summary below of what is involved. He is happy to provide any further information and also to offer initial support to make any handover go smoothly (for contact details see page 35).

The Treasurer's role.

There are three main aspects to the treasurer's role.

(1) To maintain the books and produce the annual accounts.
(2) Advise Council members on the financial implications of the decisions they consider.
(3) To manage the Society investments and keep them secure.

Bookkeeping takes the most time, perhaps, on average, an hour or two each week. Using an Excel spreadsheet makes the work a lot easier so a basic understanding of computing is needed. Ninety percent of the job is receiving money directly to our bank account or via PayPal and recording the transactions. The rest is paying the bills. In January each year it takes a couple of days to produce the accounts, get them examined and prepare and submit a Gift Aid repayment claim.

Advice to Council requires you to attend occasional meetings in London during the winter months. Most issues can also be dealt with by e-mail and it is not always essential to attend every meeting. If required, the treasurer (as is the case with other officers and council members of the Society) may claim reasonable travel expenses for meetings attendance (max. £50.00/meeting).

The investments require very little work. I do a quarterly valuation to ensure I know how the value is changing.

It can appear a bit daunting at first but if you can deal with things as they come in, it quickly becomes a routine. You can keep up to date anywhere, where you have your computer and an internet connection. Very little paper is involved!

Nick Light
Honorary Treasurer

Molluscs in Archaeology book cover competition

One of the Conchological Society's initiatives is the publication of a handbook on *Molluscs in Archaeology* edited by Mike Allen in the Oxbow Studying Scientific Archaeology series. The book is nearing completion and will be with the publishers shortly, but we need a cover illustration or photograph.

Submit a colour image (photograph or design) and the best will be chosen by the Editorial Board at Oxbow Books. The winner will receive a free copy of the book (whether or not their image is actually selected for the cover).

The book includes chapters on land snails and freshwater snails for palaeo-environmental reconstruction in archaeology including of machiar, blown sand, the chalklands, caves and river valleys, and from Malta), and their statistical analysis; marine molluscs, oysters and middens and food economy; marine shells as artefacts, and ornaments and a source for dye; science and shells including radiocarbon dating and isotopes. So the book will be a 'must have' for any students, and practitioners studying molluscs in archaeology.

Amongst the contributors to the over 20 chapters are our own Mike Allen, Bri Eastabrook, Jan Light, Janet Ridout-Sharpe, Liz Somerville, and Tom Walker.

The cover size is 240 mm × 170mm (of which the image area is 170 x 115 mm). It might be worth looking at other cover designs at Oxbow Books (*www.oxbowbooks.com)*, and others in the Studying Scientific Archaeology Series (Handbook of Geoarchaeology, and Wild harvest) – where Oxbow have just done a rapid mock-up for their catalogue.

Deadline: end of April 2017.
Send your submission to Oxbow Books (jpg@oxbowbooks.com) and head the email Cover Molluscs in Archaeology. If you would like further information about the context of book please contact Mike Allen (aea.escargots@gmail.com).

Field Meeting to Brookwood, Surrey, 23rd April, 2016

June Chatfield

Five of us attended this field meeting, including Isobel Girvan, botanist at Surrey Wildlife Trust who had previously conducted some wildlife surveys at Brookwood Cemetery: our records will add to the database. The morning was spent in the section of Brookwood Cemetery adjacent to the railway line, while the afternoon explored the Basingstoke Canal from Sheets Heath bridge to Pirbright lock. Thirty-nine species were recorded.

Brookwood Cemetery

Brookwood is in north-west Surrey, west of Woking and on acid soil of the Tertiary (Bagshot Sands). This is infertile country that was originally heathland, and a challenging venue for a mollusc meeting, but records are needed none-the-less. Still functioning for burials, there is also an active friends group, The Brookwood Cemetery Society, a voluntary group dedicated to its preservation, history and appreciation, who conduct guided walks once a month from March to November (www.tbcs.org.uk). The cemetery has an interesting history (Clarke, 2004). Some 2,000 acres of sandy heathland were bought cheaply from Lord Onslow, Lord of the Manor, by the London Necropolis and National Mausoleum Company in 1852 to provide for the burial needs of the expanding metropolis of London. As London churchyards were overflowing with burials and causing pollution problems, the concept was to use the railway line adjacent to the site to transport coffins and mourners to Brookwood by means of special trains out of London Waterloo. They initially had their own London platform and later, a separate funeral station was built, the facade of which still exists in Waterloo Bridge Road. A spur of the railway continued through the cemetery, first stopping at the Non-conformist chapel and finally over Cemetery Pale Road, at the Anglican chapel. The railway funerals were abruptly brought to an end when the London station was bombed in 1941. The cemetery has been enshrined in bryological literature as the type and only locality of a new leafy liverwort *Lophocolea brookwoodiana* which was found during a bryophyte field meeting led by the author for the South London Botanical Institute and the London Natural History Society in 2004 (Paton and Sheahan, 2006). This undescribed liverwort was named by Jean Paton, then the national liverwort expert, who is a friend of Conch. Soc's Honorary member Stella Turk in Cornwall. Jean, incidentally, added some records of snails to the early non-marine mollusc atlas (Kerney, 1976) that she had found incidentally amongst her specimens of mosses and liverworts.

Due to the acidity, the most promising place to start on molluscs was the tall vegetation and nettles at the back of the Brookwood station 'down' platform where construction work would have added some lime to the soil SU95196 56927 (figure 1). Here were found theusual wayside assemblage of nine snails and four slugs (table 1, CE1). We then moved on to wet woodland of oak and silver birch (SU95173 56639) near a cottage towards the military cemetery that Isobel had previously explored for plants, where the wet nature of the soil, possibly from iron panning, had probably led to its exclusion as a burial site. Walking towards this, we saw yellow Bagshot Sands exposed on well-drained ground from recent internments. The woodland produced nine species of molluscs, six snails and three slugs (table 1, CE2) (figure 2). Three were glass-snails with thin, somewhat translucent, shells (*Oxychilus alliarius*, *Zonitoides excavatus* and *Euconulus fulvus* (figure 3)) that did not require much lime and the acidity- tolerant *Discus rotundatus* with a thicker ribbed shell, up to 7mm across.

figure 1: Collecting by the station at Brookwood.

figure 2: Collecting in the wet woodland at Brookwood Cemetery.

figure 3: *Euconulus fulvus*, wet woodland, Brookwood Cemetery. (photo: Peter Topley)

Of the genus *Oxychilus*, the garlic glass-snail, *O. alliarius*, is the smallest species and the one that is more usually associated with acidic situations, such as the logs and leaf-litter of this wood on Bagshot Sands, but in more calcareous situations it tends to associate with well-rotted stumps and logs where the humus provides local acidity of the microhabitat. Other parts of the non-conformist cemetery explored the previous day but not visited by the Conch. Soc. were around SU94404 56946 (table 1 CE3).

The highlight of the field meeting was the finding of several living specimens of Britain's only calcifuge snail, the hollowed glass-snail *Zonitoides excavatus* (figure 4) that is not often found on field meetings in the eastern part of England, although the author is familiar with it as part of the leaf-litter fauna of acidic oak woodlands in Wales. The distribution map in the Kerney atlas (1999) shows that its range is concentrated in the western half of Britain

figure 4: Hollowed glass-snail (*Zonitoides excavatus*), a calcifuge. (diameter c. 6 mm) (photo: John Glasgow)

figure 5: *Discus rotundatus:* comparison with *Z. excavatus* in figure 4. Left: typical form from Rickmansworth, Herts. Right: var. *alba* from Minehead, Somerset (diameters 5.8−6.4 mm). (photo: Peter Topley)

from Scotland to Cornwall, an area of generally acid terrain and of higher rainfall and humidity than Surrey. Its shell most resembles *Discus rotundatus* (figure 5) in size (about 6mm across), large number of whorls and consequently smaller area of body whorl and in the large, open umbilicus below. It differs in the shell having no ribs, just growth lines, a uniform greenish brown shell without the distinctive red-brown flecks of *D. rotundatus* and a thin and translucent, rather than opaque, shell as one would expect of a calcifuge. It was found under and on logs and in the oak/birch leaf-litter.

Basingstoke Canal

figure 6: Basingstoke Canal at Brookwood. View from Pirbright bridge looking towards Sheets Heath bridge.

After lunch, eaten on seats at the station, the group crossed the Basingstoke Canal at Sheets Heath bridge and walked along the tow-path (figure 6) to our furthest point just beyond Pirbright Lock cottage. Habitats here (table 1 BC1) included trees and shrubs at the base of the railway embankment, walls of the cottage garden and bridge, herbaceous vegetation along the canal, the canal for freshwater species (figure 7) and, back over Pirbright bridge, the oak leaf litter of the wooded strip along the tow-path (table 1, BC2). Some parts of the canal bank had a damp soil indicated by the shoots of greater horsetail and waterside plants like meadow-sweet.

Basingstoke Canal in its upper reaches crosses the Hampshire chalk downs, and at Greywell tunnel near Odiham (the limit of the current navigable access due to an important bat roost in the tunnel) chalk springs feed the canal bringing a calcareous element to the water that is reflected in the molluscan fauna. Like the cemetery, there is a Friends organisation of volunteers with an interest in the recreational use of the canal.

figure 7: Collecting in bankside habitat and canal at Pirbright Lock. (photos: Peter Topley and the author)

Background is explained in the guidebook (Jebens, 2004) obtainable from the Canal Visitor Centre at Mytchett, while the current canal information leaflet highlights its recreational use and gives a map for walkers (and conchologists) to follow the tow-path. It is run by the Basingstoke Canal Authority and the Surrey and Hampshire Canal Society. Originally 37 miles from Basingstoke, Hampshire to the Thames at Weybridge via the Wey Navigation, the canal was completed in 1794 and timber, flour and chalk from Surrey to London were the main cargoes, but it did not prove profitable and the canal company went bankrupt in 1866. A succession of owners kept the canal in operation, supported by the Army camp at Aldershot and, from 1923, the carrying of coal and timber under the last owner A. J. Hornsworth, until his death in 1947. It was purchased in 1950 by the new Basingstoke Canal Company but by the mid 1960s was semi-derelict and full of weed. I remember it then as a wonderful mollusc habitat at Fleet, Hampshire in 1963. In 1966 the Surrey and Hampshire Canal Society worked to get the canal into public ownership for recreational use; this was successful with Hampshire County Council acquiring their stretch in 1973 and Surrey County Council in 1976. Since then there has been ongoing restoration of the canal (including its many locks) for recreation and thus weed control but there is a limited water supply and the stretch through Deepcut dries out in summer: this can be seen from the railway line alongside (Southwest Trains, Waterloo to Alton and Basingstoke). The canal history impacts on the molluscs and its heyday for them would have been during the weedy period of dereliction in the 1950s and 1960s.

Results are given in Table 1. At Pirbright Lock there were 11 terrestrial and 16 aquatic species and on the Sheets Heath section 10 terrestrial species and the amber snail *Oxyloma elegans* on bankside vegetation. It would be worth recording from other sections of the Basingstoke Canal on future field meetings. Whilst slugs were found, snails were more abundant due to increased calcium levels along the canal.

The freshwater fauna consisted of four species of ram's-horns that tend to be associated with water weed (*Anisus vortex*, *Bathyomphalus contortus, Gyraulus albus* and *Planorbis carinatus*), two pulmonate pond snails (*Lymnaea stagnalis* and *Physella* sp. – introduced), one operculate (*Bithynia tentaculata*) and small bivalves (*Sphaerium corneum*, c. 1cm and *Pisidium casertanum, P. nitidum, P. personatum* and *P. subtruncatum* less than 3mm): the *Pisidium* spp. were taken for identification by Rosemary Hill. Two gastropods – *Planorbis carinatus* and *Bithynia tentaculata* – are indicative of lime-rich water. One live specimen of *Lymnaea stagnalis* taken alive was particularly large at a shell height of 6 cm (figure 8).

Leaf-litter samples taken from the wet wood at Brookwood Cemetery (oak and birch) and oak litter taken from along Basingstoke Canal Sheets Heath section were disappointing as the litter was so dry.

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figure 8: The large specimen of *Lymnaea stagnalis* from Pirbright Lock.

table 1 (opposite): Results of the collecting at Brookwood Cemetery and Basingstoke Canal (incorporating finds from the leader's recce the previous day): CE1 Behind the railway station at Brookwood Cemetery; CE2 The wet oak/birch woodland at Brookwood Cemetery; CE3 The Non-conformist section on 22 April 2016 (JC); BC1 Pirbright Lock section; BC2 Sheets Heath section. Key: L = alive, S= shell only.

Species name	English name	CE1	CE2	CE3	BC1
Aegopinella nitidula	Smooth glass snail	L			L
Anisus vortex	Whirlpool ram's-horn				L
Arion ater agg.	Large slug		L	L	L
Arion circumscriptus	Spotted false-keeled slug				L
Arion intermedius	Hedgehog slug	L	L		
Arion subfuscus	Dusky slug	L	L	L	L
Bathyomphalus contortus	Button ram's-horn				L
Bithynia tentaculata	Common bithynia				L
Cepaea hortensis	White-lipped snail				L
Cepaea sp					L
Clausilia bidentata	Two-toothed door-snail				L
Cochlicopa lubrica	Slippery moss-snail				S
Cornu aspersum	Common garden snail	L			L
Deroceras invadens	Tramp slug	L			
Deroceras reticulatum	Netted field slug	L		L	L
Discus rotundatus	Rounded snail	L	L	L	L
Euconulus fulvus	Tawny glass snail		L		
Gyraulus albus	White ram's-horn				L
Hygromia cinctella	Girdled snail				
Lauria cylindracea	Chrysalis snail	L			
Limax maximus	Leopard slug		L		
Lymnaea stagnalis	Great pond-snail				L
Monacha cantiana	Kentish snail	S			L
Nesovitrea hammonis	Rayed glass snail		L		
Oxychilus alliarius	Garlic glass snail		L		
Oxychilus cellarius	Cellar glass snail	S			L
Oxychilus draparnaldi	Draparnaud's glass snail	L			
Oxyloma elegans	Pfeiffer's amber snail				
Physella [*acuta*]	Pointed bladder snail				S
Pisidium casertanum	Pea mussel				L
Pisidium nitidum	Pea mussel				L
Pisidium personatum	Pea mussel				L
Pisidium subtruncatum	Pea mussel				L
Planorbis carinatus	Keeled ram's-horn				L
Sphaerium corneum	Horny orb mussel				L
Trochulus hispidus	Hairy snail	S			L
Trochulus striolatus	Strawberry snail				L
Vitrina pellucida	Pellucid glass snail	S			
Zonitoides excavatus	Hollowed glass snail		L		
	Total	13	8	4	27

Snail farming in East Kent

*Helen Howard**

H&RH Escargots is a mother and daughter snail farming business based in East Kent. We started the business nearly ten years ago, after my daughter had completed her course at agricultural college. We didn't have a farm so we looked around for an agricultural activity that didn't require a lot of land. The idea of snail farming popped out of a web search on a site about agricultural diversification belonging to one of the Scottish Universities, but it was really difficult to find out any information about how to do it. I was a biologist so I understood some of the basics but from that starting point, we began to learn about snails and snail farming. It feels as though we still learn new things every day, but somehow I seem to have become regarded as an expert on snail farming. An amazing number of people are interested in growing their own snails at home as part of the 'grow your own food' movement so we supply breeders and hatched eggs in season with a booklet on how to look after them. Our 'Grow Your Own Escargots' packs and 'Mini Snail Farms' for children sell well as gifts. There is also sufficient demand to run a snail farming course about once a month. When we started the business that is a direction we could never have guessed would become so important.

I'm afraid we farmers don't use the up to date nomenclature for our snails. We farm *Helix aspersa maxima* (i.e. *Cornu aspersum maximum* (Taylor, 1883)), 'gros gris' in French, which can reach 5 cm across the shell (figure 1 and font cover); and typical *Helix aspersa aspersa* (i.e. *Cornu aspersum aspersum* (Müller 1774)), or 'petit gris', which are more like the common garden snails [The split into the two sub-species *C. a. aspersum* and *C. a maximum* is estimated to have occurred in the mid to late Pliocene, probably in the same parts of western North Africa, although *C. a. aspersum* now has a wide distribution (Czarnoleski *et al*., 2015). Ed.]. As a food source they are said to be high in protein, low in fat and carbohydrates, and rich in nutrients such as iron, calcium, potassium, phosphorous, copper, zinc, Vitamins A, B6, B12, K and folate as well as essential fatty acids such as linoleic and linolenic acids (source: Inderscience Publishers). If you keep them out of doors and feed them on waste vegetables and fruit they can be an environmentally friendly way of producing protein.

figure 1: Mating *C. a. maximum*.

* H&RH Escargots: www.hrh-escargots.co.uk; https://twitter.com/1snailview

There is a relatively small number of different species of land snails currently farmed or collected from the wild for the table in different parts of the world. *Eobania vermiculata* and *Theba pisana* are not commonly served in the UK but are popular in other European countries; both species are sold by Euro-helix in Italy for example. *Helix pomatia* – our Roman snail – Escargots de Bourgogne in France, is said to be difficult to farm because it doesn't respond well to being kept indoors, so where it is farmed that is entirely out of doors. It is protected by legislation across most of Europe but can be collected from the wild in some countries, usually at restricted times of the year. In the UK, it cannot be collected from the wild at all of course (with apologies for telling you something you probably already know). But live specimens are sometimes advertised for sale on e-bay, supposedly imported from countries where legislation is weaker or not enforced… but who knows?

Just for interest, I have established a small colony of *Helix pomatia* on my allotment, from (legally!) imported stock. They have bred, laying eggs relatively late in the year in July or August so I was concerned the babies might be too small to survive the winter, but at least some of them do. I've been intrigued by their behaviour. From my observation (not scientifically tested) they seem to be more influenced by day length than temperature. When I leave them out of doors they seem to bury themselves in the soil in October no matter what the temperature and pop up again in March/April. The 'Müllers' by contrast seem to respond more directly to temperature so that in a mild winter such as 2015/16 they were still wandering around looking for something to eat in January.

There is demand in the UK for the large African snails *Achatina* spp. to eat and they are on sale in some London street markets. I believe these are usually imported to meet that demand, but I have had several people of West African family history coming on my snail farming courses. I also get calls from people wanting to buy African snails from me. I usually guess that's what they want when they ask to buy just one snail. I've heard that new commercial snail farms are springing up in various African countries, especially Nigeria, to meet local demand but also for export. NGOs in some places are also using snail farming as a local industry, providing a cheap nutritious source of protein and iron, or to provide employment and generate income. I read about a scheme in Cameroon designed to encourage local populations to move away from reliance on bush meat.

I've read that both Roman snails and the common garden snail were brought to Britain by the Romans. I believe not everyone supports that view but it is a good enough story for me to tell everyone I meet that eating snails is part of our cultural heritage. Needless to say, I have met many sceptics on that subject! But I've seen lots of English recipes for cooking snails dating back centuries, including a particular association with monasteries. I've often wondered why they fell off the menu here while they remained popular across the rest of Europe. I was recently given what sounds to me like a pretty good answer to that question by a blogger called Miss Foodwise, who is very knowledgeable on the history of cooking in Britain (http://www.missfoodwise.com). She suggested that the Reformation was the key to the change because after that it became dangerous to engage in any activity that might be associated with Catholicism. So, the 'wallfish' was left to flourish and become a garden pest instead of remaining the cheap nutritious source of protein it still is in many parts of the world.

Recent travellers to Malta, Cyprus and Corsica tell me you can still see baskets of live snails for sale in many market places. There is a flourishing snail farming industry in Northern Italy centred around the Istututo Elicicocultura in Cherasco and Spain has hundreds of snail festivals every year. Snails are served on fast days such as during Lent and on Christmas Eve in some Eastern European countries. Consumption seems to be increasing in the UK: 750,000 a year being a recent estimate of the numbers sold here. (http://www.independent.co.uk/life-style/food-and-drink/news/snails-farmers-just-cant-keep-up-with-demand-from-british-diners-9057148.html).
It is ironic that snails, originally the food of the poor, are now mainly to be found in Michelin-starred restaurants, which is rather similar to what happened to oysters.

Because we sell all our snails live the business has been taken in many different interesting directions. As a former biology teacher, I've been keen to take the snails into primary and nursery schools to help teachers with a bit of basic science education.' Meet the snails' days always go down really well – the children get very excited and they fit perfectly with so many aspects of the national curriculum. I've even taken part in a primary French class and served hot snails in garlic butter. It was amazing how many of these eight year olds had eaten them before or were keen to give them a try.

Snails as reptile food or bird food is a growing area too. Keeping reptiles as pets is popular in the UK and some species demand live snails. We regularly supply the reptile houses at several zoos: ZSL London Zoo, Bristol and Chester as well as some other conservation projects e.g. Durrell Wildlife Conservation in Jersey. In addition, the RSPB bought baby snails from us through the summer for the last two years to feed baby corncrakes in their captive breeding programme.

Because snail farming is still relatively unusual in the UK we have featured many times in the Press and TV from *Taste of Britain* to *Countryfile* and from the *Alan Titchmarsh Show* to *Easter Eggs live*. There's quite a demand from film companies for snails to film for advertisements so we offer a film package whereby they can hire the snails they need for a few days then return them, and I supply them with housing, food and care instructions. So, our snails have become film stars and 'strutted their stuff' in front of many cameras. Who knows where the business will go next?

[Reference: Czarnoleski, M., Labecka,A.M., Kozłowski, J. (2015) Thermal plasticity of body size and cell size in snails from two subspecies of *Cornu aspersum*. *J. Mollus. Stud.* **82** (2): 235−243. Ed.]

figure 2: *C. a. maximum* showing dark mantle.

figure 3: *C. a. aspersum* showing a white mantle, one of the distinguishing features in farmed snails when compared to *C. a. maximum.*

Helix lucorum in captivity: longevity and calcification

Peter Topley

In 2005 I collected a specimen of *Helix lucorum* from a field about 40 km south of Sophia in Bulgaria, where it was very common (Topley, 2007). When found, the snail appeared to be already mature with a fully formed lip to the aperture (figure 1). In Greece, this species has been shown to reach sexual maturity three years after hatching (Staikou et al, 1988). Since then I have kept this individual in captivity, providing necessary food and available calcium (in the form of cuttlefish 'bone') and at the time of writing (January 2017) it is still living (figures 2 to 4) and is thus conservatively around 14 years old.

In June 2012, a colony of *Helix lucorum* was recorded by Maurice Pledger at Pitfield Open Space in Hoddesdon, Herts. This non-native species had been recorded for the first time in the UK as a probable 'escape' in a garden in Wimbledon in 2009 (Palmer, 2010). I visited the Hertfordshire colony about a month later observing both adults and juveniles and active egg laying (Norris, 2013) and took away a couple of individuals to observe in captivity. These subsequently laid eggs and a couple of juveniles survived for a while but unfortunately later died during a cold spell the following winter (the tank was kept in an unheated room with a small heat mat). The two adults survived (however I did not observe any further mating or egg laying) until, very recently, the smaller of the two died (presumably aged at least 6 years) and its shell is shown in figure 5); the second adult is still living.

Obvious from the photographs of the older shells is the heavy calcification of the shell, especially noticeable on the outer lip and columella. There is a high-energy cost in secreting a calcareous shell and calcium carbonate can be mobilised from the shell when needed, particularly in the formation of eggs (Cameron, 2016). The resulting heavy shells in these captive individuals are possibly the result of the easy availability of calcium (in the form of cuttlefish 'bone') and/or the lack of egg production during captivity, although older heavy-shelled individuals are sometimes observed in the wild, some of which in the past have been described as distinct 'varieties'.

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figure 1: Adult *Helix lucorum*, near Sophia, Bulgaria, June 2005. (Shell height (h.): 38 mm, width (w.): 43.2 mm).

figure 2: The same *H.lucorum* shown in figure 1 after eleven years in captivity (individual can be identified by area of repaired damage to penultimate whorl), June 2016.

figure 3: The *H. lucorum* from Bulgaria in January 2017, showing thickened lip and parietal callus.

figure 4: *H. lucorum* individual shown in figures 1−3; detail of aestivating animal, January 2017.

figure 5: Shell of small *H. lucorum* collected from Hoddesdon, Herts in 2012, kept in captivity and died December 2016 (h.: 32 mm, w.: 35.4 mm).

Saxicavella jeffreysi Winkworth from a Sussex whelk pot

John Fisher

It was interesting to read of the recording of this species in the Marine Recorder's report in Mollusc World (Taylor, 2016). I believe the record was of half shells only but even this was more than I had ever found at the time.

However, in July I was on a family holiday in Sussex and decided to do a bit of shelling. Having drawn complete blanks at Camber Sands, Winchelsea, and Rye Harbour I decided to give up and do some sightseeing. I had always wanted to visit the beach fishing fleet at Hastings, and this proved to be a very profitable experience. As I was walking amongst the boats I came across an old whelk pot full of muddy sand. It had obviously been dragged along the seabed and filled up with sediment. Luckily the fishermen had not emptied it and I could see some shells in the sand. Having worked my way through the whole sample I managed to collect 42 complete shells of *Saxicavella jeffreysi* Winkworth 1930. About half of them had drill holes in one valve but as the photo shows many were in very good condition (figure 1). The only other species present was *Fabulina fabula* (Gmelin, 1791). I was informed by the fishermen that the pots had been used about 2 miles offshore.

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figure 1: *Saxicavella jeffreysi* retrieved from a Sussex whelk pot. (length 8−12 mm). (photo: Stephane Morin)

Suspected crow predation on *Planorbarius corneus*

Dear Editor,

It was with great interest that I read the article by Gordon Collett in a recent edition of *Mollusc World* (**39:** 7) about crows predating river mussels on the Thames.

This brought to mind an observation I made in 2014 on Lough Beg, Northern Ireland. As part of an evaluation of the invertebrate interest on the west shore of Lough Beg, partly owned by the Royal Society for the Protection of Birds (RSPB), I came upon what appears to be another example of crows feeding on freshwater molluscs. The south-west corner of the Lough comprises a very extensive grazed shoreline on sandy substrate subject to often deep flooding in winter. In September 2014, after a long dry spell, and with the Lough near its lowest point, large, flat-topped boulders appeared above the water table where a small stream enters. There is a rich macrophyte growth in the warm, shallow waters here which encourages an abundant population of gastropods, including *Planorbarius corneus.* A single sweep of a water net may bag ten or fifteen of these close to the water's edge.

It was the top of the emerged boulders, though, that caught my attention. These were covered with the shattered remains of mature *Planorbarius* shells (figures 1 and 2). Most of the shells had been broken or split close to the centre and the animals removed. There is a large water fowl presence on the Lough but I had never heard of ducks feeding in this way. Local RSPB field staff were contacted but could offer no further insight though they agreed that ducks were unlikely to be responsible. The only other birds in the vicinity were magpies and hooded (grey) crows (*Corvus cornix*). After discussion with the RSPB co-ordinators of the survey it was agreed that hooded crows were the most likely culprits. No crows were actually seen on the rocks during the survey, rather in the vicinity, but their involvement is strongly suggested by: damaged shells being exclusively on top of the rocks and not in the water; the rocks being isolated from mammalian predators and some way from the shore; the pattern of damage suggests piercing blows (using beaks?) to the shells. Presumably the snails, sitting on floating macrophytes, were pulled from the water beside the rocks and then broken and eaten on the rocks.

This postulated behaviour appears to be entirely opportunistic. Fragmented duck mussel shells (*Anodonta anatina*), Inhabiting shallow water further north on the Lough, were also found during the survey, usually near large emergent stones though not actually on the stones. Whether crows were implicated in the latter instance is unclear but seems unlikely as live shells were only found in water at least 30 cm deep.

Yours sincerely

Roy Anderson

Belfast, N. Ireland

figures 1 and 2: Predated *P. corneus*, Lough Beg, Northern Ireland.

A place of awe and inspiration

Harriet Wood

Opening up our collections to the public is a real treat for any curator. We are almost always welcomed with gasps of delight as visitors enter the treasure trove that is the shell collection at Amgueddfa Cymru − National Museum Wales. It is brimming with shells of beauty with stories to tell, century old books with hand painted pictures and letters from shell-lovers of the past. It is undoubtedly a place of inspiration and reminiscence and so perhaps it is not surprising that creative writing groups enjoy using it as their muse.

I recently had the pleasure of showing one such group around (figure 1). A member had already read and loved Helen Scales' beautiful book *Spirals in Time* and so I brought out some of her stories with the shells on show for the writers to witness first hand *. These tales of molluscs naturally unfold when going through the vast diversity of the group - where they live, how they live, what they eat – from metal armoured snails at the bottom of the Indian Ocean to ghost slugs rasping earthworms to a spaghetti-like death. The stories are endless and an hour simply isn't enough! As well as inspiring them the shells evoked memories for the writers too, stories of happy hours spent eating cockles by the sea and of school days where each pupil had a tin of shells to use for counting.

It seemed only right that the pieces the group produced should be shared with those who already have an avid appreciation for shells. I hope you enjoy them as much as I have.

figure 1: the creative writing group viewing the molluscan collections in Amgueddfa Cymru — National Museum Wales.

*See *Mollusc World* **38**: 15 for a review of this book. Helen Scales is the guest speaker at our AGM on 8th April [Ed.].

figure 2: Cephalopoda exhibit set out in the Mollusca Section, National Museum of Wales.

Ode to Octopuses

Eight-armed cephalopod.
Blue blooded, intelligent, master of disguise.
Inspiration for art.
Monster of legend and literature.

But the Nautilus hides snug within an exquisite shell.
Gentle against the pearlescent grey,
logarithmic spirals of perfection,
patterned with ridges, streaked brown and gold.
Argonaut treasure.
Unchanged for millennia.

Another makes a papery shell, delicate, cradle-white,
a lullaby-rocking nursery to keep the babies in.
She will guard them with her life,
while the male floats away to oblivion.

Mysterious creatures of the deep.
Short-lived and persecuted,
slowly revealing the secrets they keep.

Sue Avery October 2016

Molluscan Sonnet

I shall not praise a single slug or snail,
this is a poem for molluscs of all sorts:
for those on land that glide on slimy trails
and those that live on sea beds, mud or rocks;
molluscs with shells that twirl to left or right,
with poison darts. I praise all molluscs: bright
sweet juicy mussels, cockles hard as stones,
cowries, colossal squid and octopus,
limpets, winkles, argonauts and tritons,
all charm me with their fearful otherness.
No net of words can capture them, I found;
and then, in undiscovered seas, I drowned.

Anne Bryan October 2016

Searching Shells and Memories

Returning to an old familiar shore
but treading uncertain ways
as feet sink into wet sand.

The clouds clear after grief-like showers,
my pockets big enough for that rainbow,
signalling, when no one is watching
except the gulls
skimming the seas' multitude
of dark blue shadows.

Truth is I know what I'm looking for,
a return of past delight,
tiny brown needle-sugar shells
and thick-lipped dog-whelks.
The sand is soft, then firm
towards the muddy lace of tide.

Rock pools beckon
with treasures of pink pelican-foot
and twirling peaks of wentletrap.
Through the dimpled window of the sea
violet sea-snails float upside down
and ridged coffee-cream limpets
are tucked under stones,
wrinkled sting-winkles nestle
in cradles of pebbles,
clinging to their rocky cribs.

Soft breezes of nostalgia
hum tunes of folded away yesterdays
held in the echoes of a shell to the ear
and the heart is stirred long after reaching home.

Peggy Rees

The law of the deep

When the octopus spotted the mussel
he expected a bit of a tussle,
but the stealthy white shark,
gliding up through the dark,
made short work of that tentacled morsel.

Anne Hughes October 2016

Exhibit about shell structure set out in the Mollusca Section, National Museum of Wales.

Teaching the logarithmic spiral

Said the Nautilus to his son Simon:
'Logarithms are what we rely on
to grow healthy and strong.'
Sighed his son, 'You are wrong.
Evolution dictates what we thrive on.'

Anne Hughes October 2016

The vegetarian curator

A museum curator called Hannah*
of cheerful and out-going manner
loved those shells in her care
but moules marinières
was not something she'd have for her dinner.

(*apologies to Harriet for getting her name wrong - memory let me down AGAIN)

Anne Hughes October 2016

A word in your shell-like

A word in your shell-like…

Like when, sitting all alone, you raise an empty conch to your ear and hear the sound of an ancient sea.

Like the intruder in your bed that you transfigure and string-along until you have it polished to perfection.

Like the wampum that was woven into Hiawatha's belt, you symbolised the peace and unity of native peoples.

Like your home is truly your castle, built and fortified to your own design, carried daily on the ceaseless ebb and flow.

Like the secret that you harbour, clammed-up and water-tight, the patent emblazoned shield-like on your back.

Like the strandlines on beaches - driftwood, weed and shell - separate the water from the land: you patrol the border of time and tide.

Like Botticelli's Venus rising from the waves, gold-wreathed and naked on a shell, you maintain your mollusc mystery.

Like not twisting your tongue when asked to recite: 'She sells seashells on the sea-shore. The shells she sells are seashells'.

Tony Atherton October 2016

Molluscan 'Types' from the collection, Mollusca Section, National Museum of Wales.

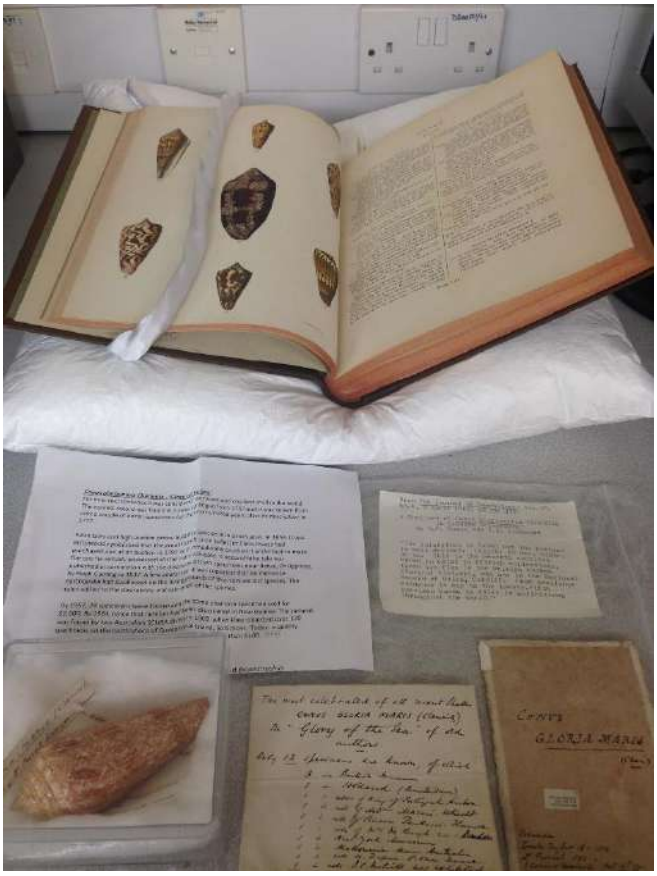

Exhibit about *Conus gloriamaris* set out in the Mollusca Section, National Museum of Wales.

Mollusca Section, National Museum of Wales: Items showing the history of the mollusc collection, including J. C. Melvill (1845−1929), whose collection was acquired by J.R. le B. Tomlin (1864−1954). 'Probably Tomlin's early association with the National Museum of Wales, through the then Director, W. E. Hoyle, led to his bequest and, by the 1940s he had already started to transfer his collection. It has been estimated that the bequest totalled over one million specimens and represented over 30 000 species. Tomlin's malacological library was also bequeathed and this consisted of some 2200 bound volumes and over 7000 reprints or pamphlets.' (https://museum.wales/curatorial/biosyb/mollusca/collections/melvill-tomlin)

Slipper limpets predated: who did it?

June Chatfield

Following a visit to the Russell Cotes Museum in Bournemouth, in May 2016, I took advantage of proximity to the shore to enjoy sea air and indulge in some beach-combing. Shells of the American slipper limpet (*Crepidula fornicata*) that established here over a century ago are abundant on the strands at Bournemouth and were photographed during a Conchological Society field meeting in 2014 (Chatfield 2015). Apart from wear and tear, being washed up and down the beach by the tide, those shells were reasonably intact. My eye was taken this year by some fairly freshly dead shells that had large jagged holes on the convex surface of the shell (figure 1). This seemed to indicate the work of a predator, but what was it? In an American book *A Natural History of Shells* (Vermeij,1993) a chapter is devoted to predators of molluscs and their methods and this includes a photograph of the snake's-head cowrie (*Monetaria caputserpentis*) predated in Guam that had a similar type of hole made in the curved top of the shell and also of a money cowrie (*M. moneta*). His colleague, Lucius Eldredge, in the field with him commented: *I think crabs do it. I've seen crabs break cowries like this in our saltwater aquarium at home*. Later tests in the laboratory enabled him to hear the crabs breaking the shells. Studies on three American species of *Crepidula* (Hoagland 1974) showed that *C. fornicata* was subject to more predation than the other two suggesting some control on its spread in the USA. More recent laboratory experiments confirmed predation of juvenile *C. fornicata* by a shore crab (*Hemigrapsus sanguineus*) and a hermit crab (*Pagurus longicarpus*) (Pechenik, Ambrogio and Untersee 2010). Does this happen in the introduced range of American slipper limpets in Europe? The American slipper limpet has a thinner shell and could well be broken by smaller crabs of temperate habitats like our edible crab (*Cancer pagurus*). Both predator and prey live in the sublittoral zone below the low tide mark. Has anyone else seen this in *Crepidula fornicata*?

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figure 1: Jagged holes in the top of slipper limpets made by a predator. Bournemouth, Dorset, 2016.

The girdled snail, *Hygromia cinctella,* in Scotland

Adrian Sumner

figure 1: Two specimens of *Hygromia cinctella* from St Andrews, showing the typical shell colour and shape.

The girdled snail, *Hygromia cinctella,* is a Mediterranean species that was first reported in Britain in 1950. Comfort (1950) found this snail at two localities in Paignton, Devon, on cultivated ground with exotic plants. In fact, *H. cinctella* turned out to have been in the area since at least 1945 (Milman, 1951), and Comfort (1951) found it was widely distributed around Paignton. For many years *H. cinctella* was restricted to South Devon, but in the 1980s and 1990s it began to expand its range, moving north and eastwards, as well as westwards into Cornwall. By 2006, it had reached Leeds, in Yorkshire (Norris, 2006). It then made a great leap northwards, turning up in Glasgow in 2008, where Richard Weddle found it in Partickhill, on the west side of the city (grid ref. NS553671) (Weddle, 2009). A single specimen of *H. cinctella* was found among several collected from Japanese Knotweed. This remained the only Scottish record for a few years, until I found Girdled snails in Livingston, West Lothian (NT036683); Edinburgh (NT228738); and St Andrews, Fife (NO516612), in 2012. Subsequent records have been from Uddingston (NS688607), on the south side of Glasgow, in 2014, and from Dunbar, East Lothian (NT678774), in 2015. This species is now well established at many sites in the City of Edinburgh.

Comfort (1950) originally described *Hygromia cinctella* as '…conical, reddish brown or horn coloured with sharp peripheral keel, with a thin opaque white band coincident with the keel'. This is a pretty clear description of this species, but as will be seen, it needs some qualification. He later added that some adults reach a diameter of almost 20 mm (Comfort, 1951), but the largest one I have found in Scotland is only 11.3 mm in diameter, and most are under 10 mm.

The conical appearance of the upper side of the shell, the sharp peripheral keel, and the rounded underside, are characteristic of this species. The colour of the shells and animals is variable. The specimens I found at St Andrews conform very well to Comfort's description (figure 1); the shade of brown is quite distinctive, and I cannot think of any other snail that is quite the same colour. However, most of the Girdled snails I've found in Scotland have thinner shells, with the body colour tending to show through; they are either dark brown (figure 2), or whitish (figure 3). In my experience, dark-shelled snails also have dark bodies, and pale-shelled individuals have pale bodies. Whether this correlation is universal remains to be seen. As can be seen from figures 2 and 3, the whitish peripheral band is not always continuous, and does not always extend to the mouth of the shell. Some specimens have very fragile shells, even so thin that they crumble when picked up; girdled snails may be very sensitive to a lack of lime in many parts of Scotland, and this might restrict their potential distribution.

The only species that *Hygromia cinctella* might possibly be confused with is the Strawberry Snail *Trochulus striolatus,* which lives in the same sort of habitats. *T. striolatus* has a shouldered shell, often more obvious in juveniles, but never an actual keel, and it has quite a large umbilicus; the umbilicus in *H. cinctella* is small, and largely covered over by the edge of the shell so that it is not really visible (figure. 4). *T. striolatus* often has a faint peripheral band on the shell, but this is never as sharply defined as that on *H. cinctella*.

figure 2: Dark-shelled specimen of *Hygromia cinctella* from Edinburgh, with a dark body.

figure 3: Pale-shelled specimen of *Hygromia cinctella* from Edinburgh, with a pale body.

figure 4: Comparison of *Hygromia cinctella* (left) and *Trochulus striolatus* (right). Top: frontal views, showing the keeled shape of *H. cinctella* compared with the rounded, shouldered outline *T. striolatus.* Bottom: the umbilicus of the two species, almost closed in *H. cinctella*, and large and open in *T. striolatus.*

Where does the Girdled snail live? All the sites where I have found *H. cinctella* so far have been ruderal; in Edinburgh it favours rough vegetation beside the old railway lines, now cycle paths and footpaths, that criss-cross the city, but anywhere in a built-up area with, for example, nettles and similar vegetation seems to be suitable. The sites at Livingston and Dunbar were both just outside garden fences, suggesting that the snails may have originated in gardens. This was especially obvious at Dunbar, where the snails were just outside the back garden fences of some newly built houses, and associated with discarded pots and plant trays. *H. cinctella* also climbs walls, and can be found underneath boards lying on the ground, as at St Andrews.

It will be interesting to follow the spread of the Girdled snail in Scotland, to see if it is restricted to areas relatively rich in lime (like many built-up areas), or whether it can establish itself anywhere. Although the girdled snail has become established in Edinburgh, why has there been only one record of it in the Glasgow area since 2008? Has it failed to establish itself there, or is it simply that it hasn't been searched for thoroughly? So far, with the exception of the St Andrews record, all the finds have been in the Central Belt, but this could just be observational bias; if *H. cinctella* has been brought to Edinburgh and Glasgow, there seems to be no reason why it should not be introduced into other towns and cities in Scotland. The rapid spread of this snail northwards through England, and now into Scotland, could almost certainly only have happened with, no doubt unwitting, human assistance; sites with newly established gardens, where plants have been brought in from elsewhere, should be particularly profitable when looking for this snail.

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The changing status of the Kerry Slug *Geomalacus maculosus* Allman in Ireland.

Roy Anderson

Speculation about the status of the Kerry Slug *Geomalacus maculosus* Allman, 1843 in Ireland has raged ever since its discovery in the middle of the nineteenth century.

It was a key species in the so-called Lusitanian concept as put forward by the naturalist Edward Forbes. This proposed that those elements of the Irish fauna and flora that it has in common with northern Spain but nowhere in between, survived the last glaciation in refugia off the south coast of Ireland (today under the sea). This theory has largely been replaced after a series of discoveries have shown that not just fauna and flora but also human populations in Ireland are probably derived from northern Iberia. Mascheretti *et al.* (2003) examined the genotypes of Eurasian pygmy shrew across its range in Europe. The Irish population showed close genetic affinity to a population from Andorra but not to that of Britain or other places in Europe. The genetic structure of the population further showed that the entire Irish population had originated from a single founder event. The authors concluded that it had been introduced in the Mesolithic or early Neolithic from south-west Europe, almost certainly by human agency. Human populations, mainly in western Ireland today bear striking genetic and physical similarities to populations in northern Spain (Hill *et al.*, 2000) which can be explained by the same early migrations, apparently across, or along the coasts of, the Bay of Biscay. Of course, Mesolithic hunter-gatherers were largely displaced in the Neolithic by farmers of middle-eastern origin (Cassidy *et al.*, 2016), except in more remote regions like western and northern Ireland and western Scotland. Further research into the human story may provide better understanding of these processes.

The idea of early introduction through human migration has been strengthened by an examination of the genetic affinities of the banded snail *Cepaea nemoralis* in Ireland. The easy assumption that the Irish banded snail is derived entirely from populations in Britain has proven to be false. Grindon and Davison (2013) demonstrated that some Irish populations are from a cryptic Franco-Iberian genetic line, not a north-west European line. Their nearest relatives live today around Toulouse in the south-east Pyrenees. The authors of this paper posited that the banded snail was an item of diet for Stone Age travellers and was probably introduced deliberately as a food source. Another mollusc with Pyrenean affinities in present day Ireland is the Pyrenean semislug *Semilimax pyrenaicus.* When discovered in Ireland in the 19th century this was considered likely to be an accidental modern introduction rather than a native. The idea of early introduction was not considered. Its rarity at the time no doubt reinforced the impression of a vagrant or invasive species in the early stages of colonisation. But it fits the pattern established above. This raises the question of how many other Irish molluscs could have been accidentally introduced from Spain in the Stone Age? Another Iberian slug *Arion flagellus,* like *Geomalacus maculosus,* was described new to science from Ireland, rather than from Iberia (Collinge, who described it, collected material near Schull, Co Cork in 1893). In recent times it seems to have spread from its earlier range in western Ireland to colonise eastern Ireland and Britain. But the Irish population, like that of *Geomalacus,* has very limited genetic range, suggesting it was introduced by a single or limited series of founder events

The Kerry Slug, as part of the 'Lusitanian' fauna, provides a clear example of early introduction, and was probably accidentally introduced in the Mesolithic. One of the mysteries surrounding its occurrence is why it is so strictly confined to the extreme south-west corner of Ireland, never having been recorded, heretofore, outside West Cork and Co Kerry (Platts & Speight, 1988). The most reasonable explanation is that being a frost-sensitive species, this part of Ireland is more suitable and wider expansion would have been restricted by unfavourable climate. Like the pygmy shrew, genetic variability of the Irish population is very low compared to that of Spain (Reich *et al.*, 2015) suggesting a single or at least a very limited number of founder events. It may have been introduced near first landfall for migrants on the coast of south-west Ireland where it is now established.

But the story does not end there! This article was written primarily to show that the range of *Geomalacus* is not static. In 2010 J. Kearney reported a large population of *G. maculosus* from a Sitka spruce plantation at Lettercraffroe in West Galway. This site is about 80 miles north, as the crow flies, from the nearest point in its Co Kerry range. The site was visited in September 2011 by Ben Rowson, myself and

James Turner as part of an exploration of the Irish slug fauna preparatory to writing the FSC handbook of British and Irish slugs (Rowson *et al*., 2014). It is a desolate place with thick peat overlying Carboniferous limestone and planted with large blocks of Sitka spruce. We did not see any *Geomalacus* on the ground or under stones by Lettecraffroe Lake, where we stopped (figure 1). It was only when bark flakes were peeled off spruce trunks in the surrounding forest that their hiding places came to light. Almost every spruce had several slugs squeezed behind bark flakes on main trunks (figure 2). In broadleaf woodland in Co Kerry slugs often squeeze into inaccessible crevices in tree trunks during daylight hours or in dry conditions. They can then be seen only with luck and the aid of a pocket torch. We didn't attempt to estimate the size of the Lettercraffroe population but it must run to many thousands of individuals. All specimens encountered were of the brown colour form. What they feed on in this barren habitat is not obvious. There are some lichens on outer branches of the spruce but otherwise available food appears to comprise algae and detritus on the trunks. However, lichen on spruce branches can make a reliable food source. Foliose lichens are an important resource for large populations of the tree snail *Balea sarsii* in spruce plantations of western Co Fermanagh (pers. obs.). These small snails can be beaten in their hundreds from suitable Sitka spruce in what appear to be unsuitable terrain. Perhaps spruce lichens act as a food source for *Geomalacus* in Galway as well?

There seems little doubt that the Lettercraffroe population has been introduced from the main range of the species in southwestern Ireland, probably transported accidentally with forestry vehicles or timber. An analogous situation has been observed in Northern Ireland where *Semilimax pyrenaicus* appears to have spread to a number of new sites through forestry activity (Anderson, 1992).

So how should *Geomalacus* be classified? It clearly belongs to a relatively narrow type of invasive organism, an 'early anthropic introduction'. After 8,000-odd years of relative stability it may have become better adapted to Irish conditions and, with the influence of climate warming, may now be in a new phase of expansion. If it can survive at Lettercraffroe then it can survive almost anywhere in lowland Connaught. Visitors should keep an eye open for the strange sight of flattened *Geomalacus* under bark flakes on spruce!


figure 1: Lettecraffroe Lake, West Galway.


figure 2: *Geomalacus maculosus* on spruce bark, : Lettecraffroe.

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Molluscs and glow worms – field meeting on the Malvern Hills, 11th April 2016

Rosemary Hill

The purpose of this field meeting was to examine the distribution of molluscs in relation to recorded sightings of the glow-worm (*Lampyris noctiluca*) on the southern section of the Malvern Hills and also to see whether the hedge snail (*Hygromia limbata*) is still thriving at the base of the East-facing side of the Hills. The organiser and three intrepid members attended, in spite of a forecast of heavy rain for the day. The morning began with optimism as the forecast rain was only at the drizzle stage and the party set off up to the ridge from the Blackhill Car Park. While both sides of the hill were examined, it was found subsequently on the 'Where's the Path' website (https://wtp2.appspot.com/wheresthepath.htm) that all records were in VC 37 (Worcestershire) but some also indicated that they were in VC36 (Herefordshire) as well! The vegetation was unimproved short grassland, grading to scrub and deciduous woodland with some fallen timber on the lower slopes. As a general rule, exposure at the top of the ridge favoured plant species of dry grassland, with more persistent dampness from run-off favouring a wider range of species preferring less dry conditions on the lower slopes. There is a high rate of recreational activity over the whole of the Malvern Hills and this would suggest that the site might be unfavourable for molluscs, but reasonable vegetation persisted within the network of official and unofficial paths. The routes of paths have clearly changed with time. Despite this, a good range of molluscs was found but the finds were sparse in the grassland.

Twenty-two species were found on the west-facing side, of which the most interesting was several juvenile *Vitrina pellucida* on a log and only just visible to the naked eye (figure 1). The leaf litter included *Euconulus fulvus* L seg., *Vitrea crystallina* and *Punctum pygmaeum.* Lunch was hastily eaten in the open before the rain became organised for the afternoon and the east-facing slope was examined. Thirteen species were found, including three species in a quarry further down the slope, including *Arion flagellus, Arion fasciatus* and *Vitrea contracta.* The overall impression gained was that this area is not as acid as first supposed although Precambrian granite-like rock is present. The lower number of species found on the eastern side probably reflected the

figure 1: Two juvenile *Vitrina pellucida* (c. 1 mm) on a log, west-facing slope of Malvern Hills. (photo: Tom Walker)

conditions of the day, as heavy rain had set in and no leaf litter was collected. By now all participants were damp and getting chilled within their saturated waterproofs but the three younger participants were still determined to go in search of *Hygromia limbata*. Two headed into the wooded lower slopes (figure 2) towards an ivy-covered cliff face whereas the organiser crossed the main road and examined an ivy-covered stone wall. Both parties found *H. limbata* in abundance (figures 3 to 6) and with a good range of active juveniles and adults, and *Cornu aspersum, Cepaea nemoralis, Arianta arbustorum* and *Clausilia bidentata* were added to the species list giving a total of 25 species. The wet weather favoured the slugs and virtually every snail species was found alive. Attempts to photograph *H. limbata* in the field were thwarted by the wetness of the shells which upset the focussing on the camera. It was suggested that there could be a lot of ivy-covered stone walls in the Malvern area which would repay examination for *H. limbata.*

figure 2: Habitat of *H. limbata* on a wooded lower slope, Malvern Hills. (photo: Tom Walker)

figures 3 and 4: Pale and dark forms of *H. limbata*, Malvern Hills, April 2016. (photos: Tom Walker)

How the mollusc records relate to the distribution of the glow worms is an interesting point. According to a paper by Jenny Palmer 'Monitoring glow-worms *Lampyris noctiluca* on the Malvern Hills Conservators' land' published in a recent issue of the *Worcestershire Record* there was a good cluster of sightings along the top ridge of the hill where we were working but this was not the point at which there was a high density of snails. This suggests that the glow-worms are mobile, hunt for their prey and consume several snails in the course of their lives. It is also possible that they obtain prey in the wooded areas and scrub where the snails are more frequent but climb up the hill to display where their luminescence may be seen over a greater distance. There was no indication that the presence of glow-worms had a serious impact on the molluscs present. Jenny Palmer's observations are that the adults displayed in short grass or open places but that the larvae live in the thick vegetation. So this species needs a mosaic of habitats.

To conclude, the sighting of plenty of active molluscs made up in part for the poor weather but this impacted on the thoroughness of the survey. It would be interesting to find out if the mollusc species distribution really differs on the east (and west) facing slopes of the Malvern Hills.

Acknowledgements

I would like to thank the Malvern Hills Conservators for permission to survey on the site and especially Harry Green whose idea the meeting was and who assisted in obtaining permission and alerted me to Jenny Palmer's paper.

figures 5 and 6: *H. limbata*. Photographs of individuals taken in 2006. See http://www.wbrc.org.uk/WORCRECD/Issue%2026/two_slugs_and_two_snails.htm for more details. (photos: Harry Green)

The keyhole limpet, *Diodora graeca* (Linnaeus, 1758)

Ian F. Smith

Synonyms: *Patella graeca* Linnaeus, 1758; *Fissurella graeca* (Linnaeus, 1758) [in Jeffreys]; *Fissurella reticulata* (da Costa, 1778); *Diodora apertura* (Montagu, 1803); [*F. reticulata*, Donovan in Forbes & Hanley].
Vernacular names: Keyhole limpet; Brenigen bendoll (Welsh); sleutelgathoren (Dutch); fissurelle (French).
For a **Glossary** of scientific terms used, see page 30.

Shell Description

Conoidal, profile is usually straight or concave at anterior, and straight or convex at the posterior (figure 1). The conoid is up to 25 mm long by 10mm high, but intertidal specimens are usually smaller. The apex is about a third of the way from the anterior, with a slit aperture immediately in front of it. The slit, or apical aperture, varies in size on shells of the same size (figure 2); it is rounded at the ends and slightly constricted at the mid-point, sometimes making a keyhole or figure of eight outline.

figure 1: *D. graeca* profiles: straight or slightly concave anterior (on right in image), and a straight or convex posterior. L. 14 – 20 mm.

figure 2: Similar length shells (left has damaged posterior) but the right one is narrower with a larger apical aperture. L. about 17 mm.

Very small young ones have a spiral protoconch, but it is soon lost through expansion of the apical aperture by resorption (figure 3). The rim of the apical aperture is often raised at its mid-point, but resorption may remove this and the mid-point constriction (figure 4). The apical aperture is also constricted at its interior by an encircling shelf (figure 5).

figure 3: Right side view of 5.5 mm long juvenile. The apical, spiral protoconch is enlarged above to show its former shape (white dots), now partly resorbed by the lappets of the growing siphon. The protoconch is entirely resorbed with further growth.

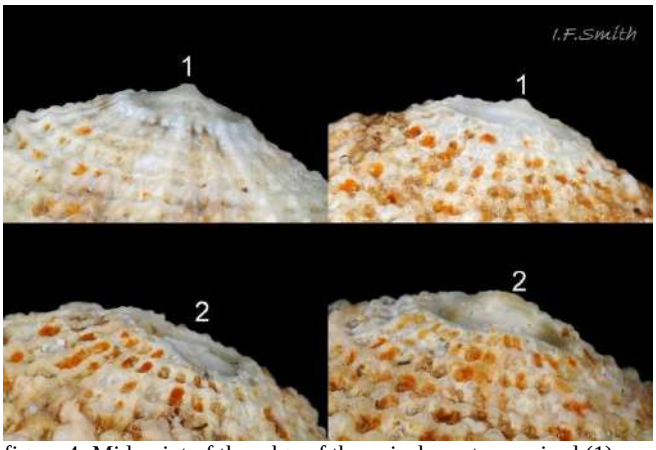

figure 4: Mid point of the edge of the apical aperture: raised (1), eroded/resorbed (2).

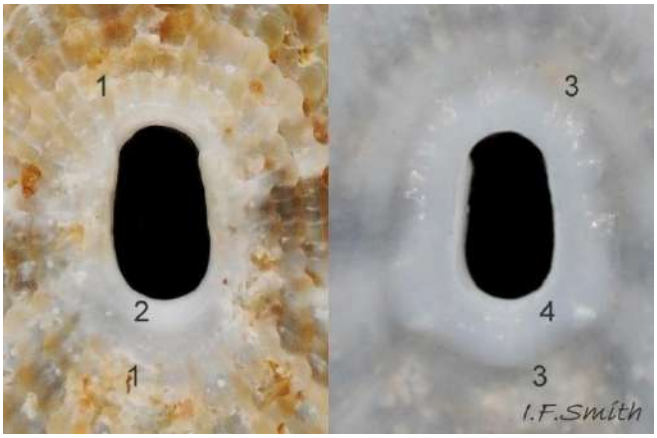

figure 5: Apical aperture: upper edge (1) & basal shelf (2) seen from exterior, and shelf (4) and its outer edge (3) seen from interior.

The main aperture measures up to 25 mm long and 15 mm broad. It consists of an elongated ellipse, the posterior being wider than the anterior (figure 6). The width to length ratio varies (figure 2), and the aperture edge is crenulated by the ends of ridges. The lateral edge of the aperture is arched up from the horizontal and is not moulded to the substrate as it usually rests on the foot (figure 7). The shell's interior is coated with white porcellanous nacre which is thickened into a pronounced rim around the apical aperture (figure 5), and there are short radial grooves at the edge of the main aperture that are aligned with ridges on the dorsal surface. A larval operculum is lost at metaphorphosis. The ground **colour** of the shell exterior is an almost lustreless whitish and/or tan-white with, often incomplete, radiating bands of grey, rusty-, greenish- or dark-brown (figure 2). The bands are faintly visible on the interior (figure 6).

figure 6: The elongated, elliptical aperture, L. 17.5 mm, has an interior of porcellanous nacre. The posterior is wider than the anterior. Exterior radiating bands are faintly visible.

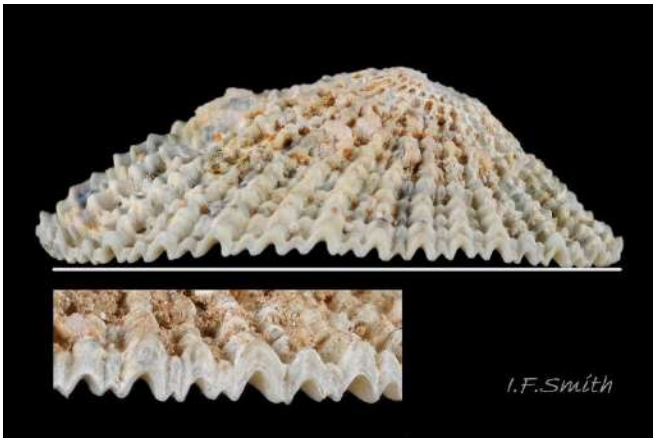

figure 7: The edge of the aperture is arched up from the white horizontal line, and is not moulded to the substrate as it usually rests on the foot. The rim is crenulated by the ends of the ridges.

Live shells are often coated with detritus and epizooic growths (figure 8). Shell colours fade on dead shells (figure 1). The periostracum is imperceptible.

figure 8: A live specimen coated with epizooic growths and detritus. West Anglesey, Wales. March 2014.

Body description

The **flesh** is either cream, yellow (figure 9), orange (figure 10) or red, often spotted with a darker shade, except for the tentacles, part of the snout, and the body above the epipodial tentacles (figure 11). The **snout**, large with thick lips (figure 11), can project downwards or forwards (figure 9). The **cephalic tentacles** are long, either coloured as the body, or paler, without darker spots. There is a small black **eye** on a very small peduncle at the base of each cephalic tentacle (figure 9).

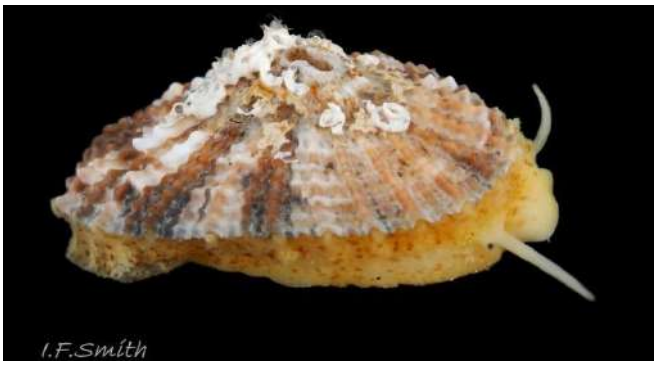

figure 9: Yellow flesh; spotted red except for the tentacles and part of the forward pointing snout. The eye is on a small peduncle at the base of the cephalic tentacle.

figure 10: *D. graeca* emersed under a stone at low tide with much of the orange body exposed. The middle-fold-mantle tentacles are extended at the ends of the shell-ribs.

figure 11: The body above the line of epipodial tentacles lacks spots. The snout is large with thick lips pointing downwards. L.17.5 mm.

The elaborate **mantle** has three folds: (a) an outer fold reaches the aperture rim and is in contact with the inner surface of the shell, producing calcareous matter to line the interior and to enable growth at the edge of the aperture; (b) a middle fold extends as nodular glandular tentacles (which possibly secrete repugnatory matter) protruding at the ends of the radiating shell ridges (figures 10 and 12); (c) a greatly enlarged inner fold forms a curtain, often completely shielding the head and foot (figure 13) but they may protrude when in motion (figure 9) and, at times, the mantle is drawn within the shell (figure 14).

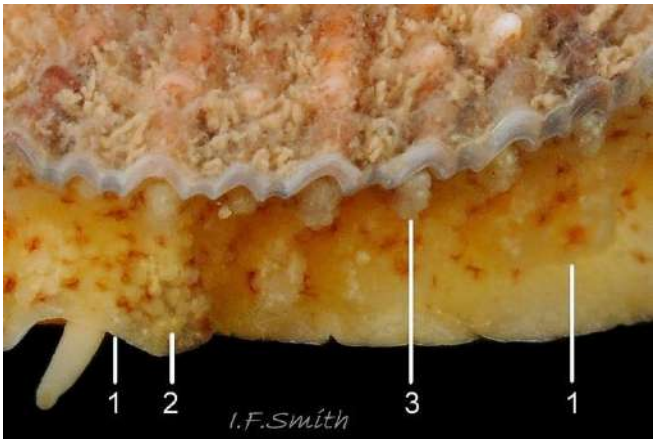

figure 12: 1. edge of the mantle-curtain; 2. nodules on mantle-curtain; 3. nodular, glandular, pallial tentacle at the end of ridge.

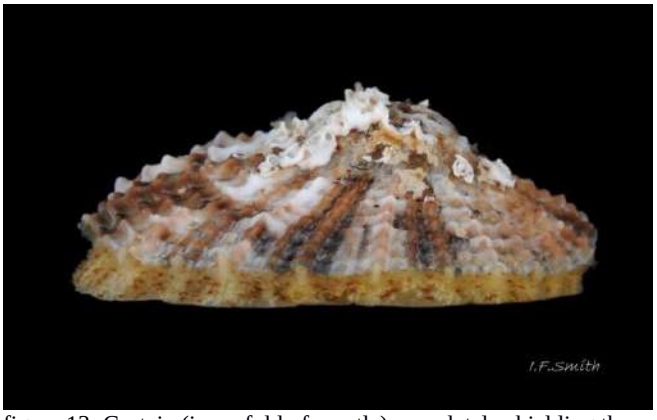

figure 13: Curtain (inner fold of mantle) completely shielding the head and foot from view. Glandular secretions may deter predators. L.16.4 mm

figure 14: Mantle withdrawn. Row of touch-sensitive epipodial tentacles at junction of the spotted foot and plain upper body.

The mantle also extends from the apical aperture/slit as a white to brown **exhalent siphon** accompanied by rounded, densely lobular, anterior and posterior lappets of a similar colour (figures 15 & 16). The lobules may produce repugnatory substances and, very probably, substances to resorb the shell as the apical aperture/slit is enlarged.

figure 15: The apical exhalent siphon with whitish anterior and posterior lappets.

figure 16: The apical exhalent siphon with dark brown, densely lobular, anterior and posterior lappets.

The sole of the **foot** is a broad ellipse (figure 17), the anterior of which is sometimes indented centrally (figure 18). The foot is coloured as the mantle or paler, except the sole which lacks darker spots. When emersed from water, usually, much of the foot and mantle remain exposed (figure 10). Defence may rely on repugnatorial glands in the mantle skirt and sides of the foot, though the latter may be antiseptic rather than repugnatorial (Fretter & Graham 1994). The junction line of the foot with the upper body has a row on each side of about thirty touch-sensitive epipodial tentacles, usually alternating large/small (figure 14).

An enlarged epipodial tentacle at the base of the right eye peduncle has been reported mistakenly for a **penis**, but *D. graeca* has no penis; it has an enlarged epipodial tentacle situated by the left eye in both sexes (figure 19). A strong whitish horseshoe-shape shell-muscle connects the animal to the shell (figure 19).

figure 17: The sole of *D. graeca* is a broad ellipse; coloured as the mantle or paler, but without darker spots. L.17.5 mm.

figure 18: *D. graeca*, showing the anterior of the foot indented, and the mantle covering parts of the foot, snout & cephalic tentacles. L.16.4 mm.

figure 19: View showing the enlarged epipodial tentacle at the base of the left eye peduncle, and part of the whitish horseshoe-shape shell-muscle connecting the shell to the body. The dorsum of the foot is paler than the mantle, with darker marks. L.17.5 mm.

<u>Internal anatomy visible with simple dissection</u>

When the shell is removed, the whole mantle is exposed. The central part is translucent except for the white to brown apical siphon, siphon-lappets and a broad collar around the siphon. Several features can be seen through the mantle (figure 20), but are more easily viewed if it is removed (figure 21) .

The peripheral mantle skirt has dark scallop marks where it fitted the crenate shell-edge (figure 21). In the nuchal cavity above the head, and below the apical siphon, are two ctenidia, symmetrically arranged with the central anus and kidney opening at their base (figure 22). Behind the anus are the kidney, digestive gland, and the orange and granular female-gonad with ova (figure 21), or the whitish male-gonad (figure 20). Next to the left ctenidum is the style sac region of the stomach. Encircling the viscera, and separating them from the mantle skirt, is the white horseshoe-shaped shell-muscle (figure 19) severed to remove the previously anaeshetised and killed animal from the shell (figure 21).

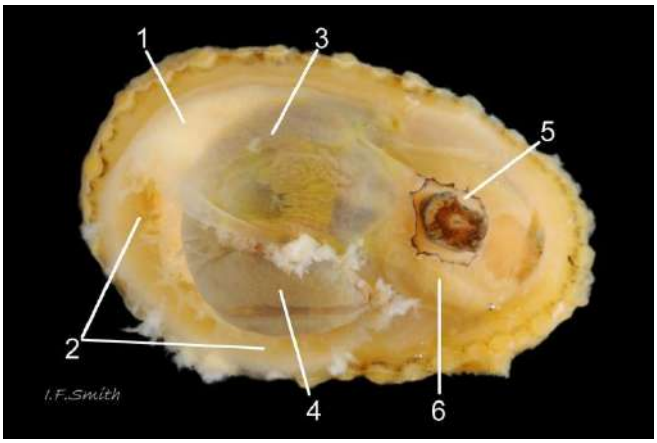

figure 20: Internal anatomy of a male *D. graeca* showing: 1. part of the white male-gonad under the translucent mantle; 2. two thirds of the male gonad removed; 3. translucent mantle over the digestive gland; 4. digestive gland exposed; 5. siphon, lappets and dark edged collar of the substantial mantle; 6. mantle over the ctenidium. L. 17.5 mm.

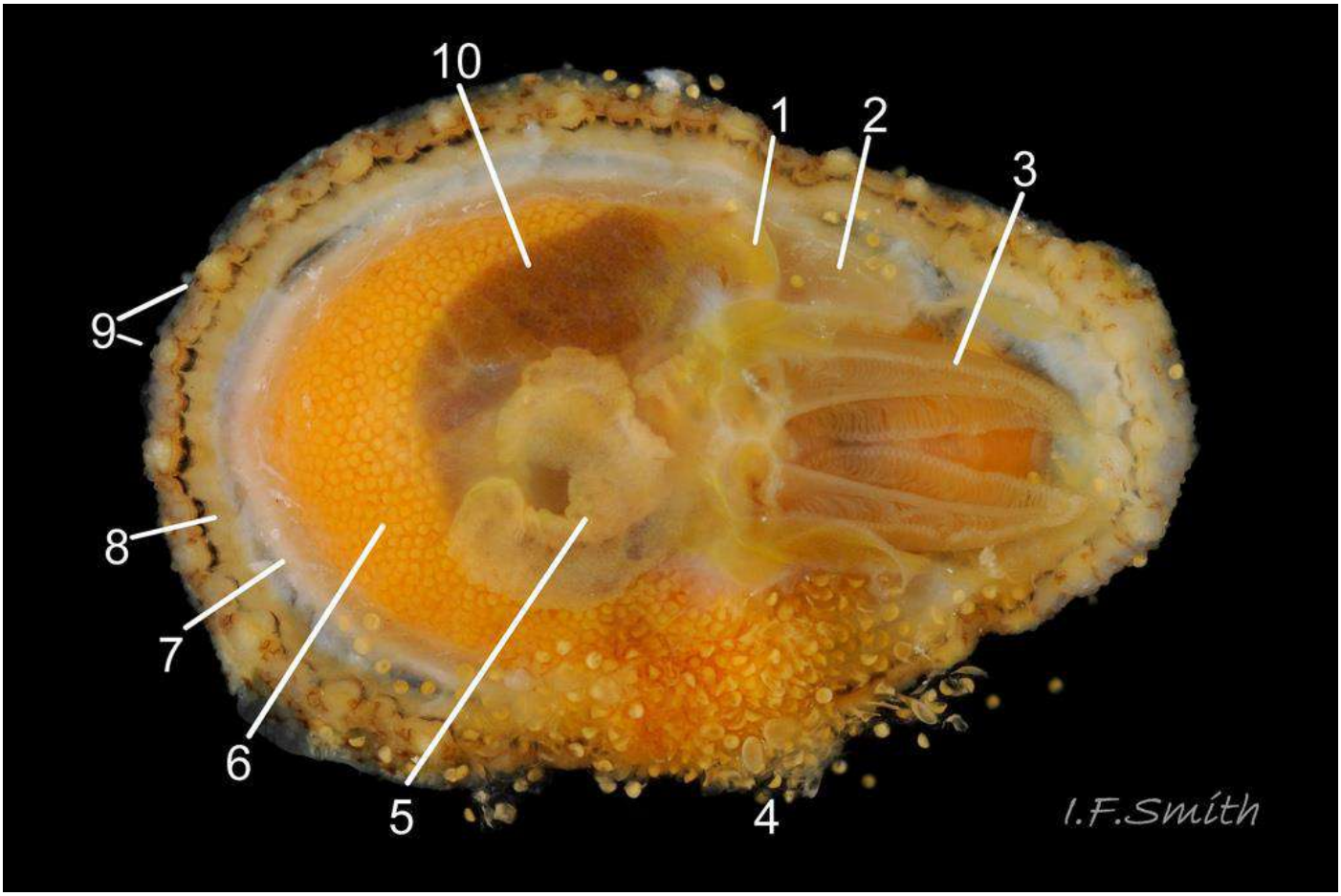

figure 21: Dissection of a female *D. graeca*: 1. short rectum; 2. style sac region of stomach; 3. left ctenidium; 4. ova spilling from rupture in ovary; 5. kidney; 6. ova in female gonad (ovary); 7. severed white shell-muscle; 8. outer mantle fold with dark scallop marks where it fitted the crenate shell-edge; 9. mantle tentacle; 10. digestive gland. Shell length 16.4 mm.

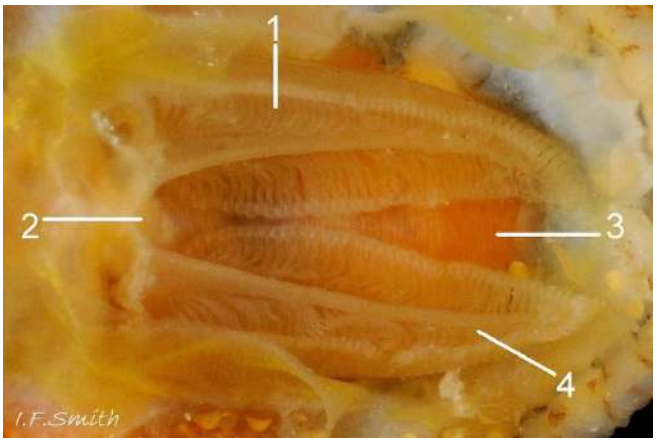

figure 22: Contents of the nuchal cavity below the apical siphon: 1. left ctenidium; 2. anus and urogenital openings; 3. dorsum of head. 4. right ctenidium.

Key identification features

Diodora graeca

- Limpet with 'keyhole' aperture in front of forward tilted apex, one third of the way from the anterior edge of the shell.
- Maximum size: height 10 mm, length 25 mm.
- Littoral and sublittoral on most rocky coasts of Britain & Ireland, but not the North Sea or N.E. Irish Sea.

A similar species

Puncturella noachina

- Limpet with narrow slit aperture in front of a backward curving, nearly central, apex.
- Slit partly blocked internally by septum.
- Maximum size: height 4 mm, length 7 mm.
- On stones from hard bottoms at 20 m to 150 m deep in Scottish waters, south to Yorkshire, and littoral in the Arctic.

Habits and ecology

Sublittoral to 250 m on hard substrate where sponges grow, including oyster beds, dead shells and rocks. As the apical aperture and exposure of the foot reduce resistance to dessication, littoral specimens are restricted to permanently moist niches near LWS, such as the underside of large stable rocks that are not embedded in sediment. *D. graeca* prospers where there is a moderate amount of suspended matter in the water if it is able to crawl on rock to avoid being smothered; the shell is often coated in epizooic growths with adhering detritus (figure 23). It lives in fully marine salinity down to 21‰.

Water enters the mantle cavity from the front and both sides, flows over a pair of respiratory **ctenidia** and a central anus (figure 22) and exits with faeces through

the apical siphon. Detritus and faecal matter too dense to be swept upwards are cleared via the main aperture by periodic forcible contraction of the shell-muscle to clamp down the shell like a sink-plunger. Experimentally blocking the apical cavity of the American species *Diodora aspera* produced no observable harm; the flow became inhalent at the sides, and exhalent at the anterior (Voltzow & Collins in Wylan). But the passage of faeces over the ctenidia makes sanitation problems more likely in the long term.

The limpet clings to the same spot on a rock for long periods and returns after feeding expeditions. The foot adheres strongly, but not as well as patellid limpets, so it cannot survive in such wave-exposed positions as they can. The large mantle curtain and parts of the head and foot are exposed as it moves (figure 24).

figure 23: At rest; the mantle-curtain concealing all of the body except the posterior tip of the foot. The shell is coated in epizooic growths with adhering detritus. L.17.5 mm.

D. graeca **feeds** on sponges, especially *Halichondria* and *Hymeniacidon* and, perhaps, some detritus. Its flesh colours match the colours of the sponge. A string of mucus with food particles in it is moved through the stomach by the rotary action of a gelatinous rod, the 'crystalline style'. The style sac part of the stomach is next to the left ctenidium (figure 21). As faeces are directed away from the ctenidia to the apical siphon there is less need for compaction to avoid contamination, so the intestine is much shorter and less looped than in most patellids (figure 21).

Breeding takes place between December and May (in Plymouth). External fertilization is performed by the, presumably proximate, male as the female spawns. Sperm emerges from the kidney opening adjoining the anus (figure 22). In the ovary, the eggs have reticulated orange shells (figure 21). Spawn exits the anterior of the mantle cavity as a continuous stream and is spread by the foot on the underside of a rock where the ova swell into a continuous, yellow, adhesive, gelatinous sheet several centimetres across, that soon hardens. Ova are arranged one deep, each touching its neighbours. Both trochophore and veliger stages are passed in the ova. Young emerge as crawlers with a spiral protoconch of 1.5 whorls with no apical opening. As each grows, a slit appears in the anterior edge of the mantle with an associated slit in the margin of the developing cone (enlarged body-whorl). Later, the mantle slit closes at the margin, leaving the earlier slit in the mantle and shell as a hole on the anterior face of the shell. Further differential growth results in the hole migrating to the apex of the shell in the adult, and the loss of the protoconch by the resorption enlarging the hole.

figure 24: In motion; the foot and cephalic tentacles protruding from the darker mantle-curtain. The siphon and dark brown lappets are well expanded from the apical aperture. L. 17.5 mm.

Distribution and status

Faroe Islands to Canary Islands, eastern Mediterranean and Aegean. It is found on hard substrate around Ireland, the Isle of Man, and the south and west coasts of Britain from Kent to Caithness, Orkney and Shetland. Apparently, it is absent from the N.E. coast of the Irish Sea and from the North Sea, except for occasional beached fossil *Diodora* sp..

Links and references

Larger versions of the images, and an account with links to free PDFs of many of the following references, can be accessed on-line at https://flic.kr/p/neEJnk.

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Current taxonomy: World Register of Marine Species (WoRMS).

Glossary

‰ − parts per thousand. (Sometimes abbreviated p.p.t.)

aperture – mouth of gastropod shell; outlet for head and foot.

apical aperture (on *Diodora*) − hole for siphon at apex of shell. a.k.a. slit or keyhole.

cephalic (adj.) – of or on the head.

ctenidium – comb-like molluscan gill; usually an axis with a row of filaments either side.

epipodial (adj.) – of the epipodium.

epipodium – collar or circlet running around sides of foot of some gastropods, often bearing epipodial tentacles.

LWS – low water spring tide level (level reached by lowest low tides for a few days every fortnight; Laminaria or coralline zone on rocky coasts).

mantle – sheet of tissue that secretes the shell and forms a cavity for the gill in most marine molluscs.

operculum – plate of horny conchiolin, rarely calcareous, used to close shell aperture.

periostracum – thin horny layer of chitinous material often coating shells.

repugnatorial – serving to repel enemies.

resorb – absorb again.

trochophore – spherical or pear-shaped larvae that swim with aid of girdle of cilia. Stage preceding veliger, passed within gastropod egg in most spp. but free in plankton for patellid limpets, most Trochidae and *Tricolia pullus*.

veliger – shelled larva of marine gastropod or bivalve mollusc which swims by beating cilia of a velum (bilobed flap).

The mud pond snail (*Omphiscola glabra*) – what is its current status?

*Hannah Shaw**

The Freshwater Habitats Trust is seeking volunteers to help update the records for this rare temporary pond specialist

Following on from Mags Cousins' article about the status of the mud pond snail in Shropshire in *Mollusc World* issue 42, this article sets out an overview of this species in England and Wales and further highlights the need for updated records.

figure 1: Adult *Omphiscola glabra* sieved from a flooded area of marshy grassland, dominated by *Juncus effusus* and *Deschampsia cespitosa*, near Crossgates, Radnorshire. January 2017.

The mud pond snail *Omphiscola glabra* is a Nationally Scarce (RDB 2: 1991) aquatic snail that appears to be continuing to decline throughout its British range (figure 1). This interesting little snail is a member of the pond snail family *Lymnaeidae* and is related to the commonly occurring great pond snail *Lymnaea stagnalis* and the wandering snail *Radix peregra* both of which are frequently found in garden ponds, however, the pond mud snail requires clean, seasonally wet pools and ditches with low nutrient levels and it is often the only aquatic snail present in suitable habitat. Where it does occur with other species, these associates are also temporary pond specialists, and it can often be

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found with the moss bladder snail *Aplexa hypnorum* and the red-crusted pea mussel *Pisidium personatum*. In the past, these slightly richer habitats may have been discounted and therefore the mud pond snail may have been overlooked. It can occur amongst a more diverse snail community, especially in woodland temporary pond settings, where less well adapted snails can survive the dry phase in damp leaf litter. In these settings, it is not unusual to find mud pond snail with dwarf pond snail *Galba truncatula*, marsh snail *Lymnaea palustris*, and Leach's bithynia *Bithynia leachii*.

The mud pond snail is widespread but Janus (1965) described it as having a 'local distribution, occurring in small ponds and ditches, those liable to dry out'. Macan (1977) described it as uncommon. The species has declined in the last 50 years and has disappeared from large areas of Southern England (JNCC, 2010). It is now classified as Near Threatened on the IUCN red list. This rapid decline has largely occurred through loss of habitat due to the drainage of damp agricultural land, and the resulting loss of seasonally flooded depressions, to improve pasture. It has also suffered from the loss of clean unpolluted habitats; in the last Countryside Survey 92% of ponds were found to be biologically degraded. Some loss of habitat may also be attributed to direct habitat destruction where attempts have been made to eradicate the dwarf pond snail *Galba truncatula* which is the intermediate host of the liver fluke *Fasciola hepatica* – a serious parasite of sheep. Ironically, some well-meaning conservation projects have also resulted in the loss of *O.glabra* habitat. Typically, this has occurred where seasonal ponds have been deepened to create permanent waterbodies.

The importance of temporary ponds to biodiversity should not be under estimated! As well as the *O. glabra*, other rare temporary pond specialists include fairy shrimp *Chirocephalus diaphanus*, tadpole shrimp *Triops cancriformis*, several species of water beetle and cladocerans and numerous wet mud plants, such as pillwort *Pilularia globulifera*, mudwort *Limosella aquatica*, and starfruit *Damasonium alisma*. *O. glabra* now appears to be restricted to areas of non-intensive agricultural pasture in Wales, with the UK strongholds in Yorkshire, Dartmoor, south-east Cornwall and the New Forest in Hampshire where there are large areas of uncultivated heaths and commons which support this snails' specialist habitat of small pools, ditches and marshy areas. Whilst *O.glabra* does not have any legal protection, it is a Priority Biodiversity Action Plan (BAP) species, and as such, is listed on the NERC Act's Section 41 & 42 List of Species of Principle Importance for the Conservation of Biological Diversity, in England and Wales, respectively (in Wales, the Section 42 Species List has now been superseded by Section 7 of the Environment Act 2016 and the new 'priority' (Section 7) species list is being compiled).

It is disappointing, that the recent Review of Non-Marine Molluscs (Seddon et al, 2015) assesses the current status of *O. glabra* as being of Least Concern, particularly as evidence suggests it is continuing to decline outside of its major strongholds. For example, in the Cheshire, Manchester and Merseyside region, repeat surveys in the last two years have produced very low numbers or no *O. glabra* from previously known sites which are now affected by water pollution issues. However, given that this species is still declining, the review recommends that the status of *O. glabra* be kept under review as more information becomes available. This recent reduction in status is concerning as it may have implications for accessing future funding for conservation projects for this species.
In Wales, the species has always been of Local distribution (JNCC, 2010) and recent visits by the author and colleagues indicate that it has been lost from the majority of its previous known sites, of which there are less than a dozen. However, encouragingly, three new sites have been found in the last 10 years, one on the Llyn Peninsula and one in Radnorshire and one in Montgomeryshire. Two of these sites appear to be isolated seasonal ponds within areas of semi-improved sheep-grazed pasture (figures 2 & 3) and the third site is a seasonally flooded depression densely vegetated with rushes *Juncus* sp in the corner of a semi-improved sheep-grazed field (figures 4, 5 & 6). Both seasonal ponds also support a large population of *A. hypnorum* with smaller numbers of *O. glabra* being present, but the seasonally flooded depression only supported *O. glabra* and a pea mussel *Pisidium* sp.

Although these new sites have been found in Wales, the species is probably still declining, particularly as its remaining habitats are extremely vulnerable to slight changes in management and nutrient pollution. Given the small number of records for this species in Wales, and the potential

to find new sites, if you live near to suitable habitat please do check for *O. glabra* and if you're lucky enough to find them don't forget to send me your record!

figure 2: A dry seasonal pond near Guilsfield, Montgomeryshire. September 2015.

figure 3: The same seasonal pond nr. Guilsfield, Montgomeryshire in June 2016.

figure 4: seasonally flooded marshy grassland near Crossgates, Radnorshire. The *O. glabra* were present in the flooded areas amongst the *Juncus effusus* to the right of the photograph centre. January 2017.

figure 5: Close-up of seasonally flooded marshy grassland, showing pools, near Crossgates, Radnorshire. The *O. glabra* were present in these pools with many juveniles (1–2 mm) present in the sample tray. January 2017.

figure 6: The *O. glabra* are present in the flooded areas amongst the submerged dead grass and rush stems. January 2017.

The Freshwater Habitats Trust's Heritage Lottery Funded *People, Ponds and Water Project* has just entered its third and final year. Our focus this year is to undertake surveys for restricted pond plants and animals, including *O. glabra*. With the help of our wonderful volunteers, we aim to survey as many known sites for *O. glabra* in England and Wales as possible, in order to update the records and gather information on the habitat to clarify the current status of this snail (see https://data.nbn.org.uk/ Taxa/ NHMSYS0020528236/Grid_Map for distribution)

This new and updated information will fill the information gap, provide a comprehensive up to date baseline from which the current status of this snail can be monitored, as well as enabling an accurate assessment of its current status. This can then inform targeted conservation action that will ensure that this endearing little snail has a long term future in the British countryside.

The optimal survey period is Winter and early Spring whilst the 'ponds' hold water, although through periods of dry weather, you might be lucky to find them surviving the drought in a dormant state under exposed stones or logs.
As part of the People, Ponds and Water Project, if you are visiting a known site, we will arrange landowner permissions for you and provide a Survey Information Pack which includes a standardised recording form, detailed location map and health and safety information. If you are interested in helping survey for this species and to find out if there is a pond requiring a survey near you, please visit our website or get in touch with Laura Quinlan, PPW Project Administrator (l.quinlan@freshwaterhabitats.org.uk).

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Freshwater Habitats Trust

Ron Boyce (1932–2015): an appreciation

Rosemary Hill

Ronald Boyce was born in South Shields on 23rd October 1932. The Second World War cut a gap in his childhood when access to the beach and to transport was very limited. After the war ended a Sunday School trip held at Rainton Park Woods was virtually the first time he had seen a sizeable wood or a river apart from small polluted remnants. This might well have been an experience which in the modern world would equate to a visit to a tropical rainforest and it was his favourite place. His mother taught him his wild flowers at an early age and was willing to tolerate the mini aquaria resulting from childhood trips to local ponds and streams. Even when this extended to asking him to retrieve his wandering snails from the kitchen when they had lived up to their name! His father also knew the doorman to the Dove Marine Laboratory at Cullercoats so he was able to study the marine aquaria at no cost. These opportunities, and the encouragement of the Head of Biology at his Grammar School, Robert Hunter, helped forge his passion for natural history. He joined the Northern Naturalists' Union and became their oldest continuous member. They were surprised to find he was still an active member when he attended the occasional field meeting when on holiday up north.

He obtained a degree in Zoology and Entomology from Newcastle University when it was still part of Durham University. This would not have been possible for him except that grants became available at the right time. He married in 1959 and had two children, Heather and Walter. His longstanding interest in photography was fostered by the Photographic Club at the Grassland Research Institute but when this closed down, he joined the Conchological Society of Great Britain and Ireland in 1991 and the British Entomological and Natural History Society in 1992. He was Programme Secretary for the Conchological Society until nearly 80 years of age and attended most of the meetings and provided photographs from these events for the Society's publications. In recent years, he became a member of the Wyre Forest study group and went to many of their meetings. One of their members described Wyre as a little bit of the north that had made its way further south and this may explain why it had such a strong appeal for him.
Ron loved to be outside, searching for rarities in all parts of the country and in the company of other experts. Every day he would go out to see what was new in the garden as if he had never seen it before. He was always keen to garden and most sessions were interrupted while he sought to photograph and identify some creature that he had found. Connecting with nature is what kept him young and responsive to life.

Apart from many trips to Durham and Northumberland a favourite holiday destination was New Zealand where he could get to grips with a different fauna and flora and indulge his passion for photography. On the last trip he made to that country when he was 80, he was still game to climb a 600-year-old volcano and gaze down into the crater.

He still achieved a lot despite a life punctuated with hospital visits and treatments in his last few years. If not well enough to be active, he would still sort shells from grains of sand ready for identification. He would claim not to know the names of micro molluscs, and he did not say when he had found something different. However, when I had the surprise of finding something I had not seen before, he could almost invariably name it correctly. Once his immune system became impaired, he was unable to travel up to the crowded Natural History Museum but still enjoyed seeing some of his Conchological Society friends at the Shell Show and at the Molluscan Workshops. He was very fortunate that the treatment he received enabled him to continue to do most of the things he loved and have a high quality of life until his closing days.

British Shell Collectors' Club

Sat. 29th April 2017 Shell Convention
Sat. 28th October 2017 Shell Show
Theydon Bois Community Centre,
Coppice Row, Theydon Bois, CM16 7ER.
Open from 9am to 5pm. Admission free.

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

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

Seven very successful Congresses of the European Malacological Societies have been held, each hosted by a national Society. Now it is our turn, and on behalf of the The Association of Polish Malacologists, it is our great pleasure to invite you to the historic city of Kraków, Poland, for the eighth Congress

(**8th EUROMAL**) from

10th to 14th September 2017.

The Congress acts to bring together both young and experienced malacologists from across Europe and the wider world.

The latest advances in all aspects of Malacology will be presented, including the use of malacological research in practical issues of pest control and medicine. It offers the chance to meet potential collaborators from many countries, and to present work in progress for constructive comment.

There will be sessions covering all aspects of Malacology, determined by the number and relatedness of contributions as talks or posters.

Here is the opportunity to showcase your work and find new contacts.

Please join us in the always sunny Gold Polish Autumn in Kraków, for both work and pleasure in September 2017!

Tadeusz Zając
on behalf of the Association of Polish Malacologists.

e-mail: euromal2017@iop.krakow.pl
See http://www.euromal.pl/ for further details.

WANTED –

copies of the Journal of Conchology up to August 2012 (vol, 41 part 1)

I am often asked if we have back copies of the Journal, and our holdings are very low on old issues.

If you have any spare and would consider donating them to the Society, please let me know.

Tom Walker
Publications Sales Manager; sales@conchsoc.org.

FSC

2017 Field Studies Council Mollusc Courses

Land snail identification: Fri 28th – Sun 30th April at Juniper Hall, Dorking, Surrey. £240 residential. Tutor June Chatfield enquiries.jh@field-studies-council.org Tel: 01306 734501.

Slug identification: Sat 20th May at Blencathra, Keswick, Cumbria £40 non-residential. Tutor Chris de Feu enquiries.bl@field-studies-council.org Tel: 017687 79601.

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

Yorkshire Naturalists' Union

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

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

Sunday 30th April: Thornwick Bay, Yorks.
Sunday 28th May: Filey Brigg, Yorks.
Saturday 24th June:
Red Acre Beach, Seaham, Co. Durham.
Sunday 25th June: Boggle Hole, Yorks.
Saturday 22nd July: Saltburn, Yorks.
Saturday 12th August:
South Bay, Scarborough, Yorks.
Sunday 10th September: Runswick Bay, Yorks.
Sunday 8th October: South Landing, Yorks.

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
The Rectory, 8 Rectory Close, Clifton, Shefford, Beds., SG17 5EL
E mails: president@conchsoc.org /magazine@conchsoc.org

HON. GENERAL SECRETARY: Rosemary Hill
447b Wokingham Road, Earley, Reading, RG6 7EL
Email: secretary@conchsoc.org

HON. TREASURER: Nick Light
The Old Workshop, West Street, Winterbourne Kingston,
Dorset, DT11 9AX Email: treasurer@conchsoc.org

HON. EDITOR OF THE JOURNAL OF CONCHOLOGY (Acting)
Anna Holmes, National Museum of Wales, Cathays Park,
Cardiff, CF10 3NP Email: journal@conchsoc.org

FOR BACK NUMBERS OF CONCH. SOC. PUBLICATIONS
please apply to:
Tom Walker, 38 Redlands Road, Reading, RG1 5HD.
E mail: tom@tmwalker.co.uk

RECORDING AND CONSERVATION

HON. CONSERVATION OFFICER: Martin Willing
14 Goodwood Close, Midhurst, Sussex, GU29 9JG
Email: conservation@conchsoc.org

HON. MARINE CENSUS RECORDER: Simon Taylor
Fiddlesticks, 44 Strawberry Lane,
Tolleshunt Knights, Essex, C05 0RX
E mail: marine@conchsoc.org Phone: 01621 810141

HON. NON–MARINE CENSUS RECORDER: Adrian Norris
17 West Park Drive, Leeds, LS16 5BL
E mail: nonmarine@conchsoc.org

SUBSCRIPTIONS and MEMBERSHIP

Please send subscriptions or directly related enquiries to
Carolyn Postgate, CIRCA subscriptions, 13-17 Sturton Street,
Cambridge, CB1 2SN
E mail: shellmember@gmail.com

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. • 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 July 2017 issue should be with the Hon. Editor prior to 1st June 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 members have 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).

2017 Ms J. Joseph, 344 Quinton Road, Harborne, Birmingham, B17 0RE josephj-2007@hotmail.co.uk *C F G Mb Nb W*
2017 Dr H. Perry, 35 Cardiff Road, Dinas Powys, CF64 4DH hilaryjperry@aol.com *B C G Nb*
2017 Ms E. Tong, 3 Penfold Terrace, Kirkby Fleetham, Northallerton, North Yorkshire, DL7 0RZ emma.tong@york.ac.uk *A B C D G Mb Mf P Z*

The codes in italics indicate the member's interests:
A – Applied conchology; B – Conchological books; C – Conservation; D – Diving; F – Fossils; G – General malacology including genetics/physiology; Mb – British marine; Mf – Foreign marine; Nb – British non-marine; P – Photography; W – Conchological poetry and prose Z – Captive breeding.

Change of address
Dr J.P. Fan, 5, Jalan 4/53A, Petaling Jaya, Selangor 46050 Malaysia jpfan3@gmail.com
Mr F.C. Naggs, 82 Sandbourne Avenue, Merton Park, London, SW19 3EN

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 April 2017: **FIELD MEETING** (non-marine (and marine)): Golden Cap, Chideock, Dorset.
Leader: Chris Gleed-Owen (07846 137346, chris@cgoecology.com). Jurassic Coast soft cliff site with diverse habitats, including calcareous seeps. Meet at 11:00 in car park at Filcombe Farmhouse (local NT office: SY 407/929). (Marine: small reef and pools below cliff with long walk in; if interested, meet Bas Payne at 12:30 at Seatown car park (SY 421/917). Low tide (+0.7m) 15:40.)

Saturday 8th April 2017: ANNUAL GENERAL MEETING AND PRESIDENTIAL ADDRESS. Speaker: Helen Scales: **'Spirals in Time; exploring the secret life and curious afterlife of molluscs'.**
14:30 – 17:30 (PLEASE NOTE THE LATER START TIME): Angela Marmont Centre, Natural History Museum, Cromwell Rd., London SW7 5BD. (Council members please note that there will be a Council meeting before this meeting.)

Sunday 21st May – Sunday 28th May 2017: FIELD MEETING (marine): Kirkwall, Orkney.
Leader: Simon Taylor (01621 810141, marine@conchsoc.org). Shore work; at least one boat sampling trip; and a visit to the Rendall collection in Stromness Museum and possibly to other local collections. Further details from the leader or see website.

Friday 26th May 2017: FIELD MEETING (non-marine): Yardley Chase SSSI, Northamptonshire.
Leaders: Alan Outen and John Showers; CS contact: Peter Topley (president@conchsoc.org, 01462 615499). Joint meeting with the Bedfordshire Invertebrate Group and the Dipterists Forum. Large area of ancient woodland, parkland and meadows, with ponds. Site with strictly controlled access; please book by 12th May; meeting details will be provided.

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.

Saturday 16th September 2017: FIELD MEETING (non-marine): Carlton Marsh, nr Lowestoft, Suffolk.
Leader: Toby Abrehart (toby@abrehartecology.com). Joint meeting with Suffolk Naturalists Society.
River margins, fens and marshes, *Anisus vorticulus, Mercuria confusa* and others.
Meet at 10.00 at Carlton Marshes Visitor Centre NR33 8HU.

Sunday 17th September: FIELD MEETING (non-marine): East Devon. Leader: Keith Alexander (keith.alexander@waitrose.com; 01392 413092) Looking for *Malacolimax tenellus*. Further details tba.

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.

Please note the following further dates in 2017 for your diary:
Saturday 21st October 2017: INDOOR MEETING 14:00: NHM, London (preceded by Council meeting)
Saturday 18th November 2017: REGIONAL MEETING (venue probably Cambridge)
Saturday 9th December 2017: INDOOR MEETING 14:00: NHM, London (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.