

Mollusc World

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The
Conchological
Society
of Great Britain & Ireland

Bristol Regional Meeting
Snail art in Brighton
David Long memorial field
meeting

From the Hon. Editor

The November regional meeting of the Conchological Society in Bristol was a very interesting and successful event; an account of the meeting can be read in the first article of this issue. Please don't forget to consider sharing any recent conchological experiences, or items of historical interest, with other members by writing something about it for Mollusc World. The Hon. Editor would also be interested to receive any snippets of mollusc-related news for inclusion in the next issue (details of how to submit are on page 23)

Peter Topley

Hon. Conservation Officer

The Conchological Society's current Hon. President, Dr Martin Willing, has also been the Society's Hon. Conservation Officer since the post's inception in 1984. Martin has informed CS Council that it is his intention to resign from this position from the April 2020 AGM.

The Society invites enquiries from anyone who may wish to consider this vital and rewarding voluntary role. Please contact either Martin, or the Hon. Secretary Rosemary Hill, for further information. (see page 23 for contact details).

In an article for the June 1984 Conchologists' Newsletter, Martin concluded with the words: 'The Conchological Society has an important part to play in ensuring that molluscs and their habitats are conserved for future generations.' Over this long period of time Martin has enabled the Society to 'punch above its weight' in this important area. Much of this has been possible through Martin's belief from the start (and held by many of us) that a key aspect to effectiveness is when organisations and individuals collaborate in sharing resources and expertise.

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 23 for further details).



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

Front Cover: Brighton Snailspace art installation: 'FABtastic', designed by Brandwatch and Specialist Models. (see page 14) (photo: Peter Topley).

Regional indoor meeting: M-Shed and City Museum and Art Gallery, Bristol 10th November 2018

Peter Topley

This regional meeting of the Conchological Society was kindly organised by Rhian Rowson, Natural Sciences Curator at Bristol Museum & Art Gallery and Ben Rowson (Amgueddfa Cymru, Cardiff). The first part of the meeting comprised four excellent and varied talks of molluscan interest and this took place at M-Shed, a museum located on Prince's Wharf beside the Floating Harbour in a dockside transit shed formerly occupied by Bristol Industrial Museum (figure 1). The museum features exhibits exploring life and work in the city, but also had a room suitable for this part of our meeting.



figure 1: M Shed, Bristol. Venue for the first part of the 2018 regional meeting.

The following summaries of the talks are taken from my notes and recordings made on the day with the speakers' permission. Any inaccuracies or mis-quotations that may have slipped in will be entirely mine.

A tale of two species, adventures in the intertidal

Peter Barfield, Portsmouth University.

Peter (figure 2) is looking at non-native species in the Solent. The first part of his talk focused on his discovery of the poorly ribbed cockle (*Acanthocardia paucicostata* (G. B. Sowerby II, 1834)) in UK waters (Barfield, 2017) at the entrance to Southampton Water. The area is within the New Forest District Council boundary and also within the National Park. It is an important area in conservation terms, being an SSSI, Ramsar (wetland of international importance) and Special Protection Area (a protected site classified in accordance with Article 4 of the EC Birds Directive). The first find of *A. paucicostata* happened during a general check of the site on 9th July 2016. Peter walked across the shore noting the various conspicuous species and the types of habitat that were present. During that walkover he noted an *Acanthocardia* shell, picked it up and saw that it was whole and also that the shell was particularly light. He collected it and walked on. He didn't photograph it *in situ* or GPS waypoint it at the time although he was confident within 100m as to the location. The specimen is now with the Amgueddfa Cymru/National Museum of Wales (NMW). The shell has the characteristic ribs and interspaces that are found in *Acanthocardia*. On the inside of the shell the fluting goes well into the back of the shell, not just at the edge. One of the key features of the shell of *A. paucicostata* are the striations which go across the interfaces and up over

the ribs as well. The species does not have as many ribs as other *Acanthocardia*, between 16–18, and the ribs are very angular in shape, as was the case here. The species was initially keyed out using online resources and then he contacted NMW. Subsequent to publishing this find in the *Journal of Conchology* (Barfield, 2017) Peter had three more finds of shells. The first and the second shells were found intertidally, complete shells with a fair degree of colouration, whereas the 3rd and fourth were rather worn single valves found well up on the shingle. These finds indicate that it is more likely that there is a population living within the Solent area; i.e. they are not 'wash-outs' from a previous epoch. Various questions arise. When did it get here? How did it get here; was it a range expansion or an introduction? These questions were not possible to answer from the few shells found but populations are present in the Bay of Biscay and more recently on the French coast and an introduction in the Netherlands. Peter indicated that the species may have made the hop across the channel and it may have been assisted in some way. There are no live records to determine whether the species is established.



figure 2: Peter Barfield giving his talk, M Shed, Bristol.

The second part of Peter's talk focused on evidence for the occurrence of the Asian date mussel (*Arcuatula senhousia* (Benson, 1842)) in the Solent. This work has also been recently published (Barfield, P. et al 2018). The first shell was of a probably bored and eaten individual found on the East side of the Solent on a heavily used shore. Subsequent to writing the paper many live specimens were found either largely buried or lying on the surface and small clusters were seen, often occurring with *Peringia ulvae* and *Cerastoderma edule* both of which are abundant on the shore. Specimens were also found amongst dwarf eelgrass.

They can live happily in a byssus thread 'cocoon' in soft sediment, but can attach to hard surfaces (for example *Cerastoderma*, rope etc) as well. Shells were also found on the strandline. Interestingly the NBN Atlas now has nine records of *A. senhousia* from 2016, a year before Peter found it. The records are from the Environment Agency (EA) and are from further north in the Solent, towards Nettlely near Southampton. On contacting them they stated that their Water Framework Directive benthic monitoring programme had been sampling in Southampton Water every three years from 2007 and their first records of *A. senhousia* dated from 2011. It is not known why these earlier records have not made it to the NBN Atlas. This species has the potential to form dense stiffling mats excluding other species, however this has currently not been observed and the fragile

shells are no doubt easily predated upon by fish and other invertebrates. Recent work has shown that *A. senhousia* is now occurring further North in the Netherlands (Faasse, M., 2018) and more monitoring work will no doubt be needed in the future.

National scale species trends from biological records

Charlotte Outhwaite, University College London

Charlotte (figure 3) explained that most biological records don't give abundance data, they are occurrence records; where species are observed at a certain time. She chose 1970 as a 'starting point' from which to measure changes in occurrence, although much data is available from before this time. However, there were problems with the data when it came to estimating trends. Unlike standardised schemes, there is no standardised sampling protocol which could help account for biases in the data. Recording schemes generally had an increase in the number of records that they were producing and entering into databases over time. Therefore, when estimating trends, she had to ensure that she was not just picking up this increase in record numbers (for example because more people were looking, or people had some more prolific recording years than others). Another problem was uneven recording in space, for example data reported from the ant and hoverfly recording schemes showed data clustering around places where people were living; including a lot more data from southern and eastern areas of the country. So there had to be caution when interpreting trends as in these cases the data might be mainly representative of trends only in a particular area.



figure 3: Charlotte Outhwaite giving her talk, M Shed, Bristol.

The method used to obtain trends with this kind of data is called Occupancy Modelling. The model was able to account for imperfect detection, which is when it is not known whether the records are a complete list of all observations (or, for example, just an opportunistic sighting), to ensure that she was not tracking trends that were not really there. It enabled Charlotte to include information on the other biases mentioned, but it was quite intensive to run and involved having good programming skills. For smaller groups it could take a few days, running multiple things at the same time. For some of the groups that she had worked with, including bryophytes and lichens, it took three months to be able to get trends out for around 1000 species.*

Charlotte has worked with 29 recording schemes covering 31 groups of taxa, ranging from the molluscs to bees, wasps, ants, bryophytes, lichens, various beetles, flies, crane flies and fungus gnats. The overall trends showed that although there were declines, this wasn't true in all cases. The data was not abundance data, so populations trends were not known, but the ranges that species were occupying were not

reducing for everything. For example, the group 'freshwater invertebrates' (including taxa such as caddisflies, mayflies, stoneflies and aquatic bugs) showed a strong decline up to the mid-1990s followed by a strong recovery and stabilisation. Bryophytes and lichens showed a steady state and then an increase from the mid-1980s. Insects looked as if they were OK, but showed a more recent decline. Molluscs were included in a 'non-insect invertebrate' group, which unfortunately were declining (but with a more recent stable trend), along with the spiders. None of the groups, when aggregated together, had been declining consistently. What Charlotte was hoping to show in presenting her work was that the changes had been occurring over time; working out what is driving them may help in trying to alleviate declines where they were indicated. One example is the freshwater group, where the positive change in trend in the mid-1990s coincided with the implementation and enforcement of the Urban Wastewater Treatment Directive (UWTD) across the UK. So not everything in these groups was declining, unfortunately it is not the same message with other groups, such as birds, butterflies and some mammals which are known, from other studies, to be declining.

All the mollusc data used had been from the Conchological Society or from IRecord, as collated by the Non-Marine Recorder. There were not as many records included in the analysis as would have been collected because certain levels had to be reached in terms of criteria before putting data into the model. For example, records had only been included where the specific date was known and where the location was known at or below the 1 Km² level. Charlotte was able to look at 129 species of molluscs. Overall there had been around a 30% average decline in occupancy overall across the UK. When split into freshwater and terrestrial species, the latter appeared to be doing well until 1995 followed by a decline, whereas the freshwater species had been struggling from 1970 onwards and didn't seem to have been positively affected by the UWTD implementation like the freshwater insects. Individual species plots were available at the meeting. Some very common species had shown strong increases whereas there had been strong declines in others.

Charlotte hoped that she had shown that the records that we all collect are able to contribute to some vital results, and that national scale trends now existed for species where they were not necessarily previously known. Knowledge about these species had been increased and contributions had been made to, for example, the Biodiversity Indicators in the State of Nature Report, as well as submitting the science for publication in more specialist Journals. Charlotte hoped to share the results of the data outputs to try to encourage others to do similar analyses and to try to find out what the drivers of these trends are. She noted that it is only by knowing what is causing these declines the we can try to prevent them.

It is intended to publish the data in the Environmental Information Data Centre hosted by the Natural Environment Research Council's Centre for Ecology & Hydrology (www.eidc.ceh.ac.uk/); it will then be possible to download the data from their web site to scrutinise in more detail.

* The model is essentially two models in one. The first one models the true state of how the sites are occupied in the UK. The second one models the data collection process (information on what was seen, what wasn't seen, how many species were recorded on a single visit to one site); this can be used as a proxy for recorder effort. Information on the site can be added to account for site/spatial biases. Although abundance data was not included, others have been working on how the modelling can be developed to include different sources of information to get an even better picture.

Garden gastropods: slug and snail diversity in UK gardens.

Imogen Cavadino, Royal Horticultural Society (RHS).

Imogen (figure 4) was in the third month of a PhD with the above title, funded by the RHS with Newcastle University supported by the Centre for Ecology and Hydrology.

The RHS are interested in looking at slugs and snails because they regularly appear in the RHS top ten garden pests in the enquiries they get from members about issues in gardens. Photos or specimens are often sent in where it is clear that the damage is mollusc related but not clear which species is causing the damage. Therefore the RHS want to know which slug and snail species are actually present in UK gardens and to use a 'citizen science' approach to try and fill this information gap. So they need people to go into their gardens and report on what slugs and snails are there, along with further information on the type of plants grown, where their garden is, if plants are being introduced from different garden centres etc. RHS also want to compare common slug and snail species for their potential to cause plant damage in gardens. It is known that not all slugs eat the same things and while some of them are categorised as detritivores, a gardener might say: 'well I encountered this slug eating my lettuces last week', so there is a need to discover the truth about their diet. Are those species that are thought of as 'nice' in terms of gardening not actually that 'nice', and are the ones that are deemed a problem not actually a problem after all! RHS also want to collate information on what methods gardeners are actually using in their gardens. Are they putting out beer traps, ground up eggs shell etc around plants? A more sustainable approach to control needs to be encouraged, therefore targeting those people who use slug pellets for control all year round and re-educating them to think more 'ecologically'.



figure 4: Imogen Cavadino talking at M Shed, Bristol.

Imogen said that she needs to recruit a good geographic spread of participants within the UK. Slugs and snails could also be very difficult for the beginner to identify, and use slightly different identification features, which is why she has decided to initially focus on slugs and potentially broaden out into snails if possible. Imogen has a three-year limited timeframe due to her PhD funding which means that she has decided to focus on diversity rather than abundance.

Imogen explained that the RHS has many different types of members, from people who like to come into the gardens and look around (including many families in the holiday period) to those who are quite keen and already interested in wildlife and also the keen gardeners. So Imogen has decided to target the keen gardeners who spend a lot of time in their gardens, to educate them and persuade them to

participate and send in data. However, the challenge is that gardeners often think about slugs as destructive pests to be eliminated. So her plan is to try to engage with them and get them to look at slugs and recognise that there is more than one species of slug and they have different ecological requirements and will eat different things. RHS is in a good position for this because they have a wide membership base. At the moment they have just under 0.5m members and around 2.1m visitors to RHS gardens annually. There are over 1000 RHS volunteers who donate their time to work in their gardens and around 800 staff. Many of their members are based around the large cities and around RHS gardens themselves. Imogen also wants to involve people with specialist knowledge, like Conchological Society members.

To ensure that people are sending her accurate data Imogen would like to arrange to provide some pre-training to keen participants, starting out by recruiting volunteers to come along to training sessions, perhaps based around RHS gardens. She wants to also verify records through photos to ensure that participants are sending in correct records, potentially receiving specimens for verification, particularly for the harder to identify species (e.g. in the case of species aggregates). RHS is also thinking about using the 'swab a slug' idea, using sterile swabs on the slugs' bodies to obtain viable DNA for barcoding. Unfortunately, Imogen said that this has had quite mixed results in actually obtaining viable DNA, so that further work is required.

One of the issues Imogen identified was identification resources. The FSC slug key (Rowson et al., 2014) was brilliant but would involve a cost which might deter some people whilst the online Conchological Society key (www.conchsoc.org/aids_to_id/id1.php), only takes identification so far (eg. to *Arion ater* aggregate). Imogen therefore felt that there was a lack of resources at present to get complete beginners interested. One of the ideas was to produce a fold out guide, it was felt very difficult to narrow down a subset of slugs that might be found in gardens. Other alternatives are therefore being considered such as a mobile phone app or creating something like an FSC web-based Identikit tool that could be embedded on other web sites (www.fscbiodiversity.uk/?q=fullscreen/identikit). To enable people to record the data Imogen said that she may need to produce some kind of paper recording form for those who don't have a computer, alongside an online form.

One of the main challenges for Imogen is how she could get people to survey a variety of microhabitats in their gardens in a relatively simple way, encouraging systematic effort and not just 'opportunistic' records. One of the methods of slug capture for recording that she had been considering was using refuge traps; a popular method in agriculture for monitoring slugs in integrated pest management schemes. A range of different materials could be used which had been shown to have different capture rates. Different baits could also be used.

Placement of traps was also an issue (e.g. a lawn as compared with a turned flower bed). With this in mind Imogen had been running an experiment at five different sites at Wisley with quite large beds next to uniform lawns. The setup consisted of two sets of traps of three different materials (upturned plastic saucers, cardboard or hardboard squares), one placed on the beds, one on lawns. Half of them were baited and half un-baited, each being held down by a 0.5Kg weight. Unfortunately, this did not deter visits by badgers who decided that her bait was delicious! Traps were laid out in the evening and collected in the morning and any

specimens present taken back to the lab for identification. The data has yet to be looked at in detail, but a range of species has been detected, but no large Arionidae or Limacidae species even though they have been seen active on site, so obviously this method is not capturing all species. The capture rates had been low and varied greatly between traps (e.g. 2–12 slugs per trap). Imogen suspected that this was more likely to do with the substrate and trap position rather than the materials. There had been particularly noticeable low rates on lawns, whereas on flowerbeds far more were captured. Some non-molluscan results from this included the discovery of populations of non-native flatworms attracted to the bait (two different species have been provisionally identified, *Australopacifica atrata* and *Kontikia ventrolineata*, both originating from Australia). For the bait, Imogen used bran flakes (which have a bran and wheat base that potentially attracts slugs) soaked in water, selected because it would be very easy for survey participants to purchase compared with other potential baits such as Layers Mash. As this method may not detect all slug species Imogen has considered alternatives, such as combining trapping with torchlight surveys, a method that has not been used widely in the published literature. Imogen emphasised that there were issues in trying to standardise a survey method of this type; for example, how to design the route across a garden to make sure all the habitats present are included.

Imogen had originally planned to launch the survey in spring 2019 but because of all the issues involved she was now hoping to run a pilot project first using partner organisations, RHS volunteers and staff to try out different methods and obtain feedback on how they worked for them in their own gardens. The findings would then be used to shape the launch of the main survey and data collection period. Activities involving the public with slugs and snails are planned at RHS sites in 2019. It was also planned to launch a targeted citizen science survey to potentially map the largely detritivore species *Limacus flavus*, which may be declining in the UK. This could then act as a ‘gateway species’ into improving gardeners’ knowledge of other species.

A brief discussion then followed, including about whether a ‘tidy’ garden might encourage a normally detritivore species to attack growing vegetables, whereas encouraging an approach of less tidy gardening might provide the ‘distraction’ of more natural food sources.

The origins of molluscs: a molecular and palaeobiological approach.

Jakob Vinther, Bristol University.

Jakob (figure 5) introduced his talk by saying that apart from fossils there is a history of time recorded in our DNA and that palaeontologists need to take this history and integrate this information with the fossil record in order to understand how life came to be.

In the first part of his talk, Jakob had described how he set out to discover how the fossil record of Cephalopods and the DNA of modern molluscs tied together to improve our understanding on how and when they appear, and using ‘molecular clocks’ to understand the timing of when two organisms diversify from one another by looking at mutations in the DNA (Tanner et al., 2017).

‘About 500m years ago at the transition from the Cambrian to the Ordovician a lot of different cephalopod groups

appeared, with their chambered shells etc. They existed for quite some time. Molecular clocks suggested that around the Silurian/Devonian period about 416m years ago a diversification occurs and you get Nautiloids (which are around today) and the development of Coleoid cephalopod molluscs (comprising squid, cuttlefish and octopuses). Prior to this it was thought that these two groups could be extended further back in time, however a certain feature that we know is shared between these two groups is that they have a ‘beak’. The oldest beaks are from the Devonian. This fits quite well with the idea that their common ancestor having evolved a beak, they then radiated. There are major transitions at this time where forms that previously had a shell which they carried above themselves started coiling the shell independently; some moved the shell inside the body and then they evolved beaks. At the same time, fish with jaws evolved, there was an ‘arms race’, and the cephalopods had to adapt to this massive change in the predator/prey landscape. They therefore either had to move the shell inside the body, which made them more agile, or they had to coil the shell because having a long shell makes you more vulnerable. In the past people suspected that squids and octopuses had an ancient fossil record, because when you go to places like Lyme Regis and look at the Kimmeridge Clay, or Strawberry Bank in Wiltshire, you find fossil Coleoids and although they look very squid-like they are actually related to the octopuses and vampire squids. In Bristol we have been trying to date the origin of these two groups; we have dated vampire squids back to the Triassic period (about 220m years ago), which the fossil record also supports. So there is a consistency in the history of the DNA of these animals and the fossil record. Many of these groups have a poor fossil record because they have lost their shells or they have become further reduced (for example the belemnites appeared in the Jurassic and were very abundant, but then later became extinct at the time when the new groups evolved with small internal shells, improved agility, camouflage, ink sacks etc, started to radiate and were able to escape new predators).

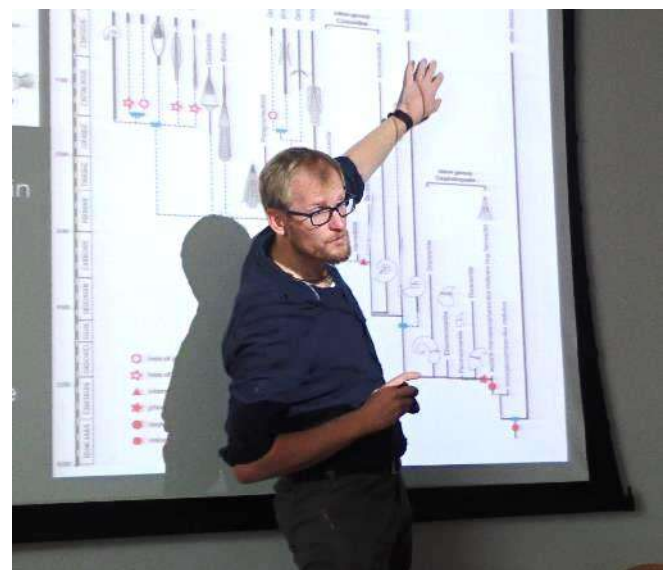


figure 5: Jakob Vinther, M Shed, Bristol.

‘When I was an undergraduate, I developed an interest in chitons, molluscs with eight shell plates on their back and a mantle around them. I got interested in these because I was interested in the Cambrian evolutionary explosion (early Cambrian is about 520m years ago) and decided to work on fossils from the Cambrian called *Halkieria*. The fossils were

found in North Greenland and are in the collection of the Natural History Museum of Denmark in Copenhagen. *Halkieria* have a shell at either end and many beautifully ornamented small sclerites [hardened plates or spicules] on their body which are less than 1mm in diameter, with spiny sclerites along the margin [Jakob passed around examples of these fossils (figure 6)]. I was interested in the possibility that *Halkieria* might be able to link different phyla. It was thought that they might be the origin of such groups as the Brachiopods (with two shells either side of the body) and Annelids (their bristles possibly being derived from sclerites), but the link to molluscs was thought to be tentative. However rather than confirming these earlier ideas I ended up arguing that *Halkieria* is a mollusc (Vinther and Nielsen, 2005). I found that there was a lot of similarity between the sclerites in *Halkieria* and those in modern day chitons, in the ways they grow, their composition and how they are replaced during growth. The mid-Cambrian *Odontogriphus* has a radula like the ‘conveyor-belt’ radula seen in molluscs; this is therefore a soft-bodied mollusc from 505m years ago. *Wiwaxia* is a genus of soft-bodied animals that were covered in carbonaceous sclerites that protected them from predators, and whose radula and general morphology suggest a relationship to shell-less molluscs.



figure 6: *Halkieria* fossil shown at the meeting.

“Modern day molluscs in the class Aplacophora are small worm-like molluscs with sclerites on their body. Text book scenarios of molluscan evolution usually begin with showing the aplacophorans because they are ‘wormy’ and make the assumption that when you are worm-like you are very primitive. This is wrong. Snakes and earthworms are derived from animals with appendages and aplacophorans are highly derived as well. Most conchologists focus on the shell-bearing molluscs; these are generally considered the ‘pinnacle’ of mollusc evolution. But maybe there are alternative scenarios. Looking at the fossil record, there are bivalves going back to about 520m years. Other fossils show that bivalves might have evolved from molluscs that look like small limpets, compressed laterally with a fine slit along the top surface that eventually became two shells. Likewise, for gastropods, early progenitors are also found. Chitons, which were always thought to be primitive, have a fossil record going back only to the upper part of the Cambrian (the chiton-like *Matthevia*) and aplacophorans don’t really have a fossil record, although more recent fossils (c.425m years) of a possible aplacophoran with chiton-like characteristics have been found. I sequenced seven genes from modern molluscs and did various types of phylogenetic analysis to obtain a ‘tree of life’. From this I was one of the

first people to confirm that chitons and aplacophorans are closely related to each other. At around the same time two other publications confirmed this relationship and they are now grouped together in the clade Aculifera. Using fossils to calibrate the ‘molecular clock’ we can date the aplacophorans and chitons from the boundary of the Cambrian and Ordovician.

‘Some Cambrian fossils have been found in Morocco of flattened slug-like organisms covered in sclerites with a shell on the front and possessing a ‘more modern’ type radula possessing hundreds of teeth... When this and all the other evidence is put together from fossils, the anatomy of the living organisms and the molecules, we could say that the common ancestor of all living molluscs had sclerites and a single shell. [Jakob then showed a model of what a possible ancestor would have looked like (figure 7)] There is a slightly younger group of chitons that evolved a very bizarre skeleton with seventeen shell plates and many of spines and sclerites called *Protobalanus* [Jakob showed a 3D printed model from a CT scan of a fossil (figure 7)]. *Protobalanus* is very different from the more ancient groups because it has a much more heavily interlocked armour etc. They appeared in the Silurian/Devonian when Cephalopods evolved beaks and fish evolved jaws and they needed to be much better defended against these new predators. They otherwise look remarkably similar to certain living chitons in terms of their body plan, but are called multiplacophorans.’ Jakob suggested from molecular analysis (coupled with fossil evidence) that living chitons diversified much later than the multiplacophorans, which themselves later evolved independently.



figure 7: examining a model of *Protobalanus sp. spiniacronatus* at the Bristol meeting (model length c.25cm).

(model by 10TONS APS, Denmark)

Following the talks, attendees adjourned to various Bristol cafes for lunch prior to making their way up the hill to Bristol City Museum and Art Gallery. The museum has had a somewhat complex history with origins dating from 1823 (see: www.en.wikipedia.org/wiki/Bristol_City_Museum_and_Art_Gallery for details). Unfortunately, 17000 specimens in the natural history collections were lost when the building was gutted by fire following a bomb hit on the night of 24–25 November 1940, during the Bristol Blitz. The remaining natural history collections were later transferred to the Art Gallery building next door, which they now share with the antiquity and art collections (figure 8).



figure 8: Bristol Museum and Art Gallery, central hall.

Having arrived in Bristol the previous day, I had time to explore the museum before the meeting. On the ground floor of the museum is a gallery called South West Wildlife, which features some excellent displays of the molluscs and other wildlife found in different environments including rocky shore, sand/mud (figure 9), open sea, freshwater and sand dunes.



figure 9: 'Life in sand and mud' display in the Bristol Museum's South West Wildlife gallery.

Having guided meeting participants through the back corridors of the museum Rhian introduced us to the natural history collections which are made up of around 650 000 specimens including approximately 150 000 shells as well as books, field notebooks, archive documents and photographs. The collection was grown from donations from local people, curators, and groups including the University of Bristol and Bristol Naturalists' Society. Rhian had put on display some historical items including a picture of former curator and geologist Samuel Stutchbury (1798 – 1859) (figure 10) and some shells with a connection to the exiled Napoleon Bonaparte whilst he was on Elba (figure 11). Everyone who had attended the regional meeting agreed that it had been fascinating and a great success.



figure 10: Samuel Stutchbury (1798 – 1859)

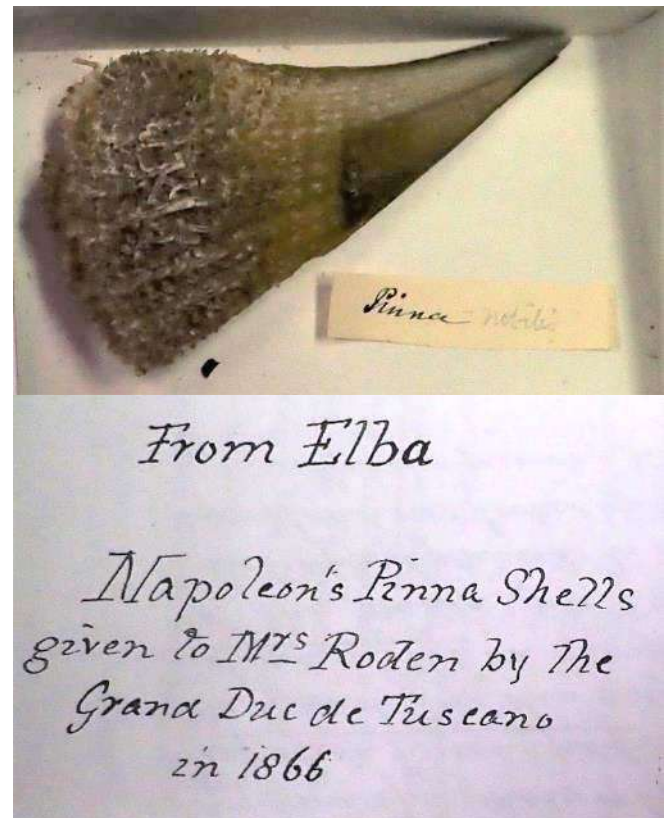


figure 11: A small *Pinna nobilis* with a Napoleonic connection, exhibited at the regional meeting.



figure 12: Rhian talking to participants about the Bristol Museum natural history collection.



figure 13: Rhian taking participants on a tour of the natural history collection.



figure 14: Example drawers from the shell collection. The natural history collection is used regularly by researchers, artists, students, scientists and television production companies.

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Whatever happened to the Channel Islands mollusc records? *Chris du Feu*

Some people, particularly those associated with the Channel Islands, will have seen that most recent distribution maps, including those in the excellent FSC guide 'Slugs of Britain and Ireland', the NBN Gateway maps and now the OS-gridded NBN Atlas maps, do not show the Channel Islands records. Traditionally these records have been plotted in an inset in the south-west corner of the British Isles map. Their special treatment was partly to fit them into a page without shrinking the rest of the British Isles but also because the Channel Islands records have UTM grid references. The OS grid stretches only part way across the English Channel. Incidentally records from the island of Ireland which is not covered by the OS grid have Irish grid references which have always been accepted by the NBN.

The reasons for the omissions are, if not lost, at least shaded by the mists of time. It seems likely that the complications of incorporating UTM grid references and the resulting mapping were too great to be accommodated when the NBN Gateway was created. When, more recently, the Atlas was planned, it seems that the problem of mapping the islands was just overlooked.

After some lobbying, the NBN has now managed to incorporate Channel Islands records into the system. They cannot be plotted on any maps which are based on the OS grid but can be plotted using the Display as Points features which are based on longitude and latitude (figure 1). Thanks are due to the NBN for making these, and other, records mappable in the Atlas.

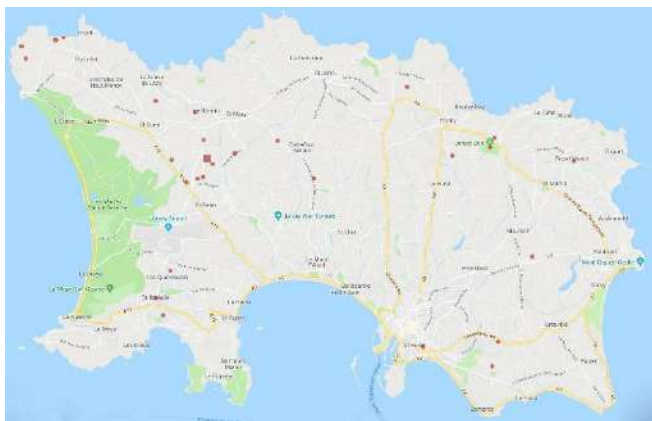


figure 1: *Deroceras reticulatum* records in Jersey.
(Map source: NBN Atlas)

The lack of accessibility of records to the islands was brought home very clearly on a recent holiday visit (including some slug recording) to Alderney. On reporting finding *Ambigolimax valentianus* to the records centre at the Alderney Wildlife Trust, I was told that they had almost no records of terrestrial molluscs, the main data set was held in Guernsey. Contacting Guernsey painted much the same picture: very few computerised records, the best source was the 1999 Atlas. On returning home I made enquiries about the Conchological Society Channel Islands records. When Adrian Norris took over as recorder, it was not possible to computerise the islands' records based on the UTM grid. Thus, new records submitted from the islands were kept in spreadsheet files and older, non-computerised records

remained on paper. (This is definitely not a criticism of recorders past or present. The technology for incorporating the records has not been available until recently and there have been more than enough demands on recorders without the complications of trying to deal with UTM co-ordinates.)

By happy chance, Robert Cameron was sorting society records at the NHM at the time of my enquiry. Thus it was that I was soon in possession of a collection of copies of old papers, some original field records and some 10km composite record cards used when the 1999 Atlas was prepared. With considerable help, particularly regarding nomenclature, from Adrian who also passed on all the Channel Islands records he held, I began computerising paper records and incorporating them with those already in spreadsheet format.

It sounds simple but there were problems, many of which are instructive for future computerisation of archive records.

Older records often name a place but do not give any map reference. With a map and some local knowledge, map references can be found in most cases. However, a few cause problems. With time, names can change or places disappear. (Perhaps the most difficult example was Arnold's Pond which, thanks to Rich Austin's deep delving into the Guernsey archives, we now know was a three acre boating lake over 100 years ago but is now reduced to an area of brackish pools and marsh, known as Vale Pond.)

Paradoxically, common species may have very vague records whereas the rarer ones will usually have named locations. Thus *Deroceras reticulatum* (figure 2) may be 'common throughout island' but no exact place or date mentioned. This record can then only be assigned to the whole island with a date range rather than precise date.



figure 2: *Deroceras reticulatum*. (photo: the late Derek Rands)

Many older records mention a larger area – such as an island parish or even whole island which may straddle grid lines. Perhaps worst are the few references to species on the island of Lihou. It is just off the Guernsey coast and a mere 500 metres from east to west. However, the 10km UTM grid line cuts down through the middle. We know any record from the island must be within 300 metres of the centre but that record could be in either of two 1 km grid squares WV2378 or WV2478 (figure 3). Using either one would be precise but potentially incorrect; WV 27 would be correct but very imprecise. The same is true, on a larger scale for the bigger

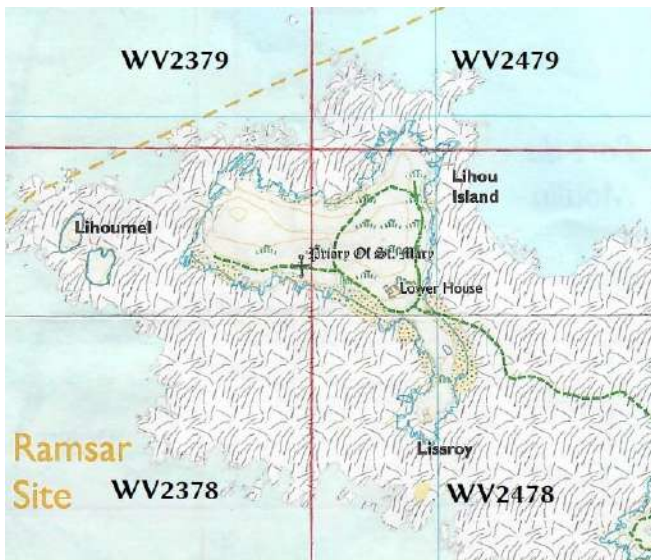


figure 3: States of Guernsey map of Lihou with added UTM grid lines and square names.

(Mapping copyright © States of Guernsey 2019)

islands. A record for 'Jersey' can only be represented accurately, but not precisely, by a 100km reference because the island straddles six 10km squares.

Alderney presents another little problem of its own. It lies near the southern edge of UTM square WA, the other islands are all in WV. Discrepancies between the flat grid and the curved Earth it represents are greatest near the edges of each of the squares. Alderney is within the Bailiwick of Guernsey and, for convenience, the map used by the authorities notionally extends the WV grid into the south of WA with a slight misalignment of the grid lines from the true WA. The correct UTM grid references can differ from those on the Guernsey map by 100 metres. This is of little consequence for records at a 10km scale but, with current desirability for more precise records and the very small size of that island, it does represent a potential problem.

And then there is the 'Guernsey Grid'. Less said, the better.

Although the NBN does not accept UTM map references, it does accept references given as longitude and latitude. Conversion from UTM involves some non-trivial trigonometrical manipulation. On-line conversion is possible but is prohibitively time-consuming when large numbers of records are involved. However, the imprecise records that cause most problems for UTM grids become very easy indeed with longitude and latitude. Whereas the UTM and OS references have an implicitly given measure of precision (number of figures), L&L need an extra field to give the precision. Where just a region (island, parish, part of island) is reported, choose a convenient point near the centre of the area and use this for the map reference location. Then give a degree of precision equal to the radius of the circle centred at that point which covers the area. With many records from single areas, and with spreadsheet filter functions, assigning map references to these places is very rapid indeed.

Perhaps a note about the use of longitude and latitude in general is useful here. L&L never suffers from inaccuracies caused by imposing a flat square grid on a spherical body. The current use of degrees and decimal points of degrees, rather than degrees, minutes and seconds together with negative signs for west and south makes recording simple

and entering into data handling machinery very simple. For co-ordinates in Britain and much of Europe, three decimal places will give precision to within 100 metres. So far, so good. However, most spreadsheets store numbers to several significant figures, even if you format them to appear as three decimal places. Thus, for example, (53°, -1°) which is given to a precision of about 100 km will appear on the spreadsheet, as 53.000 -1.000 and be stored internally identically to this second value which is precise to 100m. With L&L it is essential that a degree of precision is recorded separately.

NBN staff were then very helpful in directing me through the process of final formatting to Darwin Core specification. Adrian Norris and the various islands records centres did a final eyeballing of the data sets and the whole data set was submitted to the NBN in spring 2018. Ben Rowson holds a copy and hopes to incorporate this into the society's main data set as soon as time permits.

One thing is clear when working through old records. The records on the composite 10km square master sheets that were used to create the 1999 Atlas formed the basis of the spreadsheet of Channel Island records held by Adrian Norris. Every record on one of these sheets has been derived from all individual records anywhere in that square over a long period of time for that species. For example, the single 10km record of *Deroceras reticulatum* in WV55 represents at least 30 separate records in various parts of the square over many years. Some, but certainly not all, of these original records are held in other papers. Where are the 'lost' records? No doubt many of these reside in recorders' own records. Perhaps some of these have been computerised by the recorders themselves but never submitted as individual, rather than composite, records.

In the past, the species records system has been aimed primarily at recording distributions. However, we now realise how rapidly distributions can change (and some of these changes can be plotted with the facilities in the NBN Atlas). The composite records, which may cover a period of many years, conceal such changes. Composite records also conceal annual patterns of appearance and fine-scale location data. With modern technology there is no practical limit to how many records can be stored or manipulated. Mapping tools can link location data to habitat and other geographical features.

It would be a great pity if such detailed historical information were to be lost. It was quite a challenge to deal with the Channel Islands records but the outcome is well worth it. I would urge recorders to make efforts to try and resubmit as many old records as possible which now are held in the Conchological Society database only as a part of a composite record.

I am very grateful to various people who have given time and expertise to helping with this work – Robert Cameron for locating the paper records and much advice; Adrian Norris for very much help particularly with nomenclature; Francis Gilbert and the late Mike Hounsome with advice on conversion from UTM to longitude and latitude; Rich Austin for location information of many Guernsey sites; Ben Rowson, staff at NBN, Jersey, Guernsey and Alderney records centres for continuing advice and comment.

Field meeting in the Cotswold Commons and Beechwoods NNR, Gloucestershire, September 29th 2018. *Keith Alexander & John Fleming*



figure 1: Attendees at the Cotswold Hills field meeting in memory of David Long.

(photo: Colin Twissell)

A field meeting was organised in the Cotswold Hills in memory of David Long, Gloucestershire County Mollusc Recorder, and former Conchological Society Council Member and Past President, who died in the autumn of 2017. The meeting was targeted at *Ena montana* as this species has recently been assessed as being Near Threatened in Great Britain (Seddon et al, 2014) and the Cotswolds are known to support the largest extent of habitat in the country (Kerney, 1999). The Cotswold Commons and Beechwoods have been designated as a SSSI and NNR for their ancient beech woodlands and unimproved limestone grasslands, a key feature of the beechwoods being their rare terrestrial molluscs which are restricted to ancient woodland sites; *Ena montana*, *Phenacolimax major*, *Acricula fusca* and *Macrogastra rolphii* are all named in the SSSI citation. It is unusual to find any invertebrates stressed in SSSI citations, other than butterflies and dragonflies of course.

Five Conch. Soc. members and ten members of the Gloucestershire Invertebrate Group and Gloucestershire Naturalists' Society met at the National Trust's Ebworth Centre on 29th September (figure 1). David Long's widow Pat briefly addressed the group before we headed off into Workman's Wood (SO9001) for the morning foray. This wood occupies the head of the Sheepscombe Valley and is drained by a series of small streams with a few dam-held ponds – the mollusc fauna has been described in detail by Long (1980). Although the first section of the woods is maturing beech plantation on former parkland, one of the first molluscs found was *Zenobiella subrufescens*,

found by sweep-netting the sparse ground vegetation (figure 2); clearly this species is well capable of extending out from its ancient woodland refugia into neighbouring secondary woodland as conditions become suitable. Down into the valley bottom and the first *Ena montana* was spotted about 2m up on the trunk of a mature beech tree of about 2m girth. More were found along the valley bottom, both amongst woody debris lying on the ground and again on tree trunks (figures 3 and 4). Five were counted on the trunk of one mature sycamore, reaching as much as 3m above ground level. It is assumed that the snails climb the tree trunks to browse on epiphytic algae and perhaps lichens, although no-one was sure if real evidence was available. They are known to browse on vascular plant tissues in the ground vegetation and tree epiphytes provide a useful food resource later in the season once the woodland ground vegetation has died back to a considerable degree.



figure 2: Searching ground vegetation in the beech plantation.

(photo: Colin Twissell)



figure 3: Photographing *Ena montana* on trees, Workman's Wood.
(photo: Colin Twissell)



figure 4: *Ena montana* on tree trunk, Workman's Wood.
(photo: Keith Alexander)

The damper soil conditions through the valley bottom woodland support a range of specialist species. *Carychium tridentatum* is a good example as well as the rarer *Azeca goodalli*. The route back up towards the Ebworth Centre across older beech woodland added *Helicigona lapicida* to the morning's list, with a large mature specimen found beneath a thick ivy stem ascending one of the larger old beeches.

Most of the party moved to Pope's Wood (SO8702) for the afternoon; this woodland lies on the Cotswold escarpment and is much drier. One of the first species found was *H. lapicida*, knocked from the ivy-covered trunk of a standing dead hulk by the entrance gate. *Ena montana* was quickly spotted on a beech trunk (about 2m girth), again at about 2m height above ground but no more were seen on tree trunks. An interesting find was two immature *E. montana* knocked from free-hanging strands of ivy, attached to the top of a standing dead tree trunk. They could only have reached this position by climbing down the hanging ivy stems. *H. lapicida* was found in good numbers here

on the older beech trees (figure 5) but *Z. subrufescens* was more elusive than in Workman's Wood. A few large *Z. subrufescens* were found by beating Clematis which was covering large bushes of hazel and dogwood along the path-sides. A sweep-net was placed beneath the Clematis to capture any falling snails; the Clematis growth was at a height of 2m above the ground.



figure 5: *Helicigona lapicida* in Pope's Wood.
(photo: Keith Alexander)

In conclusion, we achieved the object of the meeting by finding *Ena montana* - nine adults and two juveniles in Workman's Wood, including the five adults on one sycamore, and one adult and two juveniles (the latter obtained from hanging ivy, an unusual site) in Popes wood. Also of interest were *Helicigona lapicida* and *Zenobiella subrufescens*. The previous week of dry weather had reduced the number of molluscs usually found on trees and vegetation, so more were found by hand searching leaf litter and moss. It may be worth noting that David Long recorded nine *Ena montana* during his 1978 survey of Workman's Wood (Long, 1980). Boycott (1939) described *Ena montana* as abundant and throughout these woods, and this field meeting has shown that this still seems to be the case. Interestingly, Kerney (1999) comments that they will climb a few feet up smooth tree trunks in wet weather, but both sites were very dry and the day was warm and sunny; clearly this habit does not depend on wet weather, at least not here in the Cotswolds.

Acknowledgements

Thanks are due to the Cotswold Team of the National Trust for permission to investigate the molluscs of these two woods.

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Snailspace: a public art event in Brighton

Peter Topley

In 2013 I visited Bristol for Gromit Unleashed, a public charity art trail in which 80 giant artist-decorated fibreglass sculptures of Gromit were displayed on the streets of Bristol and the surrounding area. Subsequent similar events have been held there and in other towns and cities. I was therefore excited to discover that in 2018 the Brighton and Hove area was holding a similar event but this time the giant sculptures were of snails! The event was called Snailspace and was organised by Martlets, a local hospice charity. There were 50 snail sculptures, identical in shape but painted in vibrant and varied colours by different artists, each with an individual theme. The recommended route around them was called the Snailway. It may have been possible to visit all 50 sculptures in a day; however, they were widely distributed around Brighton and Hove so I concentrated on the ones in the centre of Brighton. I include here some photos of my favourites, however at the time of writing they can all be viewed at www.snailspacebrighton.co.uk/snailway/. A subsequent auction of the pieces raised £231,400 for the Martlets charity with a top price of £12,800 being paid for one of the snails.



figure 1: 'The Brightonian', by Rosie Apps. Brighton Station.



figure 2: 'Slimon', by David Shrigley. Brighton Dome.



figure 3: 'Snellie', by Judith Berrill. Commemorating local 19th century theatre manager Ellen Chart, known as 'Nellie'.



figure 4: 'Bellissimo' by Jenny Leonard. Featuring Brighton Pavilion and beach huts. Steine Gardens North.



figure 5: 'Snails Can't Dance' by Guy Parker-Rees. This snail is dreaming of dance moves from the children's picture book 'Giraffes Can't Dance', illustrated by Guy. Steine Gardens West.



figure 6: 'Saffron' by Illona Drew. 'Combining the simple beauty of real snail shells with the artist's love of intricate shapes and strong colours'. Steine Gardens East.



figure 7: 'Goldie' by Hydro Monkeys. East Street, Brighton.



figure 8: 'Around the Whirled' by Peter Pool. Outside Donatello Restaurant, Brighton. With humorous snail-related place names!



figure 9: 'All Aboard the Snail Bus' by Susan Webber. Inspired by visits to vintage bus rallies in the West Country. Brighton Place.



figure 10: (left to right) 'Conch' by Emma Fish – apparently this 'punk' snail is named Conch in reference to conch ear piercing (!). Gloucester Road; 'Gary' by Osomi and Natalie Hancock – inspired by Brighton and the diversity of its inhabitants. Queens Road; 'Nee Nor' by Mik Richardson – inspired by the characters of crime writer Peter James. Pier entrance.

Sphaerium nucleus at Thompson Common

John Baker¹, Toby Abrehart² & Jenny Jaffe³

Reintroduction of the pool frog *Pelophylax lessonae* to Thompson Common includes a programme of monitoring (Baker & Foster, 2015). During health screening visits carried out by the Institute of Zoology, orb mussels (*Sphaerium* spp.) have been noted attached to the toes of frogs.

On 12th and 13th March 2017, 35 adult common frogs (*Rana temporaria*) were captured and examined. Two frogs had orb mussels (approximately 8 mm across) attached to toes on their hind feet. One of these is shown in figure 1, the other was later identified as the swamp orb mussel (*Sphaerium nucleus* (Studer, 1820)) (confirmed by Martin Willing).

On 3 August 2018, among 31 newly metamorphosed pool frogs captured, one was found with a *S. nucleus* (8.7 mm across) attached to the long, fourth digit of the left hind foot (figure 2). The mussel had removed skin and bone from the digit and was anchored to the frog by a thread of tissue.

Thompson Common includes several hundred ponds and depressions formed by repeated freezing and thawing towards the end of the last glaciation. Previously unrecorded there, *S. nucleus* is part of a nationally significant wetland invertebrate community, which includes three other nationally scarce molluscs, the mud snail (*Omphiscola glabra*), shining ramshorn (*Segmentina nitida*) and Desmoulins's whorl snail (*Vertigo moulinsiana*) (Irwin, 1987; Hammond, 2015).

Sphaerium nucleus occurs across Europe and into central Asia. Within Europe it is found almost exclusively in small, temporary waters. In the UK it was previously known only from grazing marsh ditches within the lower Waveney valley (Norfolk and Suffolk) and the Pevensey Levels (East Sussex) (Killeen *et al.*, 2004). Since then there have been new discoveries across a larger area of the Broads National Park and recently a population was discovered at Sibton Lake in mid Suffolk (Toby Abrehart, pers. obs.). The discovery of *S. nucleus* at Thompson Common is significant as it is a new vice county record and the habitat is more typical of that found on the continent than in other sites around the UK. *Sphaerium nucleus* is not thought to be increasing its range, rather it is being recorded more frequently.



figure 1: *Sphaerium* sp. attached to the toe of an adult male common frog. (photo: John Baker)



figure 2: *Sphaerium nucleus* attached to a recently metamorphosed pool frog. (photo: John Baker)

Bivalve attachment to amphibians in Britain has been noted historically (Darwin, 1882; Kew, 1893 summarised in Rees, 1952). Sphaerid species are (more widely) the most commonly attached to amphibians (Darwin, 1882; Rees, 1952; Wood *et al.*, 2008; Laza-Martínez *et al.*, 2012). Attachment has been attributed to the response to a foreign body, in this case an amphibian toe, between the valves, which are otherwise open to allow feeding (Rees, 1952) and it has been assumed to result in dispersal of molluscs between ponds (Darwin, 1882; Rees, 1952). The relationship is parasitic because it causes harm to the amphibian host; Darwin (1882) and Wood *et al.* (2008) reported that bivalve attachment resulted in the loss of toes often within several days. The rapidity of digit loss means that an amphibian host would have to move to another water body fairly promptly to enable mollusc transfer. Successful migration may be infrequent, but Kew (1893) recounted three cases where amphibians (newts of undetermined species in two cases and a frog in the third) were found on land with bivalves attached.

During 2017 and 2018 three other pool frogs at Thompson Common were found with missing tips to digits, which is consistent with damage caused by mussel attachment (Sainsbury & Jaffe 2018; Phil and Debbie Bishop, pers. comm.) (e.g. figure 3). The harmful effects of mussel attachment may be several. Wood *et al.* (2008) noted that in addition to (partial) digit loss, sphaerid mussel attachment may interfere with egg-laying behaviour (in newts, which use their hind feet for this purpose) and locomotion. Attachment to a small frog such as in figure 2 would seem likely to hinder movement.



figure 3: Hind foot of a female pool frog missing the distal portion of the fourth toe, with phalange protruding from swollen tissue. (photo: Debbie Bishop)

Under some circumstances mussel attachment to amphibians may occur at high rates. At a pond in Luxembourg with several thousand *S. nucleus* per square metre, Wood *et al.* (2008) found 23% of newts (*Lissotriton vulgaris*, *Ichthyosaura alpestris* and *Triturus cristatus*) were carrying mussels. Rates of mussel attachment at Thompson Common are lower;

6% of 35 common frogs sampled, 0% of 30 common toads (*Bufo bufo*) and 3% of 31 newly metamorphosed pool frogs. No mussels were found on 41 pool frogs (adults and juveniles) recorded during surveys undertaken from 2016 to 2018, and none have been noted on the small numbers of newts *Lissotriton vulgaris* and *Triturus cristatus* incidentally captured. Hence *S. nucleus* may be a curiosity (and a new site record for Thompson Common) rather than a major threat to amphibians.

Acknowledgements

We are grateful to Martin Willing (The Conchological Society of Great Britain and Ireland) for validation of *S. nucleus*, to Phil and Debbie Bishop (Department of Zoology, University of Otago) for assistance in the field and Dave Bird (British Herpetological Society Librarian) for literature resources. Field work was carried out under contract to the Amphibian and Reptile Conservation Trust and was funded by Anglian Water and Natural England.

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The snail kite (*Rostrhamus sociabilis*) in Mexico *Kathy and Peter Blackmore*



figure 1: Juvenile female Snail Kite with snail, San Blas, Mexico, January 2019. (photo: Gail Haynes)



figure 2: Adult male Snail Kite (the only one seen amongst numerous females), San Blas, Mexico, January 2019.

(photo: Kathy and Peter Blackmore)

Whilst on a birding trip in January to the Pacific coast of Mexico, we visited an area of mangroves on a creek in San Blas. Whilst there we saw numerous snail kites (figures 1 & 2) feeding on freshwater snails. These birds are well known true molluscivores, their diet consisting of the apple snails whose pink egg masses (white when empty) we observed just above the water line on the mangrove stems. Whilst there we collected a couple of 'sample' snail shells and took them home to ask our friend Peter Topley if he could try to identify them. Peter confirmed that they were of the Ampullarid species *Pomacea flagellata*. This varied species is found from central Mexico to the Rio Magdalena system of Columbia (Perera and Walls, 1996). The shells (figure 3) are both approximately 49mm high by 41mm in width. Typical specimens of this species have shells of 60mm in height so these are possibly sub-adults. The sexes are separate in *Pomacea* but males can turn into females in some cases. The snails have both a siphon, for air breathing, and gills, for use under water. The kites have evolved long, narrow hooked beaks for their specialised diet. In Florida and the southern States of the USA where the much larger introduced *Pomacea maculata* (native to Brazil, Argentina and some other South American countries) is established, in over a period of just around 10 years, the snail kites have evolved larger beaks to cope with these invasive snails (Cattau et al., 2018).



figure 3: *Pomacea flagellata*, San Blas, Mexico.

(photo: Peter Topley)

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We are grateful to Peter Topley for identifying the *Pomacea* species and for other conchological informatio

Snails feeding under water

June Chatfield

During the dry summer Nick Hughes of Alton Natural History Society kept a shallow earthenware container topped up with water in his garden at Farnham, west Surrey for the birds to drink. One night he found that it had other customers – Common Garden Snails (*Cornu aspersum*). A film of green unicellular algae had developed on the bottom of the dish and one evening after dark (8th August 2018 at 9.30pm) Nick found two adult snails crawling under water and feeding on the algal film, leaving typical trails of their indulgence. They were under water which he found surprising. The breathing pore would be closed so the lung would not be flooded and they may also have been rehydrating themselves at the same time either with water ingested during feeding or perhaps some being absorbed via the thin skin of the body.

Feeding trails mostly of common garden snails are frequently encountered and were seen on 4th February feeding on algae on metal hand rails of the bridge over the

Caker Stream at Waterbrook Road, Alton and in the same place on lichen on the top of a low wall. There was also a note on mollusc feeding trails in the last issue of *Mollusc World* (48:26–27).

Right: *C. aspersum* feeding under water. (photo: Nick Hughes)





figure 1: *Clausilia bidentata*. (drawing by the author)

From 2012 to 2014 I carried out a study of variation in several shell features of five populations of the land snail *Clausilia bidentata* (figure 1), this having been described previously (Wardhaugh, 2015). One of the main findings was that mean shell height differed consistently between population samples over the three years. In order to find out whether this pattern continued, three of the populations have been studied for a further four years. These populations all occur in woodlands, where the snails can be found either at rest or crawling actively on the trunks of trees and also at times on coarse woody debris at or near ground level. The sites are Airy Holme Wood (NZ5792.1129), Yearby Wood (NZ6024.2044) and Rievaulx Terrace (SE5793.8481), all in north-east Yorkshire (vice-county 62). Further details about these sites and a map showing their locations can be found in Wardhaugh (2015). Briefly, Airy Holme Wood is an ancient semi-natural woodland, subjectively the most sheltered of the three sites, where the population occurs well within the wood. At Yearby the population occurs in a narrow extension of the wood at the north-east corner and is possibly more exposed. Rievaulx Terrace is a linear plantation at the top of a west facing scarp slope and thus exposed to the prevailing wind. Sampling and measurements were carried out in the same manner as described in the original study.

Results for all seven years for the three populations are summarised in the accompanying table and figure 2, the new data (2015 to 2018) showing a continuation of the original pattern of consistent differences in mean shell height between populations. (But note that unfortunately no data are available for Airy Holme Wood for 2015). Pair-wise comparisons between population samples for each of the seven years were analysed by using unpaired two-tailed t tests (All variances were compared initially by F test and wherever pairs were found to be insufficiently close to equality the appropriate correction was applied to the ensuing t test). In outline, for all years where data are available, the mean difference in height between samples from Airy Holme Wood and Rievaulx Terrace, and between Yearby Wood and Rievaulx Terrace, are statistically significant, with P ranging from 0.0015 to less than 0.0001. Differences between Airy Holme Wood and Yearby Wood were not statistically significant for any of the six years where comparison was possible, although nearly so in 2016 where P = 0.054.

C. bidentata feeds by browsing on lichens and algae growing on tree trunks and coarse woody debris. It may be that differences in mean shell height between the three populations reflect the influence of exposure (moisture level, ventilation and temperature) on activity levels, feeding opportunity and thus shell growth. However, the possibility of genetic differences between populations cannot be discounted. These

ideas were discussed in the original article and comparisons made with a number of relevant studies, notably those on shell height of *C. bidentata* by Boycott (1919, 1920 & 1927). The accompanying graph reveals another interesting aspect of the data in that mean shell height of the three populations fluctuated synchronously between 2012 and 2014 and again between 2016 and 2018. It is hard to think of an underlying cause for this pattern other than an environmental influence operating at a regional level but to date no correlation has been detected.

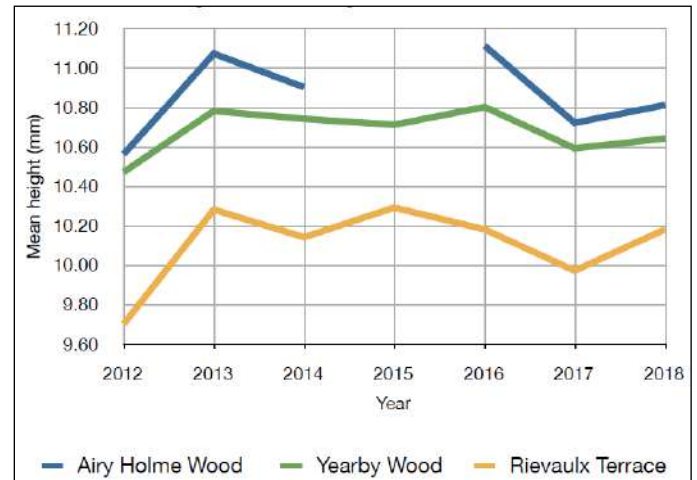


figure 2: Mean heights of *C. bidentata* shells 2012 to 2018.

Year	Airy Holme Wood	Yearby Wood	Rievaulx Terrace
2012	10.56 ± 0.593 [9.6-11.8] (31)	10.47 ± 0.588 [9.1-11.4] (30)	9.70 ± 0.608 [8.6-10.9] (25)
2013	11.07 ± 0.601 [10.0-12.5] (29)	10.78 ± 0.693 [9.4-12.3] (35)	10.28 ± 0.513 [9.2-11.4] (29)
2014	10.90 ± 0.629 [9.6-12.8] (49)	10.74 ± 0.488 [9.9-11.9] (50)	10.14 ± 0.644 [8.7-11.7] (34)
2015	-	10.71 ± 0.485 [9.5-11.7] (55)	10.29 ± 0.542 [9.1-11.4] (75)
2016	11.11 ± 0.822 [10.1-12.7] (34)	10.80 ± 0.568 [9.7-12.3] (51)	10.18 ± 0.557 [8.6-11.6] (80)
2017	10.72 ± 0.537 [9.7-12.4] (59)	10.59 ± 0.476 [9.5-11.7] (80)	9.97 ± 0.524 [8.4-11.1] (72)
2018	10.81 ± 0.628 [9.6 - 12.2] (45)	10.64 ± 0.596 [9.5 - 12.0] (62)	10.18 ± 0.604 [8.9 - 11.7] (80)

table: *C. bidentata*: mean height of shells mm ± S.D. [range] (sample size).

References

- Boycott, A.E. (1919) Observations on the local variation of *Clausilia bidentata*. *Journal of Conchology* **16**: 10–23.
- Boycott, A.E. (1920) On the size variation of *Clausilia bidentata* and *Ena obscura* within a "locality". *Journal of Molluscan Studies* **14**: 34–42.
- Boycott, A.E. (1927) Further observations on the local variation of *Clausilia bidentata*. *Journal of Conchology* **18**: 131–135.
- Wardhaugh, A.A. (2015) Variation in some shell characteristics of *Clausilia bidentata* (Ström, 1765) (Gastropoda: Pulmonata: Clausiliidae). *Journal of Conchology* **42**: 199–207.

This year there were six applications, and Council has made three grants. Many congratulations to:

Peter BARFIELD (University of Portsmouth) recently found the invasive species, *Arcuatula senhousia* (Benson, 1842), in the Solent. Commonly known as the Asian date mussel or bag mussel, it is native and widespread in the western Pacific, and has invaded various other parts of the world; in some places it forms mats, excluding other species. Peter plans to use DNA sequencing to determine which part of *Arcuatula*'s distribution the Solent population has come from, and if the population genetic make-up i.e. its molecular variance, makes it distinguishable from other locations globally. The results will inform policy and management of the species in the UK going forward. (£990 awarded.)

Matt LAW (Bath Spa University) works on subfossil terrestrial molluscs in the UK as indicators of environmental change. *Discus rotundatus* is a very abundant snail in many subfossil assemblages in southern England; Matt plans to collect recent samples of *Discus* shells from old woodland, old hedgerows, and recently planted woodland on chalk and on limestone to see whether differences in shell shape might be used to reconstruct past environmental conditions. (£707 awarded.)

John HUTCHINSON (Senckenberg Museum, Görlitz) works on terrestrial slugs. The pest slug *Arion lusitanicus* auct. non Mabille has been spreading from southern France across much of Europe. The Senckenberg Museum in Görlitz, Germany, has sampled slugs around the town over the past 25 years, during which *A. lusitanicus* has hybridized with and replaced the native *A. rufus*. John plans to use nuclear DNA microsatellite markers to find out whether *A. rufus* genes have persisted in the present populations, which look anatomically like *A. lusitanicus*, and also whether *A. lusitanicus* is hybridizing with the local woodland slug *A. ater*. (£786 awarded.)

Two grants were awarded last year:

Levan MUMLADZE has been recording molluscs in the high Caucasus to establish altitude limits and species associations at high altitude, to establish a base line for detecting climate change effects. Levan recently wrote that he spent 16 days in August and September 2018, looking for molluscs in the Great Caucasus (figure 1) and the Lesser Caucasus (figure 2). Pupillids were found up to 3250 m in the western Great Caucasus and up to 2950 m in the Lesser Caucasus; slugs were found up to 3350 m in the eastern Great Caucasus. He plans to submit an article for publication in the *Journal of Conchology* later this year.

Becky HITCHIN planned to work with divers taking part in the annual nudibranch safari at Gulen in Norway to investigate whether, as has appeared to be the case, individuals of the different colour morphs of *Polycera quadrilineata* choose to breed with individuals of other colour morphs. Unfortunately, *P. quadrilineata* was much less common than usual in 2018 – the divers saw only two mating pairs rather the hundreds that were expected; she hopes numbers will be better in 2019.



figure 1: Study area, Khevsureti, Eastern Great Caucasus (below: slug at 2800m)



figure 2: Searching Tetnuldi, Western Great Caucasus (below: *Pupilla* habitat at 3250m) (photos: Levan Mumladze)

The next grant round deadline is in autumn 2019

The maximum amount that can be applied for is £1000. Full details can be found on the Society's website, at www.conchsoc.org/pages/grants.php.

Land Snail Identification at Juniper Hall, Dorking, Surrey, Friday 3rd – Sunday 5th May 2019, led by June Chatfield. Own room £250, shared room £220, Non-resident £180 (includes all meals except breakfast).

Contact enquiries.jh@field-studies-council.org 01306 734501

Slugs and Snails at Orierton, Pembrokeshire, Friday 19 – Monday 22 July, Led by Ben Rowson. Own room £360, shared room £320, Non-resident £305 (includes all meals except breakfast).

Contact enquiries.or@field-studies-council.org 01646 623921

Slug Identification at Bishops Wood, Worcestershire, Wednesday 14 August (10-4), Led by Chris du Feu, Non-resident £45 www.field-studies-council.org

Find more detail on the FSC website/courses, click Natural History, then Animals, then Other invertebrates (snail picture) and it is possible to book and pay via the website.

Also

Beachcombing and Seashells, Margam Park, Port Talbot, south Wales, Friday 16 – Monday 19 August, led by June Chatfield. Own room £333 shared room £303, Non-resident £238 (includes all meals except breakfast).

Contact enquiries.mp@field-studies-council.org 01639 895636

FSC website/courses, click exploring the natural world and walking.

Report on Bristol Channel whelks exported to South Korea

On 10th February BBC News ran an article (Prior, 2019) about whelk fishing in the Bristol Channel.

Apparently 10 000 tonnes of whelks (figure 1) are caught in the Bristol Channel each year. The article says that a local fisherman, operating out of Saundersfoot, ‘each night’ harvests one tonne of whelks from 1,000 pots suspended from 50 buoys in the bay around Carmarthenshire. They are then transported to Milford Haven and loaded onto a factory ship which cooks and freezes them in transit to Asia. The article goes on to say that the love of whelks as a food in places like South Korea contrasts markedly with their dislike by the British public.

Hywel Griffith, head chef of a Michelin starred restaurant on Oxwich Bay, Swansea, is quoted as saying that there are two main problems about how whelks are perceived: ‘One is the traditional image of whelks being cheap food, served out of a barrow on East End back streets, and the other is the idea that they are chewy and rubbery, but it’s all about how you cook them.’ He then goes on to say that they are a nutritious and sustainable source of food because there is an abundant supply of them in the Bristol Channel and the pots don’t cause any damage to the seabed. One wonders how sustainable the whelk population actually is in the longer term, given the huge numbers apparently fished from this area each year. And would we agree with the whelk fisherman, who said: ‘Goodness knows why they like them - they taste like nan’s toenails...’?

Reference

Prior, N. (2019) *Why are whelks caught in Wales popular in South Korea?* www.bbc.co.uk/news/uk-wales-47172635

[Ed.]



figure 1: Common Whelk (*Buccinum undatum*).

(photo: © Hans Hillewaert, CC BY-SA 4.0)

British Shell Collectors’ Club

Saturday 27th April 2019

Shell Convention

and

Saturday 26th October 2019

Shell Show

Both at Theydon Bois Community Centre, Coppice Row, Theydon Bois, CM16 7ER. Open from 9am to 5pm. Admission free.

Saturday 17th August 2019

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



Conchological Society membership update

Please note the following changes of address:

Ms B. Eastabrook, 32 Lypiatt Street, Cheltenham, Gloucestershire GL50 2UD. (see also page 23)

Mr C.R. McLeod, 65 Johnston Avenue, Dundee DD3 8EY
Colin.McLeod@SNH.gov.uk

50 years ago: from *The Conchologists' Newsletter* (no. 28, March 1969)

The *Conchologists' Newsletter* was this publication's predecessor and ran from January 1961 to December 2002.

from **Cowries in Aden and Africa**

*Philip Cambridge*¹

In 1966 there were a few Arabs selling shells and corals on the beaches etc., but many of the shells offered were never collected locally, i.e. the large haliotids. Some of these were said to come from Zinjibar [a port in Yemen] but others undoubtedly came from the Somali coast or from the Red Sea, brought by fisherman and coastal dhows. Conchologists would do well to be very wary of the localities given by these pedlars. When asked where the shells came from, they usually gestured vaguely and said 'Min al b'har' (From the sea). Often the locality was adjusted to suit the customer; if the vendor suspected you wanted local shells then all his specimens came from the nearest bay; if he suspected more exotic shells were wanted then they were brought 'long way by my friend from Somalia'. Often, when the shells really were local, the seller would be loath to reveal the exact finding place in case his market was affected.

It is possible that many of the shells labelled "Aden", especially the large cowries, were brought by dhows from the Red Sea or elsewhere and sold to tourists, especially in pre-war days. One wonders how many shells in old collections were bought from natives and traders in the same way, and have since been used as a basis for work on distribution etc...

...I have before me strings of *Cypraea annulus* made into necklaces and sold in 1966 in Mombasa for only one East African shilling each by street traders who toured the cafes. The shells have the back broken open, and through this passes a length of fibre. Three rows of shells are plaited so that the broken sides are hidden...

So little interest was shown by local people in Aden that we could not find an Arabic name for shells, and had to use a word used for all insects and small creatures in general!

¹*Phil Cambridge (1918–1993) 'was widely known as an enthusiastic collector and dedicated conchologist, palaeontologist and geologist with a particular, but far from exclusive, commitment to the East Anglian Crags and their equivalents in Belgium and the Netherlands.'* (Journal of Conchology 35: 83–85) *He spent a year in what was then Aden (now part of war-torn Yemen) in 1966.*

from **How to cook...molluscs** *Arthur Blok*²

...A word of warning should be given to anybody wishing to explore the possibilities of molluscan gastronomy: before eating any mollusc be quite sure that it is fresh. I remember being told by the late W. James Wintle (secretary of the Malac. Soc., 1919) that during an experiment he made to ascertain how many of the British molluscs are edible he ate some freshwater Unios without knowing that they had been dead for some time with the consequence that he had a narrow escape from death by poisoning...

²*Arthur Blok OBE (1882 – 1974) was an engineer who made some of the equipment used in the transmission of the first radio messages. Conchology was a recreation and he had no interest in field work, but 'often said he had never regretted the advice of J. R. le B. Tomlin not to become a specialist.'* *He amassed a large collection and library which he presented to the Hebrew University of Jerusalem.* (see: Journal of Conchology 29: 67–68)

from **10-Kilometre Square Recording Scheme for non-marine mollusca** *Michael Kerney*

Although a scheme of this kind can never be said to be 'complete', coverage may be regarded as adequate when about 60% of the species which may reasonably be expected to live in any particular 10-kilometre square have actually been recorded. In most lowland areas this means in practice between about 40 and 60 records, the number depending largely on the presence or absence of good freshwater habitats (the very richest squares seem to contain over 100 species) ...

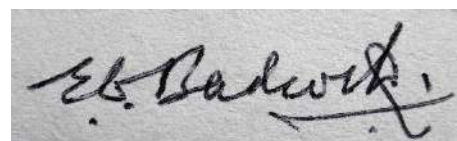
...Since the object of the scheme is to build up as large a species list as possible from a particular 10-kilometre square, a complete range of habitats should ideally be visited: e.g., a river, a wood, a stone wall, a garden, etc... However, in practice, on a quick visit to an area to which one is unlikely to return, the most profitable strategy is to make for what seems likely to be the richest spot in the square... In lowland Britain and Ireland it may be the bank of a canal or slow river, perhaps with adjacent marshes and woodland. In freshwater collecting the list can often be increased by examining flood debris, or heaps of dredged material... It is a good plan to skim from the bottom and roughly sift in the collecting scoop a quantity of the shelly detritus often present in rivers and lakes. If such siftings are taken away and carefully examined later, many additional small species which might otherwise be missed may be picked out. Similarly, in woods, it is wasteful of time in the field to search for all the minute species. A bag of leaf litter should be gathered from what seems a 'snaily' spot, and taken away to be sorted or sieved at home.

Remember that the law of diminishing returns quickly sets in once all the commoner species have been found. In a poorly recorded area it is usually more productive to spend a day visiting four squares and list 25 species from each (100 records), than to spend the same time working one square more intensively and find perhaps 50 species as a result. The blanks may be left to others, whose luck may be different...

from **Shell localities** *Eric Badcock*

Not long ago I was given some marine shells collected recently off Christmas Island in the Pacific. When writing the first label I was going to leave out the name of the ocean but fortunately I decided to consult my gazetteer. To my amazement, I discovered two other Christmas Isles: one in the Indian Ocean and the other in the Bras d'Or, Canada! Had I not used the gazetteer my specimens would, of course, have been of little scientific value due to insufficient locality data.

...While studying a large private collection recently I discovered a shell labelled 'off Terranova, Mediterranean'. We shall never know whether it was collected off that town in Sardinia or its 'namesake' in Sicily!



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: Martin Willing

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Email: president@conchsoc.org

HON. GENERAL SECRETARY: Rosemary Hill

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Email: secretary@conchsoc.org

HON. TREASURER: Nick Light

The Old Workshop, West Street, Winterbourne Kingston,

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Cardiff, CF10 3NP Email: journal@conchsoc.org

HON. EDITOR OF MOLLUSC WORLD: Peter Topley

The Rectory, 8 Rectory Close, Clifton, Shefford, Beds., SG17 5EL

E mails: magazine@conchsoc.org

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E mail: tom@tmwalker.co.uk

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Email: conservation@conchsoc.org

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E mail: marine@conchsoc.org Phone: 01621 810141

HON. NON-MARINE CENSUS RECORDER: Ben Rowson

Amgueddfa Cymru – National Museum of Wales, Dept. Biodiversity

& Systematic Biology, Cathays Park, Cardiff, CF10 3NP

E mail: nonmarine@conchsoc.org

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Cambridge CB1 2BZ

E mail: shellmember@gmail.com

For general membership enquiries please contact: -

HON. MEMBERSHIP LIAISON OFFICER: Briony Eastabrook

32 Lypiatt Street, Cheltenham, Gloucestershire GL50 2UDE

NOTE CHANGE OF ADDRESS mail: membership@conchsoc.org

How to become a member

Subscriptions are payable in January each year, and run for the period 1st January to 31st December. Members joining later in the year will receive all publications issued during the relevant calendar year. • Ordinary membership £33 • Family/Joint membership £35 • Under 18 (receiving Mollusc World only) £5 • Student membership £15 • Institutional subscriptions £47

In view of the high cost of postage for distribution from the UK, members living in the Republic of Ireland and 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, 14 St Barnabas Court, Cambridge CB1 2BZ, (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 2019 issue should be with the Hon. Editor prior to 31st May 2019; 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.



Conchological Society of Great Britain and Ireland

Diary of Meetings

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

Saturday 6th April 2019: ANNUAL GENERAL MEETING AND PRESIDENTIAL ADDRESS

Speaker: The President: Before and after the Medmerry breach: the story so far ...

14:00 – 17:30: 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.)

Saturday 13th April 2019: FIELD MEETING (non-marine): Marks Hill Wood, Langdon Hills, Essex.

Leader: Simon Taylor (book via 07947 388180 or marine@conchsoc.org). Molluscs and other invertebrates. Meet 10:00 at the car park on Delmores, Langdon Hills (TQ682874). Bring packed lunch.

Saturday 27th April 2019: FIELD MEETING (non-marine): RHS Gardens, Wisley, Surrey.

Leaders: Imogen Cavadino and Hayley Jones (imogencavadino@rhs.org.uk, 01483 226568). Native and introduced species in the gardens, glasshouses and woodland. Meet at 10:30 at the Laboratory Building. Participants must contact leader in advance, for free access to the gardens, and because places are limited and members of other Societies have also been invited.

Sunday May 5th 2019: FIELD MEETING (non-marine): Hainault Forest, Essex.

Leader: Simon Taylor (book via 07947 388180 or marine@conchsoc.org). Molluscs and other invertebrates. Meet 10:00 at the Camelot car park, Manor Road, Lambourne, near Romford, Essex, opposite the Miller & Carter pub RM4 1NH (TQ478944). Bring packed lunch.

Saturday 11th May 2019: FIELD MEETING (non-marine): Gloucestershire Cotswolds.

Leaders: Keith Alexander (keith.alexander@waitrose.com, 01392 413092) and John Fleming (01452 813659; johnfleming2012@hotmail.co.uk). Joint meeting with Gloucestershire Naturalists Society and Gloucestershire Invertebrate Group, continuing a project initiated last year to up-date records for *Ena montana* which has recently been assessed as Near Threatened in Britain. At time of printing permission had not been received for the preferred site so please contact the leaders or check the website nearer the time.

Sunday 12th May 2019: FIELD MEETING (non-marine): Bioblitz, Churchyard and adjoining Southill Park Estate, All Saints Church, Southill, Beds.

Joint meeting with the Bedfordshire Natural History Society (BNHS) and Southill PCC. Leader: Peter Topley (magazine@conchsoc.org, 01462 615499). We will be recording in the churchyard areas around this rural church and also have permission to access adjacent areas of the private Southill Park Estate. The BNHS nature table will be on display. Bring packed lunch. Meet from 10:00 at the church; parking in churchyard or signed nearby (TL 14644 42124; SG18 9LL).

Sunday 11th August 2019: FIELD MEETING (non-marine, unless Silurian fossils!): Wenlock Edge, Shropshire.

Leader: Mags Cousins (07791 505641, mags.cousins@naturalengland.org.uk). NT site with extensive ancient woodland, calcareous grassland and Silurian limestone quarries. Meet at 10.30 at Presthope Car Park, SO 583 975.

Saturday 31st August 2019: FIELD MEETING (marine): Titchfield Haven, Hampshire.

Leader: Peter Barfield (Peter.Barfield@myport.ac.uk).

Shallow muddy-sandy bivalve shore on the Solent with some dwarf *Zostera* patches; of particular interest for the recently arrived Pacific mussel *Arcuatula senhousia*; also *Mercenaria*, and possibly *Acanthocardia paucicostata*. Low spring tide at 18:04.

Meet at 16:00 on shore at SU 530 023, below Cliff Road; parking can be busy, so allow time for walk in.

September 21st September 2019: FIELD MEETING (non-marine): Wyre Forest, Worcs.

Joint meeting with Wyre Forest Study Group. Leaders: Rosemary Winnall and Mike Averill: (rawinnall@gmail.com, 07732 203393). Aquatic day, sampling Wyre Forest ponds and stream. Meet at 10:00 at Uncllys Farm, Tanners Hill, near Bewdley, Worcestershire DY12 2LR (SO 760 753). Please notify Rosemary Winnall if you intend to come.

Friday 27th September 2019 – Wednesday 2nd October 2019: FIELD MEETING (marine): Isles of Scilly, Cornwall.

Leader: Bas Payne (bas.payne@gmail.com, 01647 24515). A good variety of rocky shores and pools, and sandy flats; rich shell fauna and other marine wildlife. Low spring tides over the weekend. Detailed programme to be arranged; if interested, please contact Bas.

October 2019: FIELD MEETING (non-marine): Knepp Castle, Sussex.

Leader: Martin Willing (martinjwilling@gmail.com). Advance notice of a second meeting to look at this extensive rewilding project and try to find out what effect it is having on the molluscs. Details t.b.a., on the website.

Please note the following provisional dates in autumn 2019 for your diary:

Saturday 19th October 2019: INDOOR MEETING 14:00 (preceded by Council meeting)

Saturday 16th November 2019: REGIONAL INDOOR MEETING

Saturday 7th or 14th December 2019: INDOOR MEETING 14:00 (preceded by Council meeting)

If you intend to attend a **field meeting**, please remember to inform the leader beforehand, and if, on the day, you are held up in traffic or your public transport is delayed, please try to contact the meeting leader if possible.

Indoor meetings at the Natural History Museum take place in the Angela Marmont Centre for UK Biodiversity, Darwin Building. *Please bring plenty of exhibits and demonstration material.*

We are always happy to receive any suggestions for speakers for indoor meetings, or offers to lead field meetings, and also any suggestions about Society participation in the meetings of local and other societies.

Programme Secretary: Bas Payne, The Mill House, Clifford Bridge, Drewsteignton, Exeter EX6 6QE; 01647 24515, programme@conchsoc.org.