Mollusc World

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Mercuria anatina in West Sussex

Shell measurement

Conchologists in conflict

The Conchological Society of Great Britain & Ireland

Helping to understand, identify, record and conserve molluscs

From the Hon. Editor

The current Covid-19 pandemic continues to feature prominently in the news and affect most of our lives. However, the urgent need for international and immediate action on climate change should be at the top of everyone's agenda. In September the Conchological Society joined 109 other biological organisations in putting our name to the 'Statement of World Aquatic Scientific Societies on the Need to Take Urgent Action against Human-Caused Climate Change, Based on Scientific Evidence'. The press release includes the statement: 'The societies call for drastically curtailed global greenhouse gas emissions to avoid the worst impacts of man-made climate change to fish and aquatic ecosystems. Unless urgent action is taken to reduce emissions, scientists predict catastrophic impacts to commercial, recreational, and subsistence fisheries and human health and global economies.' See https://fisheries.org/2020/09/worlds-leading-aquatic-scientific-societies-urgently-call-for-cuts-to-global-greenhouse-gas-emissions/.

Our officially organised field meetings this year have mostly not taken place, but we have been pleased to be able to offer a small number of online 'indoor' meetings via Zoom. By the time you read this magazine at least one of these will have taken place, hopefully successfully. Although not everyone is able to access this platform, on the other hand it has enabled members who are not normally able to come to London for our indoor meetings to join us online. Please see back cover for more details.

An updated *Annotated list of the non-marine mollusca of Britain and Ireland*, by Roy Anderson and Ben Rowson has been published and is currently available for download at www.conchsoc.org/node/563. There are a number of important changes to accepted names, and some additions to the fauna, since the last edition in 2008.

Finally, on a sad note, in September we were informed of the death of Revd. Graham Long. Graham was a respected naturalist, a former Conchological Society council member and a regular contributor to this magazine. His final article for the magazine, which he submitted to me in June, is included in this issue. A full obituary will be published in due course.

This issue will have arrived around one month late due to work on the inclusion of an important article by Martin Willing on the swollen spire snail, *Mercuria anatina* (formerly known as *M. cf. similis* or *M. confusa*) in Sussex.

My personal thanks are due to Janet Ridout-Sharpe for volunteering to help in the copy-editing of *Mollusc World*. Her assistance with this issue is much appreciated.

My usual request for 'copy' for Mollusc World still stands! I would like to thank all those who have sent in articles, featured either here, or will be in a future issue.

Peter Topley

The Conchological Society of Great Britain & Ireland

Mollusc World 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 early back copies are available for viewing. Mollusc World will also be of interest to all those enquiring about this subject or the work of the Society.
We welcome all contributions in whatever form they arrive (see page 31 for further details).

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Front Cover:
The swollen spire snail, *Mercuria anatina* (height c. 3-4 mm) (see page 18).
(photos: shells─ Paul Sterry (Nature Photographers); Living animal ─ Roy Anderson)

Bembridge Ledges: field meeting report

Bas Payne

figure 1: The author and Shena Maskell searching for molluscs on the Bembridge Ledges. (photo: John Maskell)

Bembridge Ledges, at the eastern end of the Isle of Wight, is an interesting shore, if not a rich one (figure 1). Thin sand, with many small flint pebbles and cobbles at the high tide line, overlies fairly extensive platforms of chalk; as the chalk is almost horizontally-bedded, the shore goes down in low steps of slightly harder chalk separated by shallow sandy tidal lagoons, some with small beds of eel grass (*Zostera*). Even the harder chalk is fairly soft; man-made structures – especially the footings of the lifeboat station and ramp (figure 2), and a long concrete sewage outfall, provide small areas of harder concrete and stone.

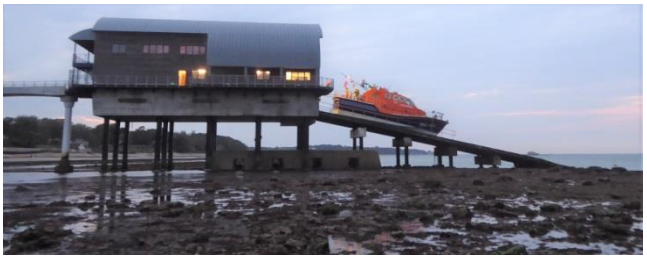

figure 2: Bembridge Lifeboat Station. Participants saw the lifeboat being launched down the ramp at the beginning of the meeting and, a couple of hours later, being winched up it.

(Photo: John Maskell)

Three of us – John and Shena Maskell and the writer – met on 19th September in the Bembridge Lifeboat Station carpark (NGR SZ 657 879) for a suitably socially-distanced briefing. Low tide was close to sunset; fortunately it was a reasonably bright and not too windy afternoon.

The primary purpose of the meeting was to see whether *Phorcus lineatus* and *Patella depressa* were present. Both are species that are common in south-west England, and it has frequently been suggested in recent years that both are likely to be extending eastward into the colder waters of the eastern English Channel in response to climate change.

A quick check of the upper shore produced little dead shell, just occasional worn limpets, top shells and littorinids. Either the tides, winds and currents weren't bringing much in, or the flint cobbles were doing a good job of destruction; hopes of shell drift and shell grit went unrewarded. Crevices in stone and concrete structures produced many *Littorina saxatilis* agg. and a single *Melarhaphe neritoides.*

Further down the shore, turning middle-sized boulders produced close to 20 live species, including frequent *Calliostoma zizyphinum* with several large adults, several juvenile *Ocenebra erinaceus* and *Trivia arctica*, and one *Gibbula magus*. Three *Aeolidia papillosa* and an egg mass were found under a stone on a reconnaissance visit the evening before.

Yellow *Littorina obtusata* were common on areas of *Fucus spiralis*, together with a small number of dark *L. fabalis*.

The chalk was riddled with piddock burrows; dead shells were fairly frequent – most were *Barnea candida*, with some *Pholas dactylus* and one *Barnea parva* (figure 3).

A sieve passed through the *Zostera* produced many *Rissoa membranacea*, *Rissoa parva* (figure 4), some *Steromphala umbilicalis* and one *Lacuna pallidula*.

figure 3: *Barnea parva*, Bembridge Ledges (scale in mm).

figure 4: *Rissoa membranacea* with *R. parva* (right) (scale in mm).

Despite long and careful searching, no *Phorcus lineatus* were found. NBN records show little to support predictions of increase and eastern spread – never common in the Solent, there are slightly more records between 1980 and 2000 (6) than since 2000 (4).

A number of *Patella ulyssiponensis* were found on concrete footings on the lower shore – this, together with earlier records by Jan Light and Ian Killeen from Bembridge, are the easternmost records of this species along the south coast. We found no *P. depressa*. As with *Phorcus*, NBN records provide little support for predictions of eastward spread of *P. depressa*; there are a number of records from the south coast of the Isle of Wight, but most are from the 1980s and 1990s, with none later than 2002.

One missed opportunity – we spent so much time not finding *Phorcus* and *Patella depressa* that we didn't collect a weed-washing sample. But it was, nonetheless, a useful and thoroughly enjoyable meeting.

Conchometry in the 21st century

Adrian T. Sumner

In general, the shells of snails develop to a set size and stop growing, often producing a thickened lip that is sometimes reflected. They are said to have *determinate growth.* Published descriptions of snails, in field guides and elsewhere, always give shell dimensions, and the adult size is a characteristic of the species. Many years ago I became interested in measuring the sizes of shells, as it seemed to me that the shells of various species that I found in Scotland might be rather smaller than the published values. This seemed plausible, as climatic factors have been reported as affecting shell size in *Cepaea hortensis* (Bengtson *et al.*, 1979; Goodfriend, 1986), and Scotland tends to be colder than England. In fact, the whole business of measuring shells can get quite complicated: people do not always measure the same things, and the same shell sizes have been quoted repeatedly for many years without amendment – indeed, some authors give only a single value for each dimension, as if all the shells of a species were identical. This article will be in two parts: first, a discussion of how shells can be measured, and some of the associated problems; and second, some results from recent measurements, which I compare with previous data in the literature.

In 1928, Boycott gave his Presidential Address to the Malacological Society on the subject of 'Conchometry' (hence the title of this article), and his address was subsequently published in that Society's journal (Boycott, 1928). In it he drew attention to the value of measuring shells. For example, different populations of the same species might have shells of different average size. In some cases shell measurements can be valuable in helping to distinguish closely related species (Alkins, 1928; Armbruster, 1995). Size measurements are also important for studying growth in snails (Cameron, 2016).

But what were people measuring? Surprisingly, many authors describe measurements of shells without giving any indication of what they actually measured. A standard method is to measure the height of the shell parallel to the columella, and its maximum width or diameter at a right angle to the columella (Kerney & Cameron, 1979) (figure 1). Because of the shape of shells, some authors have not found it convenient to measure the diameter in this way and have used the maximum diameter of the shell at whatever angle to the columella that it happens to be (e.g. Boycott, 1928; Murray & Clarke, 1968). A lack of consistency in the methods of measurement makes it much more difficult to compare different authors' studies. Of course, as well as the height and width, there are various other features of the shell that it is useful to measure: aperture height and width, spire height, height and width of the body whorl, etc. But, as Boycott pointed out, the more parameters you try to measure, the longer it takes and the smaller the samples that can be measured.

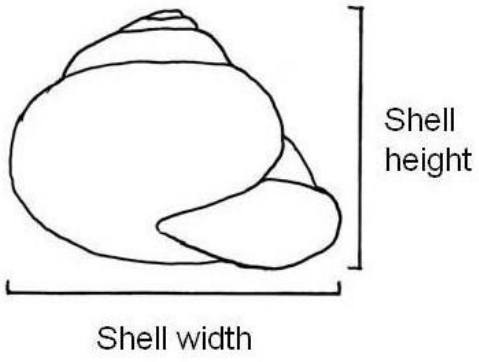

figure 1: Recommended measurements of height and width of a snail shell.

Boycott (1928) mentioned that quoted sizes of shells often seemed rather high; perhaps instead of giving average values, certain authors in the past might have selected particularly fine specimens to measure. Earlier authors often gave a single value for shell dimensions, although it has been usual for many years to quote a range of sizes. In fact, as Boycott indicated, it is important to give the distribution of shell sizes about the mean, although this is rarely done. Most shells have dimensions somewhere near the average, with fewer and fewer having more extreme values. Statistically, this refers to the mean and standard deviation. With such information, statistical tests can be carried out to decide whether small differences between populations are significant or not, but many readers will be thankful that I am not going to get involved with statistical analysis, although it is easy to make such calculations automatically using an Excel spreadsheet. In any case, it should be borne in mind that whatever the statistical analysis might show, the important thing is whether there is any biological significance in the differences.

It is worth making a few comments about terminology. As well as inconsistencies in what is actually measured, there are inconsistencies in what the various parameters measured are called. It seems clear enough that width, breadth and diameter are all the same thing, and also height and altitude (although I think of altitude as being height above sea level and it does not seem to me to be an appropriate term in this context). But what is the 'length' of a shell? For a tall narrow shell such as *Clausilia* or *Cochlicopa*, one might imagine length to be the distance from base to apex, but the only illustration I have found showing what the author meant by 'length' appears to show that it is equivalent to width (or breadth or diameter) (Panella, 1982).

Measurements are often made using vernier callipers reading to 0.1 mm; mine reads to 0.05 mm although I find it difficult to read at that level. Modern callipers are available with dials or electronic displays, which may seem to give greater precision, but this may be misleading; there are potential errors in the measuring process which may negate any greater sophistication in the instrument (see below). Callipers work well with larger, more robust shells, but are not practical for small shells. These must be measured with a microscope, using an eyepiece graticule calibrated against a stage graticule; one cannot rely on the marked magnifications of the microscope lenses. As an alternative to taking measurements of the actual shell, some workers have found advantages in taking measurements from photographs of shells (e.g. Perea *et al.*, 2008; Schilthuizen & Haase, 2010). A highly sophisticated technique is micro-computed tomography, which allows detailed analysis of three-dimensional structures (Monnet *et al.*, 2009), but of course this requires specialised equipment that is not generally available.

The problem with measuring shells is not primarily with the method of measurement, but with the shells themselves. The difficulty of orientating shells correctly has previously been commented on: 'The trouble with measuring helical objects is that contact surfaces are never opposite and constant orientation is difficult' (Palmer, 2010). When measuring the height of tall narrow shells such as clausiliids it should be quite easy to get the orientation right, but globular shells are more difficult to deal with. With practice, I have found it possible to get quite consistent repeat measurements from the same shell, but this is with empty shells indoors under favourable conditions. Handling active live snails out of doors in damp conditions is quite another matter! For smaller shells, it is best to attach them to a piece of Blu-Tack or Plasticine; the tackiness will hold the shell in place while allowing its orientation to be adjusted. If using Plasticine, choose a colour that provides a good contrast with the shell so that the edges of the shell can be seen clearly. Even relatively large shells, especially if they are rather fragile (e.g. Succineidae), can be mounted on Blu-Tack or Plasticine and the callipers brought up to the shell gently while monitoring the process under a microscope. This avoids trying to hold delicate shells in one's fingers, with the danger of crushing them. However, even with the greatest care, various random and systematic errors of measurement may occur (see Schilthuizen & Haase, 2010, for a discussion of these points).

How many shells should one measure? Boycott (1928) suggested one should 'Aim at numbers somewhere about 100; if more are readily available, collect them as separate samples; if you do not want them for your own purposes, they may be useful to someone else'. From the statistical point of view, about 30 is sufficient; if you measure more than this, you will find that the mean values and their standard deviations vary very little as the numbers increase. In any case, one should, if practicable, endeavour to measure shells in the field and then return them to their habitat. One cannot help wondering whether Boycott's collection for measurement of 571 specimens of *Alinda biplicata* at Cambridge could be connected with the disappearance of this species from that area! At the other extreme, it may be that only a very few specimens of a species could be found at a particular site; it may nevertheless be worth measuring them, as they may indicate that the population has some distinctive characters.

As mentioned above, I started measuring shells many years ago and some results are described below. Most of the populations have been visited and measured by myself, but I must thank Chris du Feu for measurements of some shells from parts of England, and Tony Wardhaugh for sending me shells from northern England. I am also grateful to Sankurie Pye for arranging for me to visit the collections of the National Museums of Scotland (NMS) in Edinburgh, where there are some specimens of particular interest. Data have been obtained from four species: *Arianta arbustorum*, *Cepaea hortensis*, *Cepaea nemoralis* and *Cornu aspersum.* All shells measured were adults, with thickened lips. The only measurements made were shell height and shell width, as shown in figure 1. The most obvious features were the great variation in the size and shape of shells, both between and within populations (figures 2 and 3). Each population measured appeared to be different, although not all the differences would be significant. A photo of two specimens of *Cornu aspersum* from the same population (figure 4) perhaps gives a clearer idea of the range of sizes that can occur in a population than a graph can. There is also a lot of variation in the ratio of shell height to width, both within populations (figure 5) and between populations. Visually, some shells of the same species appear relatively tall and pointed, while others have a more flattened shape. Although the sizes of both individual shells in a population and the mean sizes of populations of shells tend to form clusters of generally similar size, there are often some outlying individuals and populations.

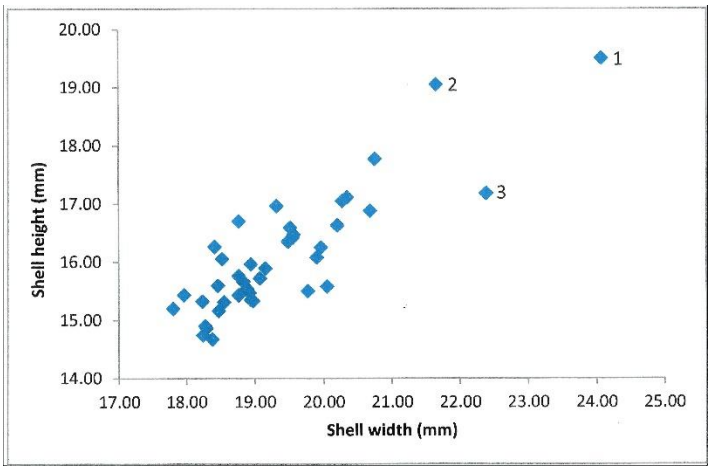

figure 2: Plot of height versus width for the populations of *Cepaea nemoralis* studied. Dot number 1 represents specimens from the Aran Islands, Ireland; dot number 2 is a specimen from the Durness limestone, Sutherland, Scotland; and dot number 3 represents specimens from Cheddar Gorge (also limestone).

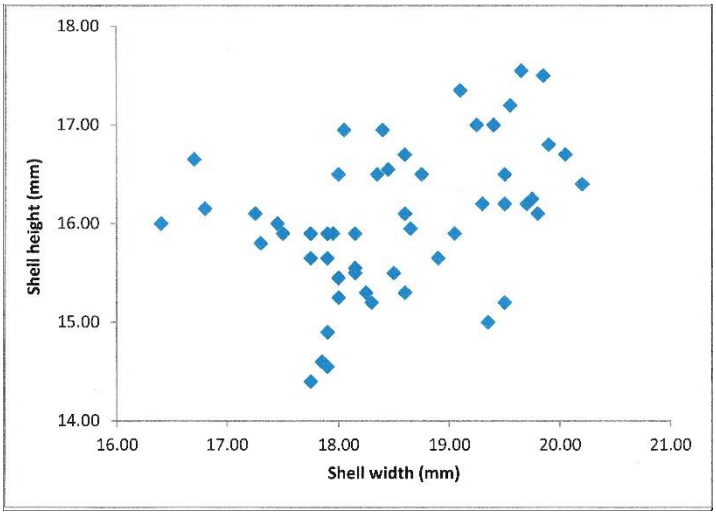

figure 3: Plot of height versus width for individuals of *Cepaea nemoralis* from Kilspindie, East Lothian.


figure 4: Two specimens of *Cornu aspersum* from Woolacombe, Devon, indicating the range of sizes that can be found in the same population (NMS collection).

figure 5: Two specimens of *Cepaea nemoralis* from Bishop Middleton, County Durham. The taller one, on the left, has a height to width ratio of 0.89, while the squatter one on the right has a ratio of 0.72.

There is (or was in 1925) a population of *Arianta arbustorum* in Casiobury Park, Watford, that had particularly small shells (table 1); accompanying the specimens (in the NMS collections) is a note: 'I have never measured a normal set to compare with these. C.O. [Charles Oldham].' The shells were obtained from a *Juncus* (rush) swamp, but whether this might have any bearing on the small size of these snails is unknown. It would be interesting to know if this population of dwarf snails is still present. Two Irish populations of *Cepaea nemoralis* in the NMS that I measured are of particular note. One, from the Aran Islands, has particularly large shells (table 1 and figure 2). Large size is characteristic of many Irish populations of *C. nemoralis* (e.g. Stelfox, 1945; Cook & Peake, 1960) and it is currently thought that these are descendants of snails brought by people, deliberately or inadvertently, from the Pyrenees several thousand years ago (Grindon & Davison, 2013). The other Irish *C. nemoralis* of interest came from Bundoran and the shells in the collection I examined are all sinistral. There is something of a mystery about these shells; apparently there are numerous sinistral shells from this site in museum collections, but hardly any have ever been found in the wild (Boycott & Diver, 1925). These shells appear to be squatter than dextral shells that I have studied. I also found them more difficult to measure than dextral shells. Could this be simply lack of experience with handling sinistral shells, or does it need a left-handed person to study sinistral shells? Finally, Tony Wardhaugh collected for me some *Cornu aspersum* from Lindisfarne which seem to be unusually small (table 1).

Table 1. Summary of shell sizes

	Height (mm)	Width (mm)	N [1]
Arianta arbustorum			
Scotland	12.40–19.95	15.10–21.40	6
England	14.80–19.10	18.05–22.40	3
Watford	11.50–14.40	14.70–18.05	1
K & C [2]	10–22	14–28	
Cepaea hortensis			
Scotland	10.90–16.95	13.65–19.90	20
England	14.65–15.50	18.09–19.69	1
K & C [2]	10–17	14–20 (rarely 22)	
Cepaea nemoralis			
Scotland	12.95–19.50	14.40–22.70	31
England	14.40–19.10	17.30–24.00	5
Ireland			
Aran Islands	16.25–22.20	21.35–27.35	1
Bundoran [3]	13.55–17.10	17.95–22.05	1
K & C [2]	12–22 (rarely 28)	18–25 (rarely 32)	
Cornu aspersum			
Scotland	23.60–34.50	24.25–33.60	18
England	21.75–34.75	22.95–33.55	5
Lindisfarne	20.10–28.40	20.85–28.85	1
K & C [2]	25–35 (rarely 20–40)	25–40 (rarely 45)	

[1] N = number of samples measured.
[2] Kerney, M.P. & Cameron, R.A.D. (1979) [3] Sinistral shells

What factors determine the size of a shell? The subject has been reviewed by Goodfriend (1986), without finding many clear correlations. There is good evidence that the size of shells is under genetic control (Cook, 1965; Murray & Clarke, 1968). This may well be the reason why a population of *Cepaea nemoralis* at North Berwick, sampled in 2003, 2015 and 2019, showed essentially the same mean size on each occasion. This agrees with the observations of Bengtson *et al.* (1979) who also found that the mean shell size in a population was almost constant over a period of several years. However, a number of environmental factors have also been shown to influence shell size (Goodfriend, 1986). Crowding is well established as such a factor, and greater population density results in decreased size (Williamson *et al.*, 1976; Tattersfield, 1981; Perry & Arthur, 1991). No data are available to indicate whether this might apply in any of the cases studied here, although none of the populations that I have studied myself appeared to be crowded. Boycott (1928) described various situations in which nearby populations of the same species had different mean sizes, and in one case he attributed the smaller size of one population to 'the general conditions [that] were not favourable' (Boycott, 1913). Nevertheless, such observations, although important, cannot distinguish between the influences of genetic and environmental factors.

One important environmental factor affecting snails is the availability of lime (or calcium). It is well known that regions rich in limestone tend to support greater numbers of snails and that certain species are restricted to lime-rich habitats (Cameron, 2016), and there is some evidence that snails may grow larger on calcareous substrates (Goodfriend, 1986). As limestone deposits are generally very localised in Scotland, that might explain why Scottish snails would appear smaller than expected. Initial observations indicated that there might be something in it: shells of *Cornu aspersum* and both species of *Cepaea* from Cheddar Gorge (figure 2) did indeed seem somewhat larger than Scottish specimens that I had previously measured. Shells from certain Scottish sites known to be rich in lime (e.g. *Cepaea nemoralis* from the Durness limestone on the north coast of Scotland; figure 2) also seemed somewhat larger than average. However, it soon appeared that shells from calcareous sites were not necessarily larger; *Cornu aspersum* shells from a limestone quarry next to the Plymouth Marine Biological Laboratory were, if anything, rather below average size. Taylor (1910), in a throwaway remark, stated that *Cornu aspersum* tended to be smaller by the sea, which might explain the relatively small size of the Plymouth specimens and also that of the Lindisfarne shells.

Other coastal shells do not seem to be unusually small, however, so there must be a variety of factors operating.

Two other points are worth mentioning. Price-Jones (1930) found that larger shells of *Cepaea nemoralis* were squatter than smaller ones: although shells of greater width also had greater height, the ratio of height to width was less for larger shells. While I have found indications of this within a population of *Cepaea nemoralis* (figure 5), the scatter of mean values of populations is such that any general effect of this sort is not clear, either in *C. nemoralis* or in the other species I studied. Secondly, it has been reported for *Cepaea hortensis* that banded shells can be somewhat larger than unbanded shells (Häkkinen & Koponen, 1982). Large numbers of shells need to be measured to detect such differences, which are likely to be small; in the only case where I was able to make sufficient measurements of a population of *C. hortensis*, there was no difference in shell size between banded and unbanded snails.

Finally, what about the question that started off this work: are Scottish snails smaller than the published values? The answer seems to be no; looking at the figures in table 1 and bearing in mind that there are rather few samples from England, there seem to be no substantial differences in size between Scottish and English snails. When compared with the values given by Kerney & Cameron (1976), which are similar to many given elsewhere, although not identical, there is also quite a good match. For *Arianta arbustorum*, Kerney & Cameron give higher maximum sizes than anything I have found, although their minimum values are quite similar. For *Cepaea hortensis* my measurements match the figures given by Kerney & Cameron remarkably well, though there are some differences in the case of *Cepaea nemoralis*: in particular, the minimum shell widths that I have measured are noticeably less. For *Cornu aspersum*, Kerney & Cameron give rather higher values than I have found; in particular, the minimum values that I have measured are distinctly smaller. Kerney & Cameron also give much higher maximum values, but qualify this by describing such values as rare. There is, in fact, a North African subspecies of *Cornu aspersum (C. a. maxima)* which grows much larger than those found in Britain or in continental Europe, up to about 45 mm in breadth (Madec & Daguzan, 1993), the largest size given by Kerney & Cameron.

In conclusion, Scottish shells are not significantly smaller than those found further south, and the sizes of these and British and Irish specimens are similar to those quoted in the literature, although there is a significant number of shells smaller than the figures given in textbooks. Nevertheless, there remains an unanswered question: what determines the size of shells in a particular population? We know that shell size is, in part, genetically determined and that the mean shell size of a population can remain the same for many years, in spite of considerable variation of size within a population. It is now over a century since Boycott (1913) attributed smaller shell size to less favourable conditions. At the risk of being immediately corrected, I would like to suggest that, as at least a preliminary step, it might be valuable to carry out measurements of shell sizes on different populations, preferably over many years, noting also as many environmental factors as possible. Only in such a way might sufficient data become available to produce some testable hypotheses about the determinants of shell size.

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Conchologists in conflict – Part 1

Brian Goodwin

As I write (April 2020), the whole country is in conflict – dealing with the coronavirus pandemic. Most of us are 'self-isolating' or in 'lockdown' and phrases such as 'social distancing' are part of our day-to-day vocabulary. There is even the occasional dark thought that I might not live to finish this piece. Political leaders are invoking the 'Dunkirk Spirit'. And although we are at war, it is not the same type of war our parents and grandparents fought. This article deals specifically with conchologists in conflict. Not just in the two World Wars, but also in some lesser known battles. In this first part, I deal with the period before WW2.

At this point I should mention that there have been two 'histories' of the Conchological Society of Great Britain and Ireland (CSGBI). The first (Jackson, 1927) was rather brief and dealt mainly with the Society's formation and its founders. The second (Crowley, 1975), although much more comprehensive, included just five short paragraphs on WW1 and concentrated almost entirely on the financial difficulties the Society found itself in. This article, which is based on information held in the CSGBI and J.W. Jackson archives, takes a rather different angle.

Many CSGBI members have been associated with the military. One of the best known was Lieutenant Colonel Henry Haversham Godwin-Austen (surveyor, ornithologist, conchologist), who was regarded as probably the greatest mountaineer of his day (figure 1). In 1851, after leaving the Royal Military College, Sandhurst, he was commissioned into the 24th Regiment of Foot that later became the South Wales Borderers, and in 1852 he saw action in the Second Anglo-Burmese War. Later, Melvill (1924) reported that 'an émeute[1,] took place in Bhutan' and he was awarded a military honour and decoration, 'having captured two forts from the enemy'. Godwin-Austen took conchological advantage of long periods in foreign lands and published extensively on molluscs, including major works on 'The Land and Freshwater Mollusca of India' (1882-1910) and 'The Fauna of British India – Mollusca' (1908). He served as CSGBI President in 1909 and 1910 and further details of his life and a bibliography appeared in Melvill (1924), while a detailed biography was produced by Catherine Moorehead (2013), albeit with relatively sparse coverage of his conchology.

Another member and ex-President, Alfred James Peile (1868-1948), was commissioned in the Royal Artillery on 17th February 1888 and served in India, Bermuda and South Africa. During the Great War 'he saw service with the heavy artillery in France and at siege artillery schools at Lydd and Borden', retiring (as Lieutenant Colonel) in 1920. His only son was killed in action in France in 1917.

Other military conchologists never saw action. One of the most intriguing is Matthew William Kemble Connolly[2] (1872-1947), son of a Vice Admiral, who also attended Sandhurst and was commissioned into the King's Own Yorkshire Light Infantry in1891. Although not in good health (he suffered with rheumatic fever), he was sent with the Royal Warwickshire Regiment to South Africa during the Anglo-Boer War (1899-1902). For Connolly, this conflict could be regarded in a positive light. Working in signalling operations, he spent long periods in remote locations in the veldt and this gave him ample time to collect and study molluscs. As a result, he became a leading authority on South African land and freshwater snails, something that might not have panned out without the

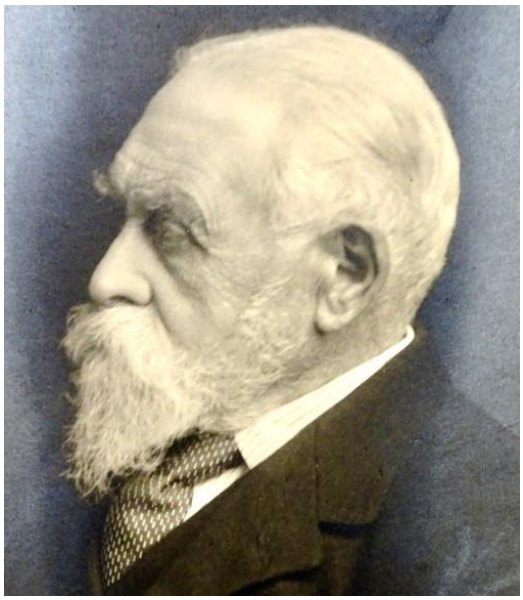


figure 1: Lieutenant Colonel Henry Haversham Godwin-Austen. (photo:(CSGBI Archive, West Yorkshire Joint Services Archive, Morley, Leeds, LS27 7JQ)

posting. He served as CSGBI President in 1930. Connolly's only son, Cyril, did not follow in his father's footsteps and became a writer and literary critic[3]. Clearly the two did not see eye to eye and Tom Pain, as a young researcher at the Natural History Museum and friend of Major Connolly, recalled being introduced to Cyril Connolly by his father with the words 'this is my son — he is a fool!' Tom himself was a WW1 baby, born at Brentwood, Essex on 13th October 1915 during a zeppelin raid on London (Verdcourt *et al*., 2003).

J. R. le B. Tomlin[4] evidently regarded Major Connolly as a somewhat dubious character. In a letter to J. Wilfrid Jackson of 20th April 1947, towards the end of the long hard winter when Connolly died, he commented:

> 'You would hear of Connolly's death – he was found dead in bed one morning at his hotel. You may know that he sold his coll'n to the B.M. [British Museum, now Natural History Museum] several years ago, & had spent about the last 3 years incorporating it, at the B.M.'s expense!'

Although conflicts such as the Anglo-Burmese and Boer Wars were significant events (especially to the participants), the two World Wars were the most important during the lifetime of the Society and what follows is a brief account of the Society in general and some particular individuals relating to WW1, followed by a more detailed consideration of two brothers involved in both molluscs and the military, and the story of a conchologist caught up in a rather different kind of conflict.

World War 1

At the 433rd meeting of the CSGBI in Manchester on 10th June 1914, Ed Collier was in the Chair and business proceeded as usual: additions to the library; donation to the cabinet; new member (Herbert W. Worsfold) elected; and numerous exhibits were shown – including, by the Rev. L. J. Shackleford, two *Marginella* species 'in fine live condition from Goree' (an island off Dakar, Senegal)[5]. By the time the 434th meeting took place (9th September 1914), Britain was at war.

The Annual Meeting on 24th October 1914 was abandoned and replaced by an Ordinary Meeting 'owing to the outbreak of war, and the possible inconvenience to our President, Mr. Bullen Newton, who was attending the meeting of the British Association in Australia'. With Newton, temporarily at least, stuck in Australia, all the officers were re-elected for a further year. The Council also placed on record 'its high appreciation of the important services to their country by members of the Society in both the Army and the Navy, and to wish for them a speedy and safe return to their homes' – a wish that was not, unfortunately, quickly fulfilled. Broadly speaking, the Society was not significantly inconvenienced although meetings of all the branches (Leeds, London and North Staffordshire) were affected, with a number of cancellations, often as a result of reductions in rail services. Those of the London branch were suspended 'indefinitely' in October 1914, but only for a short period as it turned out. No doubt many members contributed in various ways to the war effort, as the 38th Annual Report in 1915 noted:

> 'A considerable number of our members is on active naval and military service, and to these we offer hearty and most appreciative greetings and good wishes.'

At the Council Meeting of 16th October 1915 conchological jingoism reared its head and 'the question of the retention of the names of German & Austrian members on our list came up for discussion'. The matter was, essentially, ducked and it was decided that Council should be left to deal with each individual case 'on its merits'.

The Society was much more decisive about the Government's proposal to close museums until the conclusion of the war. At the 449th meeting on 2nd February 1916 it was 'Resolved … to enter an emphatic protest against the proposal' – copied to the Prime Minister and the Secretary of the Museums Association. It was believed that any financial economy would be far outweighed by the loss of facilities: to the public ('especially at this time to soldiers and sailors, wounded or on leave'); to students for research; and to school children 'as a valuable means of auxiliary instruction'. In the event, the Natural History Museum remained open to the public throughout WW1, imparting knowledge to help on the home front with displays covering gardening, pest control and foraging.

Branch meetings continued, but with some cancellations, and travel restrictions affected attendance in some cases. Throughout the war deaths occurred and obituaries were published. Relatively few of the deaths were directly attributable to the war, although the Hon. Sec. Rev. Lewis J. Shackleford died in April 1917 only a few months after his eldest son was killed on the Somme.

Shackleford was succeeded by J. Wilfrid Jackson as Secretary. Jackson was 37 and too old to be called up but nevertheless had a busy time. Before the war he had joined the Manchester Volunteer Defence Corps and during the war also served as a Special Constable with Manchester City Police (see figure 2). Later, from June 1917 to March 1920, he joined the Manchester University contingent of the Officers Training Corps.

Two military brothers, G.L. and E.G.M. Sturt, who joined the Society at the same time (in 1912), met with very different fates. The eldest, Gerald Lionel Sturt of the Rifle Brigade, India, survived the war and died in 1947.

figure 2: Manchester Special Police Company 57, near Marple, 6th June 1915, with J. Wilfrid Jackson – far right of middle row. (photo: Buxton Museum & Art Gallery archive, Buxton, SK17 6DA)

However, at the 459th meeting, held on 14th February 1917, Ernest Guy Maclean Sturt was reported 'killed in action – August 1916'. E.G.M. Sturt, born in Strawberry Hill, Middlesex in 1894, was a Second Lieutenant in the Duke of Cambridge's Own (Middlesex Regiment). He died, aged 23, on 16th August 1916, presumably on the Western Front[6], and was buried in the Ration Farm Military Cemetery, La Chapelle-D'Armentieres (figure 3). At the same Society meeting, the resignation of G.L. Sturt was announced.

STURT, 2nd Lt. Ernest Guy Maclean. 12th Bn. Middlesex Regt. Killed in action 16th Aug., 1916. Age 23. Son of Gerald and Mabel Frances Sturt, of Lismore, Weybridge, Surrey. II. C. 3.

figure 3: Grave Registration Report of the Commonwealth War Graves Commission. The marking 'II. C. 3.' refers to the location of the plot at Ration Farm Cemetery.

The war caused an increase in paper and printing costs, and resulted in the reduction of issues of the journal to three per year in 1917. In the same year the North Staffordshire branch failed to meet as its Hon. Sec. (B. Bryan) had been called up for active service. In 1918, with lighting restrictions in place, the Annual Meeting on 12th October was 'confined to the afternoon.' Dr A.E. Boycott was due to deliver the Presidential Address (on variation in *Clausilia bidentata*) but attached to the notification of the meeting was a note (figure 4). In the event, Boycott, an eminent pathologist, was unable to get release from his war duties at Porton Down and a note of explanation (figure 5) was conveyed to Jackson as Secretary. This proved to be the second year running that Boycott had been prevented from presenting his Presidential Address as a result of war duties. His 1917 attempt (on 'The habitats of freshwater molluscs') had also been read in his absence.

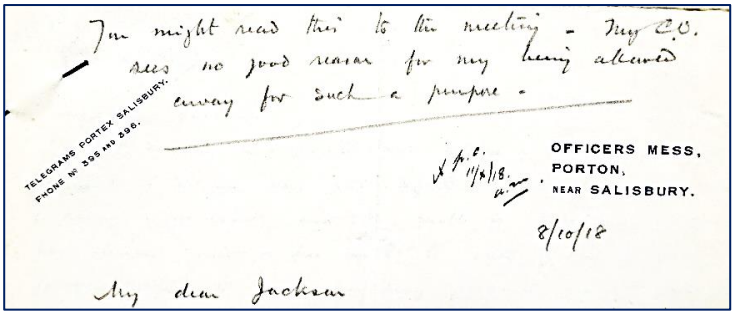
ADDRESS BY THE PRESIDENT.

Dr. A. E. Boycott, F.R.S., will deliver an Address

"ON LOCAL VARIATION IN *CLAUSILIA BIDENTATA*; WITH SOME REMARKS ON THE SIZES OF SNAIL SHELLS."

The President is uncertain of being able to attend, owing to military duties. In the event of his absence, the address will be read by the Hon. Secretary.

figure 4: From the notification of the Annual Meeting in 1918. (CSGBI Archive)


You might read this to the meeting - My C.O. sees no good reason for my being allowed away for such a purpose.

TELEGRAMS PORTEX SALISBURY. PHONE No 295 AND 296.

OFFICERS MESS, PORTON, NEAR SALISBURY.

8/10/18

My dear Jackson

figure 5: Extract of a letter from A.E. Boycott (President) to J.W. Jackson (Secretary) re the Annual Meeting 1918 (CSGBI Archive). Boycott notes 'My C.O. sees no good reason for my being allowed away for such a purpose'!

In the early days of WW1 Boycott worked for the Committee for Health in Munition Workers but in 1917 he joined the Royal Army Medical Corps (RAMC), and as a major was appointed to the Chemical Warfare Committee then led by the physiologist Joseph Barcroft. I could find only relatively brief references to Boycott's role at Porton Down, e.g. Evans (1998), but this is perhaps not surprising as it was a secret scientific research facility which had only been established in 1916. By 1918 the German forces had already used chlorine, mustard gas and phosgene on British troops in Belgium, and the Government was urgently researching how to combat these deadly gases and, presumably, how to develop our own chemical weapons. Boycott would no doubt have been subject to the Official Secrets Act, and he does not subsequently appear to have spoken much about his time there. In the 1939 obituary notices of the Fellows of the Royal Society[7], Boycott is described as being shocked when war broke out. He apparently suffered 'an especially unhappy time', with only the scientific interest of the work mitigating 'the misery he endured in the contemplation of the purposes to which the materials were being put'.

Other Society members were engaged in more mundane – but still important – war work. Thus, another absentee from the 1918 Annual Meeting was Fred Booth from Shipley. He sent his apologies to Jackson:

> 'Every minute of my time out of bed is fully occupied. This is the end of the 3rd week, helping the local Fuel Controller. 9 in the morning to 9 at night Sat & Sunday also & other weeks to come.'

I can find only one other reference to a member killed in the war – J.W. Roberts was reported 'killed in France' at the 469th meeting on 13th February 1918. Joseph William Roberts was born in Manchester in 1897 and joined CSGBI in 1913. He was therefore 20 or 21 years old when he died.

Whether physically, mentally or financially, other members no doubt suffered in their own ways. One such seems to have been L.R.W. Loyd. In 1923 he was proposed for membership by A.E. Boycott, but his (re-)admittance was queried since he had been 'struck off … in 1918 for non-payment of arrears.' Boycott reported back that he 'had been in the army in the Great War and been badly knocked about'. On Boycott's suggestion, he was readmitted and not pressed for back payments.

On a lighter note, there was another 'conchological casualty'. In 1915 Charles Theodore Cribb (later Canon Cribb) joined the Army Service Corps, stationed at Audruicq, 11 miles south east of Calais. Availing himself of any spare moments, he managed to amass a collection of over 50 species. Among these was a rare mutant that met an untimely end. As J.W. Taylor (1920) reported, 'a very handsome but scarcely mature specimen of [*Cepaea nemoralis*] mut. *donovania* Moq. which Mr Cribb was rearing to maturity, is preserved by him as an interesting relic of the wrecking of his quarters by an enemy bomb, the animal being killed and shell damaged by the explosion'. Lieut. Cribb was more fortunate than the snail and was transferred to the Royal Field Artillery, and posted to Mesopotamia and Palestine where he continued his conchological collecting (Woodward, 1978).

Cribb wasn't the only WW1 serviceman to collect snails. The Rev. H. E. J. Biggs did so as well, and much closer to the action, as Peter Topley (2017) recently recorded in *Mollusc World* 45. Biggs survived the Battle of Passchendaele and years later passed on to Peter some *Cepaea hortensis* from the 'Canal bank nr Ypres', dated '1-X-17'. It is a small wonder that these fragile artefacts not only survived the turmoil, but made it back to Britain in such good condition.

The Winckworth brothers

While any potential conchological contributions from the Sturt brothers were summarily cut short, one pair of siblings who certainly made their mark were the Winckworth brothers – Ronald (1884-1950) and Harold Charles (1878-1947). The sons of Christopher Trew Winckworth, a Brighton surgeon, and his wife Alice (née Braby), the brothers enjoyed childhood trips to explore the South Downs and both developed an interest in natural history. Ronald (figure 6) followed his elder brother (by six years) to Epsom College[8], and both undertook military service, but for Harold it was a career, for Ronald an eagerly accepted duty. Harold studied dentistry at Guy's Hospital and in 1904 he was commissioned Lieutenant in the RAMC (figure 7). During WW1 he served in the Mesopotamia Campaign (1916), where he distinguished himself as a surgeon and was mentioned in despatches. In 1919, he served in the Third Afghan Campaign.

figure 6: Ronald Winckworth. (CSGBI Archive)

figure 7: Harold Charles Winckworth, from the RAMC class photo of November 1904. (photo: Wellcome Library, by permission)

Prior to the war, Harold was pitched into turmoil of a slightly different kind when he was despatched from Malta as part of a relief party following the Messina earthquake in Calabria on 28th December 1908, which killed upwards of 70,000 Italians. For this he received the order of Officer of the Crown of Italy and the medal of the Red Cross of Italy. The later years of Harold's army career were spent mainly in India where he collected shells

extensively. From here he retired to the Seychelles where, from 1937, nudibranchs became his principal area of study.

Ronald, on leaving Epsom, undertook some short teaching stints in Weymouth, Eastbourne and Cumberland before going to Jesus College, Oxford to read mathematics. Three more short teaching posts followed before his career was interrupted by the outbreak of war and in August 1914 Ronald made a modest entry to the Navy as a Royal Naval Volunteer Reserve, the most junior rank. A.E. Ellis's obituary (1950) recorded his elevation to Paymaster Lieutenant, noting his expertise in gunnery and navigation.

Another obituary, by Griffith Davies (1951), revealed some interesting details about the circumstances of his promotion from ordinary seaman to commissioned officer. It is worth quoting in full:

> 'Having an inquisitive mind, and seeing no harm in making himself acquainted with the mysteries of the ship in which he was serving, his peregrinations were viewed with suspicion; and when there came to light in his kit bag a number of foreign grammars, the presence of a foreign agent in the ship's company seemed certain. It was some little time before he could establish his innocence; and when the facts of his education and qualifications became known (and also to save the faces of superiors!) he was compelled to accept a commission, being promoted to Paymaster Lieutenant in the R.N.R. He was as sorry to leave the comradeship of the lower deck, as he was proud of having been put in cells while suspicion hung over his head!'

Much of his war time duty took place in the waters around Britain, Ireland and Gibraltar where he served with distinction as leader of the ship's 'panic party' on convoy duty against U-boat attacks. Ellis later judged Ronald Winckworth as 'the finest type of naval officer, inspired with an intense love of the sea and ships and a single-minded devotion to duty.'

Ronald Winckworth's career after the war involved a short spell at the Marine Biological Association, teaching navigation at Pangbourne Nautical College, and several posts at The Royal Society[9]. He retired in 1944 as a result of heart problems 'exacerbated by the strain of civil defence duties'. Winckworth served as President of both the Malacological and the Conchological Societies, and he was CSGBI Marine Recorder from 1924-31, the first to hold the post at a time when marine studies were a very 'poor relation' compared to those of land and freshwater. During this period, he introduced the idea of dividing the waters of Great Britain into sea areas as a basis for marine recording (figure 8).

Of course, it is worth remembering that it is not only wars that have had an effect on conchology and conchologists. There have been other sorts of conflict and combatants. I would like to conclude Part 1 with an individual caught up in civil conflagration.

Robert John Welch[10]

Robert Welch (1859-1936) was not only the leading photographer in the north of Ireland in the late nineteenth and early twentieth centuries, but also a prominent Irish naturalist who played a leading role in the Conchological Society from his base in Northern Ireland. Welch lived at 49 Lonsdale Street, Belfast – now demolished, but at the time located near the Crumlin Road. He was well connected

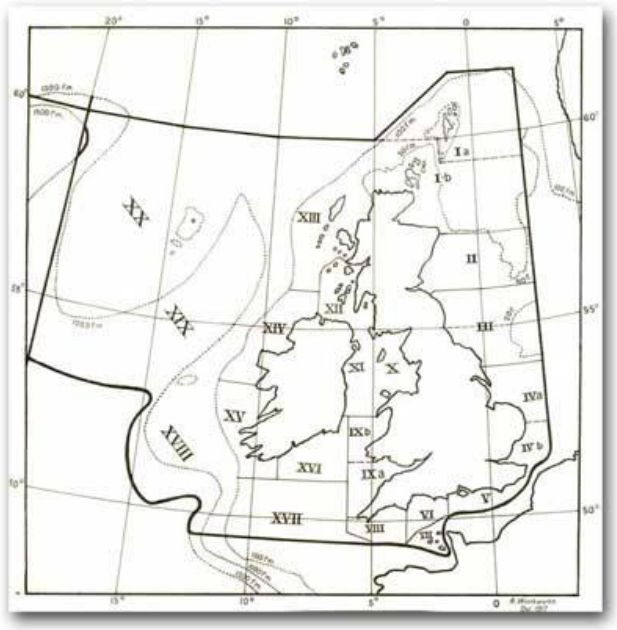


figure 8: Ronald Winckworth's map of sea areas which he introduced to facilitate marine recording. (CSGBI Archive)

in the conchological world, not only in Ireland through friendships with Robert Lloyd Praeger, Arthur Wilson Stelfox and Nora Fisher (later McMillan), but also in England where his close friends included Robert Standen and J. Wilfrid Jackson. He was extremely well regarded across the conchological community and generally perceived as generous, lively and outgoing. Jackson (1937), in Welch's obituary, described him as a 'cheery presence' and recounted his frequent attendance at CSGBI meetings where members lingered 'to listen to his entrancing talks about his collecting experiences and other matters'. One would have imagined from the portrait of him (figure 9) that graced the 'Welch memorial issue' of the *Irish Naturalists' Journal* (Volume VI (6), November 1936) that he had nerves of steel. However, his personal life

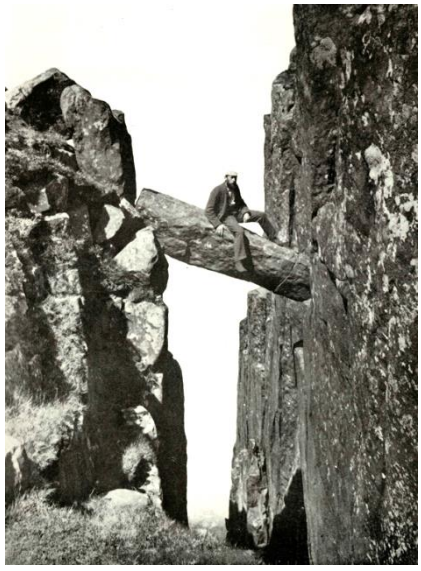


figure 9: Robert Welch on a dislodged column, Grey Man's Path, Fair Head, Co. Antrim, about 1892 (Buxton Museum & Art Gallery archive).

presented a number of challenges as letters to J. Wilfrid Jackson in 1916 and 1917 revealed, and as a result he 'suffered with nerves':

> 16.11.16 – 'I am just worried to death over certain materials' [for his photographic business].
> 22.12.16 – 'I have had to cut down my Xmas cards very much last year & especially this: & only send to a very few old friends like yourselves' [Jackson & Standen].

9.1.17 – ‘I am not at all well: and trade is in my line very bad, so I sympathise with you in your bad times.’ [likely a reference to WW1].

(Extracts from letters in the Jackson Archive at Buxton Museum & Art Gallery, by permission.)

Later, in a letter to J.W. Taylor (in the CSGBI Archive):

‘I had a lot [of] family worries for years, lost both a sister[11] who lived with me in 1915 & later a brother, who was causing me (the second to do so) endless worry & trouble’.

Compounding these business pressures and personal tragedies must have been the civil war going on around where he lived. Although ‘The Troubles’ in Ireland are generally regarded as starting in the 1960s, civil unrest began much earlier, in fact, with a significant peak as soon as partition took place in 1920. Welch was certainly caught up in the violence (as a ‘bystander’) as his letters to colleagues in England clearly show. The following is a transcript of parts of a letter to J.W. Taylor on 31st August 1921, written just a few days after ‘Bloody Sunday’. The bulk of the letter was in relation to Taylor’s ‘Monograph’ and other matters conchological, but a few added sentences give a graphic idea of the perils of living in Belfast at the time. Firstly, part way through a sentence in the first paragraph, Welch interjected:

‘(Crowd running up the street now to top, they report a little child just shot at the top of the street on Crumlin Road, ambulances busy to hospitals for hours past!)’

He finished the letter with a P.S.:

‘As I write (11am) revolver shooting going on very close at hand, 5 or 6 shots in last 3 minutes, dozens more in last hour or two. A regular battle, with Police & military out in New Lodge Road area (1/2 mile away) all night. Almost same Monday night when 6 were killed & 30 (known) wounded. Coming home on Sunday night from friend’s house on the Malone Road area, I have had more or less to ‘run-the-gauntlet’, last year also. Our trams sometimes getting a shot from snipers on the side streets, off the main tram routes. (One night in early summer I counted about 120 shots (rifle) not far away from this house). Still firing as I finish this note 31/8/21 … We have got so used to it, that even little children down to 6 years old or so, go rushing to where the shooting is going on ‘to see the fun’. Lively times! Children coming out of school now up the street & going home, playing as cooly (sic) as if nothing unusual happening.’

And then a P.P.S.:

‘Later, 4.30pm, a regular battle now at hand from the fusillade of shots last few minutes. Must go near or thru’ it to post this letter & will. We get used to it & take our chance.’

The violence in Belfast peaked in the first half of 1922 (more than 460 people were killed there between 1920 and 1922). There is little to suggest that Welch was overtly political[12] (he is listed as a Presbyterian in the 1911 Census) and thus, perhaps, not directly ‘in the firing line’ but it seems inconceivable that, despite the bravado, he would not have been affected by the dangerous events taking place in such proximity. Comparison of the vigorous younger self (figure 10) with the formal portrait taken a few years before he died (figure 11) are stark, and reveal a man who has certainly ‘been through the wars’.

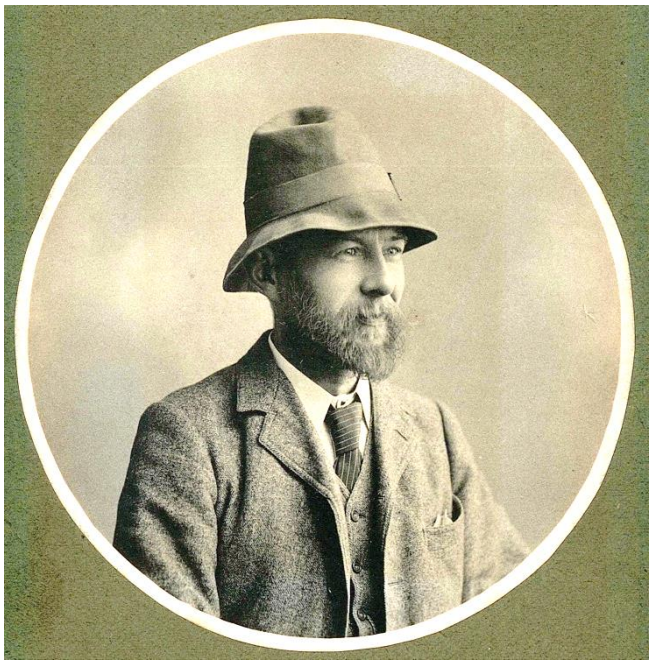


figure 10: Robert John Welch aged about 30.
(J.W. Jackson Archive, Buxton Museum & Art Gallery)

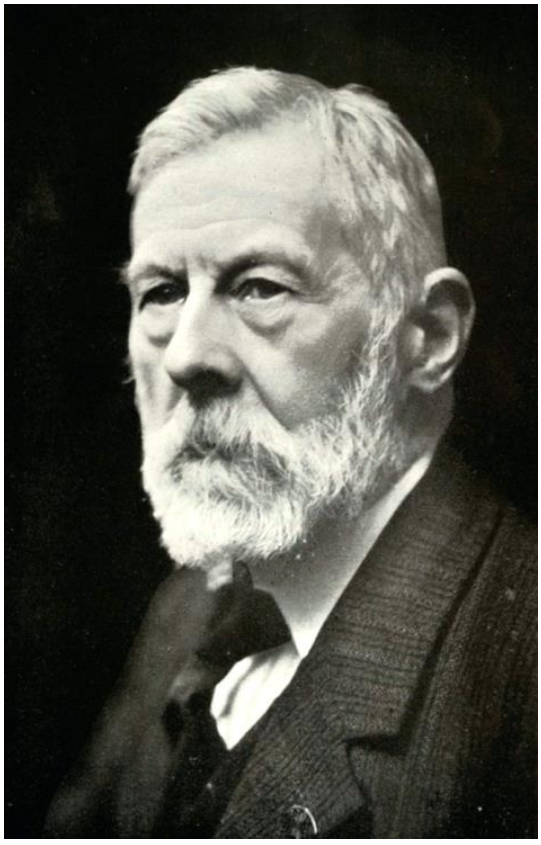


figure 10: Robert John Welch aged about 75. (CSGBI Archive)

In Part 2 we will meet an escapee from the Nazis, doodlebugs, and a conchologist with links to the H-bomb.

(To be continued ….)

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Notes

[1] A riot – I had to look it up!

[2] Also https://www.s2a3.org.za/bio/Biograph_final.php?serial=561.

[3] See Wikipedia entry https://en.wikipedia.org/wiki/Cyril_Connolly.

[4] Amgueddfa Cymru (National Museum of Wales) holds a great deal of Tomlin archive material, some of which is on-line as part of 'Documenting the past – the Tomlin archive' at https://museum.wales/articles/2010-02-15/Documenting-the-Past---The-Tomlin-archive/ . Several items are included under the heading 'Collecting in adversity/war'.

[5] As a complete aside, I would be amazed if there has ever been another example of live West African *Marginella* species being exhibited at a Conchological Society meeting!

[6] The date is consistent with the Battles of the Somme.

[7] Boycott had been appointed FRS in 1914.

[8] In later years Ronald was a friend and major influence on another eminent conchologist, A.E. Ellis, who taught for many years at Epsom College.

[9] In 1925 he started on publications and as Librarian, becoming Assistant Secretary in 1932 and Assistant Editor in 1937.

[10] Welch, a particular favourite of mine, makes regular appearances in articles I have written for *Mollusc World* (see Goodwin, 2012, 2013 and 2014 in list of References).

[11] I believe this would have been Sara Elisabeth Welch who was a year younger than Robert and who is recorded living with him at 49 Lonsdale Street in the 1911 Census. Her occupation was listed as 'photographer's assistant' and therefore she probably worked for Robert.

[12] I have, however, recently come across one relevant piece of information. In a letter from W.A. Stelfox in Belfast to Ed Collier dated 23rd June 1914, Stelfox ends with 'All very well here. Welch is newly a politician, we, the U.V.F. have done with them now.' This is clearly open to a variety of interpretations, of which perhaps the most likely is that Welch had taken to expressing political views, rather than had 'entered politics.' The U.V.F. mentioned, incidentally, is the original one (see https://en.wikipedia.org/wiki/Ulster_Volunteers) rather than the paramilitary organisation which emerged in the mid-1960s.

A juvenile Hungarian cap shell (*Capulus ungaricus*) in shell sand *Peter Topley*

After the period earlier this year when none of us were allowed to travel, it was nice to finally have the opportunity of getting away, and my wife and I spent a week staying on Holy Island, Northumberland, in August.

On the shore on the north side of the island, east of Snipe Point (figure 1), I found an area of washed carboniferous material which included a large number of small shells. On sorting, this sample mainly consisted of shells of *Rissoa parva* (as is often the case) plus around 18 other species; a fairly low diversity not untypical of the north-east coast. Amongst these was a small c. 2 mm shell which I thought might belong to a juvenile of some kind of small limpet; however, Simon Taylor put me right by explaining that this was a juvenile *Capulus ungaricus*. Then I remembered that I had seen an SEM photo of the protoconch of this species in Fretter and Graham (1981), which stated that *Capulus ungaricus* is a mainly sublittoral microphagous feeder living attached to species including the horse mussel, *Modiolus modiolus*, of which there are many records from the nearby Farne Islands. Experienced 'shell sand sorters' may come across this shell fairly frequently, but I thought it might be useful to include photographs of the specimen here, as an additional help to identification (figure 2).

To confuse things further for me, another species that turned up in this sample was *Potamopyrgus antipodarum*, clearly washed from a freshwater habitat along the coast; and indeed there is a previous record in NBN from off the north coast of Holy Island, no doubt from a similar source.

figure 1: Area of shell sand sample (in foreground) near Snipe Point, Holy Island, Northumberland.

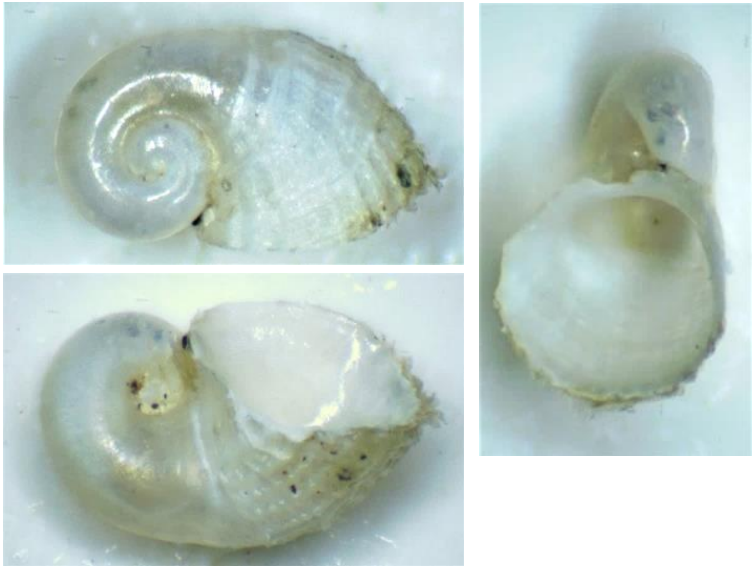


figure 2: Juvenile *Capulus ungaricus* (c. 2 mm) from shell sand, Holy Island, Northumberland.

Reference

Fretter. V & Graham, A. (1981). The prosobranch molluscs of Britain and Denmark. Part 6… *Journal of Molluscan Studies,* Suppl. **6**: 285–362.

Cellar spider, *Pholcus phalangiodes* observed biting a juvenile garden snail, *Cornu aspersum* – prey item or something else?

*Vicky Gilson**

In the Thames Valley (VC22 Berkshire) a series of warm still evenings in July tempted me out of the house for several late evening hunts for crepuscular and nocturnal garden wildlife. I chanced upon, I believe, an interesting interaction between a female cellar spider (*Pholcus phalangiodes*) and a juvenile garden snail (*Cornu aspersum*). After dark at approx. 10.20 pm on Thursday 16th July 2020 I noticed at the base of our outside boiler room door, illuminated with a head torch, a cellar spider on top of a juvenile garden snail. I watched it for several minutes climbing over the snail and attempting to bite the soft parts – including its upper tentacles and under its mantle at the front of the shell (figure 1). A visible mucus 'meniscus' extended from the snail to the spider confirming it was making contact. The snail was initially extended but withdrew partially into its shell and retracted its tentacles as the spider attempted to bite them (figure 2). After changing positions several times, the spider appeared to lose interest and moved away (figure 3). The whole encounter from when I first noticed it lasted four minutes or so.

figure 1: *P. phalangiodes* attacking *C. aspersum.*

figure 2: *P. phalangiodes* attacking *C. aspersum* – snail retracted.

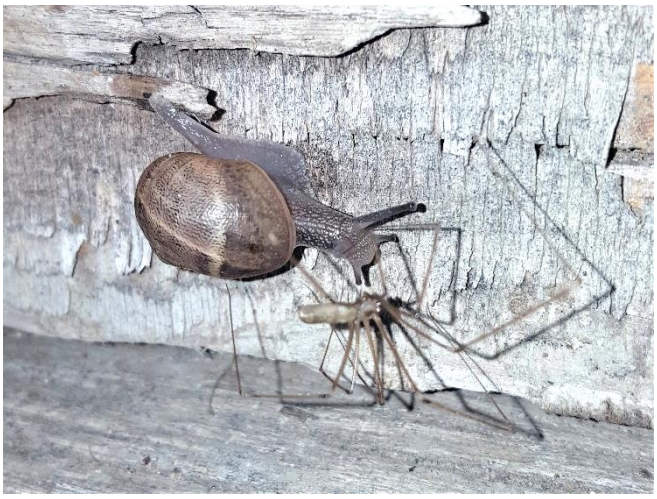


figure 3: *P. phalangiodes* moving away.

I watched the spider as it slowly walked off, and I returned three times over the following hour to see if a further episode occurred and to check on the welfare of the snail. The snail was happily continuing its business, now on the ground seemingly unaffected (figure 4), and the spider was positioned in a web next to the door on Pellitory-of-the-wall (*Parietaria judaica*) some 60 cm distant from the original encounter site, no doubt with a somewhat gummy mouth.

figure 4: *C. aspersum* unaffected after encountering *P. phalangiodes*.

I'm intrigued to know whether this was a predation attempt or perhaps a defensive act, although I did not observe an egg sac or web close to where the encounter happened. From my searches of the British Arachnological Society's library on the diet of this species, although it is listed as polyphagous I have yet to encounter reports of molluscs as potential prey items and, given the large size of *C. aspersum* and its unappetising mucus layer, this does seem unlikely for this spider species. With regard to large prey items, I noted that Nigel Webb (1979) recorded a pet stick insect (*Carausius morosus*) 45 mm in length being taken. This snail had a shell width of approx. 20 mm.

I wonder if any conchologists reading this article have heard of snail interactions with cellar spiders, or know of cases of predation occurring?

Acknowledgements
I would like to thanks Mags Cousins for the identification of the snail and the suggestion of submitting this article to *Mollusc World.*

Reference

Webb, N. (1979) An unusual capture by *Pholcus*. *Newsletter of the British Arachnological Society,* **26**: 13.

* vfgilson@hotmail.co.uk

Shell huts, Lower Grosvenor Gardens, London

Tom Walker

I was recently walking in the Victoria area of London with my wife when we noticed two small buildings liberally plastered with molluscs. They stand facing each other in Lower Grosvenor Gardens, just south of Buckingham Palace Gardens (figure 1). A small notice at the entrance states that the Gardens were redesigned in July 1952, in the French style and dedicated to Marshal Foch, a decorated hero of the First World War. The Gardens including the two shell huts were designed by Jean Moreux, the then architect-in-chief of the National Monuments and Palaces of France. Some of the shells adorning the huts were brought over from France, while others may have been sourced from English beaches, making for a cross-cultural construction. The huts were said to be 'in the style of those small pavilions that were known as *fabriques* in eighteenth-century France' – the old French term for folly.

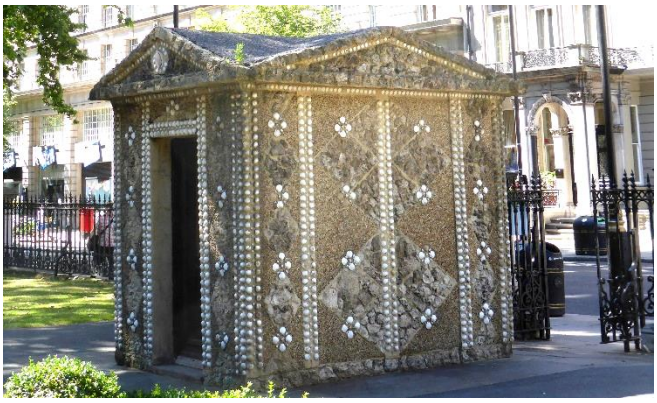


figure 1: The western shell hut.

Both huts are identical small rectangular buildings with a door at each end (figure 2) and a window in each southern side wall. They are decorated with shells, mostly still present, although a few have disappeared (figures 3 and 4). The majority of shells, forming all the vertical lines, are *Cerastoderma edule*, while *Aquipecten opercularis* are present on the pediments and forming decorative crosses on the walls. These shells could all have been sourced from English or French beaches, but others are certainly from further afield. Numerous worn *Monetaria moneta* form lines between the cockles (figure 3), and there are *Cassis cornuta* on the pediments over the doorways (figure 4). The walls themselves are mainly pebble-dashed, although the diamonds consist of flint with occasional fragments of clear or pink quartz which glisten in the sunlight.

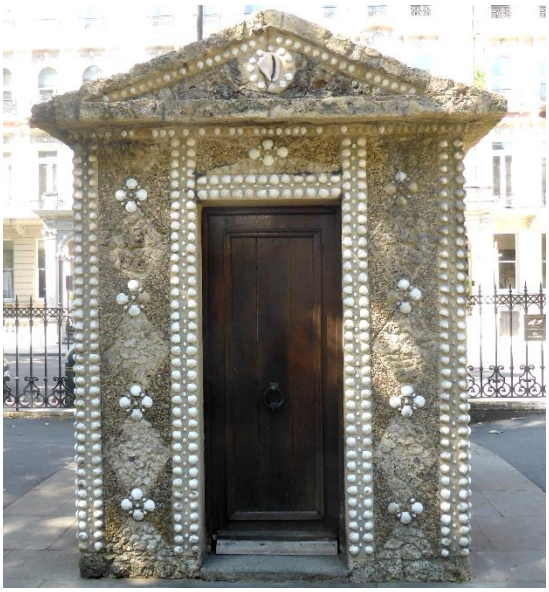


figure 2: One of the ends of the huts which are all identical in design.

A little more information about the huts is available on websites. Numerous air raid shelters had been constructed in the gardens during the Second World War. After the end of the war several trees were removed and the gardens laid out with gravelled arabesque pathways. This did not meet with public approval, and the park was redesigned as 'London's French garden' by Jean Moreux. No information seems to be available about why Moreux was selected, or why this particular garden should be dedicated to Field Marshal Ferdinand Foch, who was Supreme Allied Commander during the First World War. Apart from the huts there is a large statue of Foch in the Gardens. One hut was intended to be used for the attendant and the other to store gardeners' tools but both are now locked and the windows opaque.

figure 3: Detail of one of the walls showing *Cerastoderma edule* flanking *Monetaria moneta*, with scallop and cowry motifs between them. The flint and quartz decoration is visible.

Jean-Charles Moreux (1889-1956) was a French architect, decorator and landscape artist. His work drew upon classical, baroque and rococo designs. In 1935 he organised an exhibition 'Art in French Gardens' to satisfy his passion for gardens. He designed many buildings in France, especially in Paris, but also elsewhere in France and in other countries. In London he was responsible for the library of the Institute de France, Queensberry Place. He created many pieces of art-deco furniture, some of which include molluscs. I have been unable to find any reference to other buildings including shells, so it remains a mystery as to why he considered these for the Grosvenor Gardens buildings.

figure 4: The pediment, with *Cassis cornuta* surrounded by *Aquipecten opercularis.*

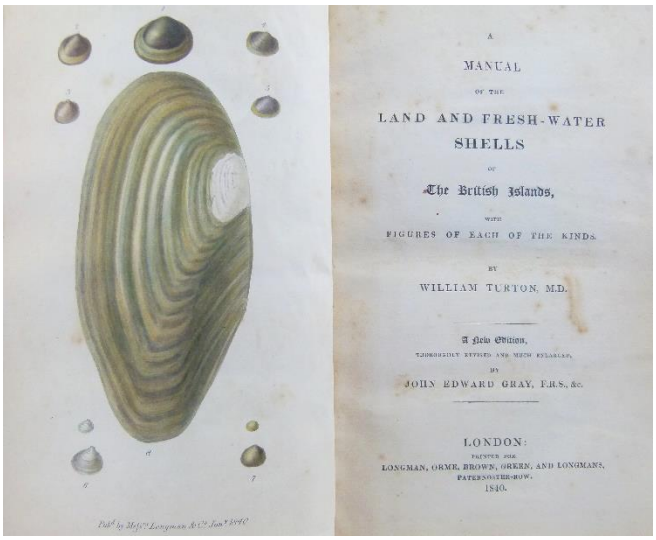
Who is the mystery conchologist?

Graham Long

Introduction

Towards the end of 2016 I came across a nicely bound copy of *British Shells* by Turton at the book fair in Lyndhurst. It was both out of my price range and, being of historic interest, not a book that I would normally have wanted for my library. However, it stayed in my mind, not least because whoever had owned it in the past had used it as a notebook, with many of the pages carrying miniscule pencil references to particular species on that page. At what proved to be, if my memory is correct, my last Conchological Society meeting, I mentioned the book to Martin Willing whose immediate response was 'buy it'. I couldn't get to the next book fair but it was still for sale at the subsequent one and after some negotiation we settled on a mutually agreeable price, and it was mine.

Back in Fordingbridge, I showed it to David, our local antiquarian bookseller, who confirmed that it was a good quality rebind and thought that it had possibly lost the inner page on which the original owner would have inscribed his name. The only indication of its early origins is a small label inside the cover: 'G.A. Poynder, Antiquarian Book-Shop, Next to General Post Office, Reading'.



A

MANUAL

OF THE

LAND AND FRESH-WATER SHELLS

OF

The British Islands,

WITH FIGURES OF EACH OF THE KINDS.

BY

WILLIAM TURTON, M.D.

A New Edition,

THOROUGHLY REVISED AND MUCH ENLARGED,

BY

JOHN EDWARD GRAY, F.R.S. &c.

LONDON:

PRINTED FOR

LONGMAN, ORME, BROWN, GREEN, AND LONGMANS,

PATERNOSTER-ROW.

1840.

figure 1: Title page of J.E. Grays's 1840 edition of William Turton's earlier work on land and freshwater shells.

A very reluctant editor

Issued by Longman, Orme, Brown, Green and Longmans of Paternoster Row in 1840, it is a revision of William Turton's earlier work offered as a new, much enlarged edition by John Edward Gray, F.R.S. &c. (figure 1). Gray, who lived at Eliot Vale, Blackheath, stated bluntly in the Preface that he would have preferred to have had nothing to do with this book. His choice by far would have been to start from scratch and write a completely new volume on British shells. As it was, he had to acknowledge that a paper presented by Forbes* to the British Association at Birmingham had partly overtaken some of his work. He makes his feelings very clear:

> 'Indeed, although this work has been called in the title page a new edition of Dr. Turton's Manual, it may be almost considered a new publication, as the only portions of the former edition that have been retained are the descriptions of the species, and a few of the general observations; in so much that, on revising it in its printed form, it is a matter of regret to me, that it was not rather undertaken as an entirely new work, which would not have cost me nearly so much trouble as editing the present one.'

A mysterious owner

Many pages have been completed with footnotes added by the owner. Mostly in spidery writing in fading pencil, although with some in ink, these require a lens to decipher them. The majority appear to be notes made when various naturalists sent him details of their finds – usually indicated by a set of initials at the end of the record – or by references from publications with Colonel George Montagu's name appearing often and Louis Pfeiffer's occasionally. Many of the local naturalists simply gave county references but some were quite specific, stating that a species was found under stones on a wall by such and such a place. The page bottoms are in fact a kind of record card of finds, mostly in the south of England but also with some from various locations in Ireland.

However, there are a few personal references which show that the owner had been in Jersey (figure 2):

> 'In June 1847 I took *H. revelata* [*Ponentina subvirescens*] near Rozel in Jersey.'
>
> 'In June 1847 I found (*Helix* [*Theba*] *pisana*) abundant… the shore location St. Helier & St. Aubin in Jersey.'

In what must be a retrospective note, there is this record (figure 3):

> 'At Lough Currigan Co Cavan I found in Sept 1832 *Succinea* creeping on stones under water near the edge of the lake in company with *Lymnaea stagnalis*, *peregra* [now *Ampullaceana balthica*] and [*Radix*] *auricularia*, *Planorbis marginatus* [*planorbis*] and [*Anisus*] *vortex*, *Bithynia impura* [*tentaculata*] and *Physa fontinalis*.'

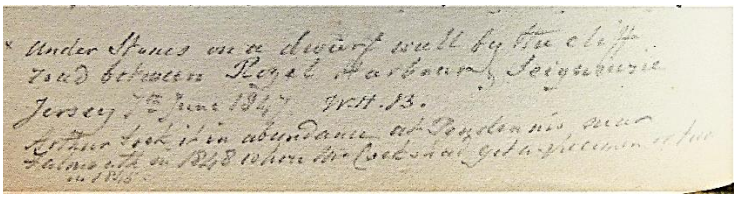


figure 2: Jersey footnote.

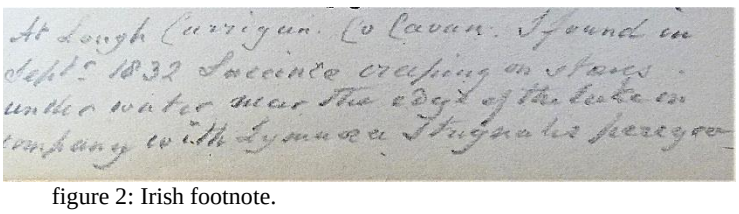


figure 2: Irish footnote.

The majority of notes refer to an area below a line drawn through the Thames Valley and Cotswolds with an odd reference to South Wales. It isn't clear where the information in them came from, whether it was in personal correspondence or from extracts drawn from local natural history papers, etc. The inclusion of Mrs Agnes Luckham, who reported finding '*Helix* [*Acanthinula*] *aculeata* near Bulstrode Bucks' suggests that some at least will have been from personal correspondence, rather than printed sources. Many simply indicate a location but some are surprisingly

detailed, as for instance the notes from Penllegare Wood near Swansea contributed by Jeffreys.

Jeffreys noted that *Helix fusca* [*Zenobiella subrufescens*] was found in 'Penllegare Wood near Swansea in damp … on the leaves and stems of *Heracleum spondyrium* [*Anthriscus sylvestris*, cow parsley] with other plants in great abundance.' The Penllegare Valley Wood was developed in the 1800s by John Dillwyn Llewelyn into the beautiful woodland estate that still exists. Cross matching dates, it seems clear that Jeffreys visited the area while it was still in its original wild state. Given the plants on which he found *Helix fusca* it probably doesn't matter, but some dates would have helped in pinpointing the timeframe that went with the location.

As one final example, Mr Bryer reported that *Pupa juniperi* [*Abida secale secale*] was found 'On the hills near St. Catherines' Tower Abbotsbury Dorset.'

Sources

Within the Introduction, Dr Gray lists the sources that he has consulted in preparing this revised edition, giving clues to the possible origins of some of the pencilled footnotes. These are indicated by underlining in the alphabetical list below, which includes a number of footnote acknowledgements that do not appear in Gray's list of sources:

A.E.B.; Boys; Mr Bryer; Mr Collins; Mr.Harvey; Hutchins; J. Jeffreys; M.D. & J.B. Joan; Mr King; Mrs Agnes Luckham; George Montagu; M & R; Petiver; Mr Prentice; Dr R. Pulteney; C. Rolyless; Rev. J. Ruckett; Mr Thornton; Mr Thomson Warren; W.H.B.; Witt. B.

So, who was the unnamed local naturalist who owned this book in the 1800s, and used it as a notebook to keep Dr Gray's printed record up to date with the latest research and recording? Do these footnotes provide any historic information that should be preserved? The book finishes with 12 plates containing 152 beautifully tinted illustrations of British land and freshwater molluscs (figure 3). Was it worth buying?

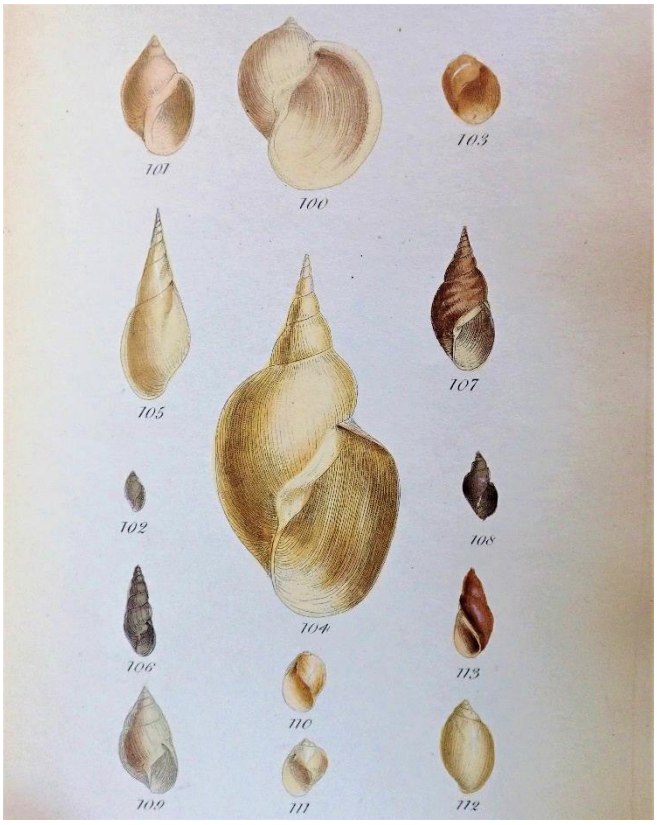


figure 4: Plate IX of J.E. Gray's edition of Turton, consisting of freshwater shells (mostly Lymnaeidae).

**A history of British Mollusca and their shells* by Edward Forbes and Sylvanus Hanley was published in four volumes in 1848-1853. [Ed.]

Letter to the Editor

Dear Peter

My entire collection and shell books are being donated to Queensland Museum, Brisbane. I volunteered for some years, and realised they needed a good wide shell collection. My collection has been made by personal collection, exchange with other collectors and donations from other collectors.

I haven't written much mollusc verse recently but long ago in the 1960s I wrote the following:

Shells[1]

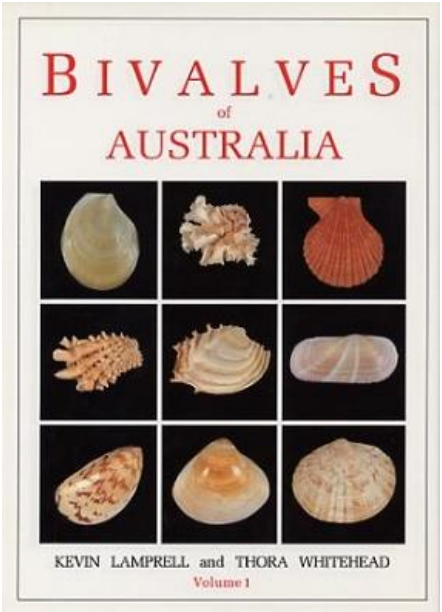
To some folk shells are like money
To other folk money means shells!
The mollusc quirk
Can be a main work
And lifelong interest as well.

'Dealers' lists' mean that every shell has a value, which makes exchange difficult as to be fair you should send the same value in your exchange parcel!

Well, that's enough for now, cheers

Thora Whitehead [2]

[Chapel Hill, Queensland, Australia]



[1]Published anonymously in the West Australia Shell Club newsletter.

[2]Thora is a distinguished Australian conchologist who has been a member of this Society for 55 years. Her publications include co-authorship of the above volume from 1992. [Ed.]

Observations on the distribution and ecology of the swollen spire snail, *Mercuria anatina* (Poiret, 1801) on the River Arun, West Sussex (with additional notes on newly discovered populations in the upper tidal Thames & River Bure)

Martin Willing

1. SUMMARY

The **Swollen Spire Snail** *Mercuria anatina* (see front cover) is frequently described as a snail tolerant of slightly brackish water and requiring occasional exposure to it. Studies of the snail on the River Arun system in West Sussex, the upper tidal River Thames, and the River Bure in Norfolk demonstrate that, although the snail can live in slightly brackish water, it is more typically found in completely freshwater situations unaffected by saline influences. All sites supporting the snail have, however, been found to experience a regular oscillation in water levels, typically directly or indirectly produced by a tidal cycle. The snail is therefore subject, on most tidal cycles, to diurnal tidal inundation. In such situations it lives on river banks and floodplains on mud or amongst a mat of vegetation debris at extreme upper tidal levels, only being submerged for short periods daily, or in some cases every few days on the highest tides. It is thus a strongly amphibious mollusc. In at least one case (Strumpshaw Marsh, Norfolk) *Mercuria* was lost from a ditch when it was disconnected to tidal water; it is argued that this was due to the loss of the tidal effect rather of the reduction in salinity. On the River Arun the snail has been shown to live in association with a wide range of freshwater aquatic and wetland Mollusca and plants. Surveys demonstrated that, on the Arun, *Mercuria* probably lives, almost continuously, at upper tidal levels along about 24 km of river channel extending from near Arundel to north of Pulborough making this population of national if not international importance.

2. BACKGROUND INFORMATION

M. anatina, (synonyms: *M. cf similis, M. confusa, Pseudamnicola confusa)* is a rare and declining species in Britain. It was categorised in the Red Data Book (Bratton 1991) as Endangered (RDB 1) whilst in the latest IUCN-based review it is considered Vulnerable (Seddon *et al.* 2014). In August 2007 *Mercuria* was placed by the UK Biodiversity Steering Group as a BAP Priority species, this now replaced in England by the Section 41 'Species of Principal Importance'. There is also evidence for decline in *Mercuria* populations elsewhere in Northern Europe. Thus, in the Netherlands, Gittenberger *et al.* (1998) show a 75% decline between 1970 -1997. *Mercuria* is a mainly western Mediterranean genus, with scattered outposts on the Atlantic coast of Europe extending northwards to the Netherlands and the U.K. There is some uncertainty as to whether, due to differing habitat requirements, the species found in southern France and those from England and Holland are conspecific (Dietrich Kadolsky; pers. comm.).

In the U.K. *Mercuria* has a very restricted distribution (Kerney 1999) and is currently only known living in three areas (figure 1). The two strongholds are (1) on the Norfolk / Suffolk borders extending into south Norfolk chiefly in the tidal stretches of the rivers Waveney, Yare and Chet (Baker *et al.* 1999, 2008) and (2) the West Sussex River Arun (Ellis 1969, Kerney 1999). Several widely scattered small populations live on the lower and upper tidal Thames (Harris 1985, Willing 2011, 2012). Two further localities are also reported from shell finds in south Suffolk near

figure 1: Distribution of records of *Mercuria anatina* in the UK and Republic of Ireland. Three time periods are shown: light/yellow (pre-1965); medium/orange (1966-1998); or dark/terracotta (1999-2019). The + symbol indicates a Roman or older subfossil record. (Map prepared from Conchological Society records by Sophie Ratcliffe at NBN.)

Aldeburgh and Shotley, but neither confirmed by the presence of live animals (Killeen 1992). There are also several populations in Ireland on the estuaries of the Shannon, Suir, Barrow and Nore (Kerney 1999).

Mercuria has very specialised habitat requirements; it is typically found on bare mud exposed at low tide often beneath vegetation such as Common Reed *Phragmites australis* or Reed Sweet-Grass *Glyceria maxima*. It is sometimes described as a brackish water species (Ellis 1969) or restricted to nearly fresh water (1 - 5‰ NaCl) in estuaries and tidal ditches (Kerney 1999). It is not found in association with obligate brackish species except for a few records with *Assiminea grayana* (Harris 1985). Instead it is more typically found with freshwater molluscs such as *Lymnaea palustris* and *L. truncatula* and wetland species including *Zonitoides nitidus* and *Carychium minimum*. Some authorities (Baker *et al.*,1999; Kerney in Bratton 1991) believe that it is more accurate to consider *M. similis* as a freshwater snail that nonetheless requires some contact with very slightly saline water; that view is questioned in this paper.

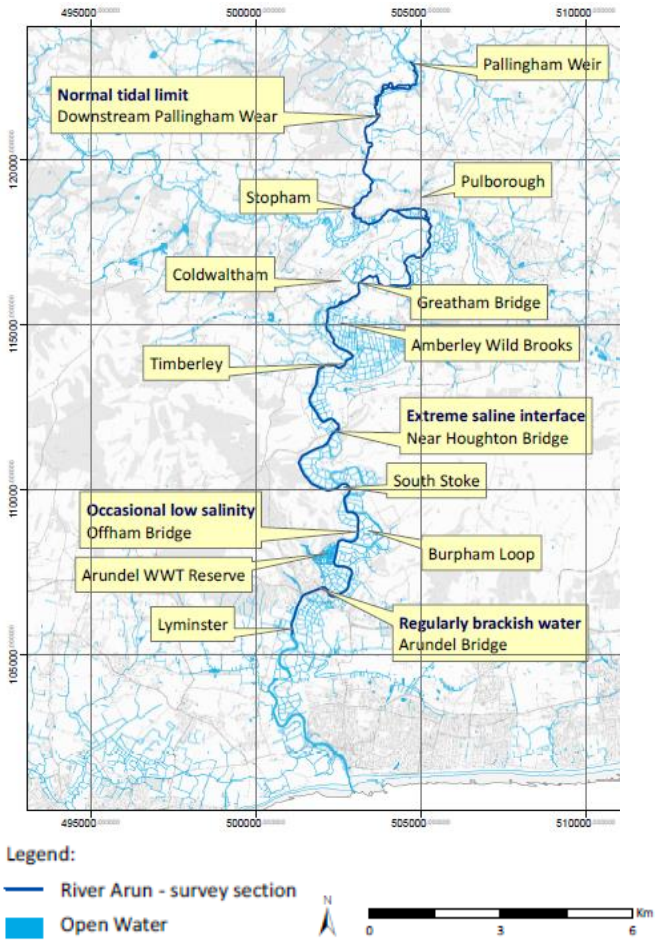


figure 2: *Mercuria anatina*: overview of survey extent on the River Arun. (Sussex Biodiversity Records Centre https://sxbrc.org.uk. Map contains Ordnance Survey Open Data © Crown copyright and database rights 2018 Ordnance Survey)

3. METHODS

Various locations on the River Arun lying between Lyminster (nr. Arundel) and Pallingham Weir (32 km) were visited between 1996 and 2018 (figure 2), on the Thames in 2011 and the Norfolk River Bure in 2008. At all locations *Mercuria* surveys were undertaken (avoiding times of tidal submersion) firstly by a close examination of ground areas with 'hands and knees' searches of damp, mud surfaces and amongst and below dead vegetation litter lying between vegetation such as *Phragmites*, *Glyceria maxima* and *Carex* spp. Surveys on the River Arun found that this technique either missed or underestimated the presence of this relatively small snail, which may be buried in mud, submerged in muddy pools or mixed in layers of muddy vegetation. To overcome this problem 'bulk samples' of surface mud and ground litter were scrapped to depth of about 2 cm within areas of 20 X 20 cm (using a quadrat frame with these dimensions; figure 3) to allow later estimates of snail density to be calculated. Collected samples were disaggregated in buckets of water and then wet-sieved using a 2 mm / 0.5 mm sieve nest. Fractions were then dried and examined with a low-power binocular microscope allowing all adult and juvenile *Mercuria* to be removed.

At most sites where *Mercuria* was found to be present, associated Mollusca (both recorded in the field and from bulk samples) and dominant vascular plants and were recorded. Molluscan naming follows Anderson & Rowson (2020). Site locations were GPS recorded and photographed. At selected sites more detailed vegetation assessments were completed. Some lower Arun salinity data was obtained from the Environment Agency (Worthing) and from a report (Atkins 2008) supplied by Southern Water (Appendix **9.4**).

figure 3: 20 cm^2 quadrat frame (purpose built!) used for quantitative studies.

4. RESULTS

4.1 Arun: Studies between 1997 – 2018 confirmed *Mercuria* on the banks of the River Arun between Warningcamp (east of Arundel) and Harwoods Green (upstream of Pulborough) a 24.3 km length of river channel (figures 4–6). The snail was recorded at 33 out of 45 river-side sites visited (**9.1:** table 2) At all river bank locations the snails were found at extreme upper tidal levels where they would only be submerged for, at most, a short period twice daily or less frequently at locations such as the Burpham Loop where a bench of marshy ground is only flooded on the highest tides.

The snail was also found on the margins of 6 side channel locations (**9.2**: table 3) flowing into the Arun but separated from the river by one-way sluice gates. These prevent the river water from entering on high tides but allow water to flow out at low tide.

Mercuria was found in association with a wide range of Mollusca including 10 wetland and 22 aquatic mollusc species (**9.3:** table 4) on the Arun banks and in the number of side channels draining into the river. The dominant associated plants were recorded at a representative selection of sites spread across the *Mercuria* range on the Arun with over 39 species recorded (**9.3:** table 5).

Mercuria population density was field estimated at a number of sites in 1997 and 1999 and for some of these the results were compared with snail counts obtained from bulk samples removed from measured areas and then lab processed (see Section 3 above). Results are presented in table 1 below. These show that *Mercuria* occurs at some Arun sites in huge numbers, frequently thousands m^{-2}. Such results demonstrate that field counts of the snail consistently underestimate by a factor of between 3 and 5 times the true numbers present.

Location	**Survey date**	***Mercuria* count**
Burpham 'Loop' TQ 03727 08441	24.8.1997[1]	5,000 m^{-2} field estimated 14,800 m^{-2} sample count
South Stoke TQ 02687 09517	24.8.1997[1]	1,000 m^{-2} field estimated 4,775 m^{-2} sample count
South Stoke TQ 02687 09517	24.8.1997[1]	125 m^{-2} field estimated 600+ m^{-2} sample count
South Stoke TQ 03073 09109	24.8.1997[1]	500 – 750 m^{-2} field est. 3,025 m^{-2} sample count
Watersfield TQ 02082 14999	23.5.1999[2]	3,000 m^{-2} estimated

table 1: *Mercuria* density counts from selected sites on the River Arun ([1]Abraham & Willing 1997, [2]Willing, 1999).

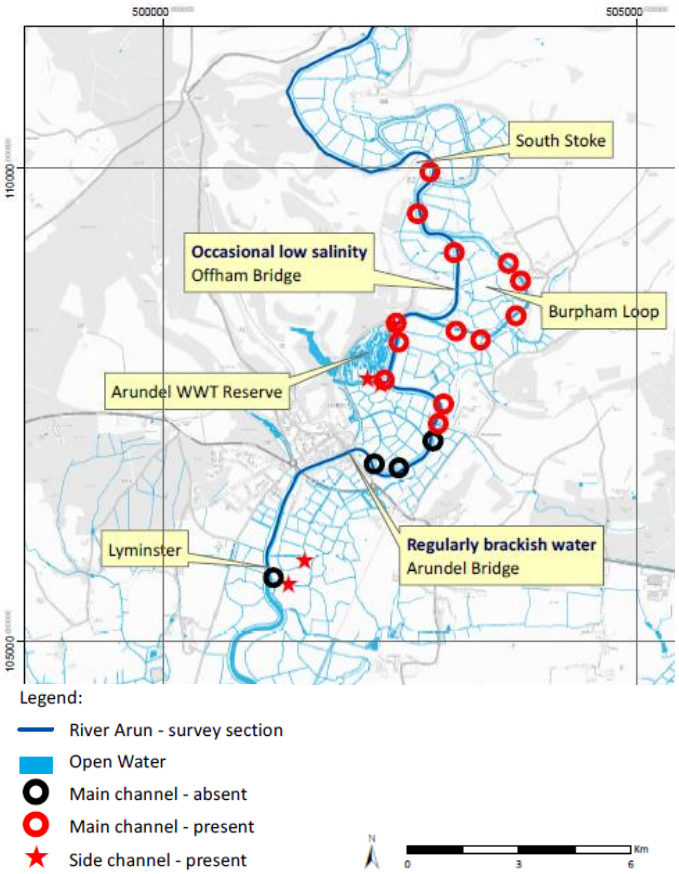


figure 4: *M. anatina*: survey results, River Arun, lower section. (Sussex Biodiversity Records Centre https://sxbrc.org.uk. Map contains Ordnance Survey Open Data © Crown copyright and database rights 2018 Ordnance Survey)

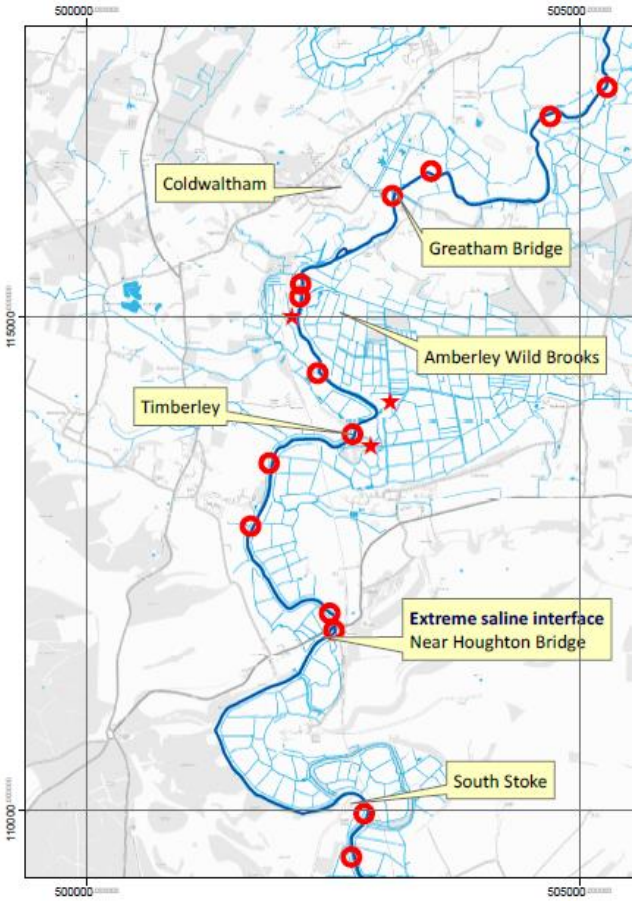


figure 5: *M. anatina*: survey results, River Arun, middle section (for key, scale and attribution see figure 4).

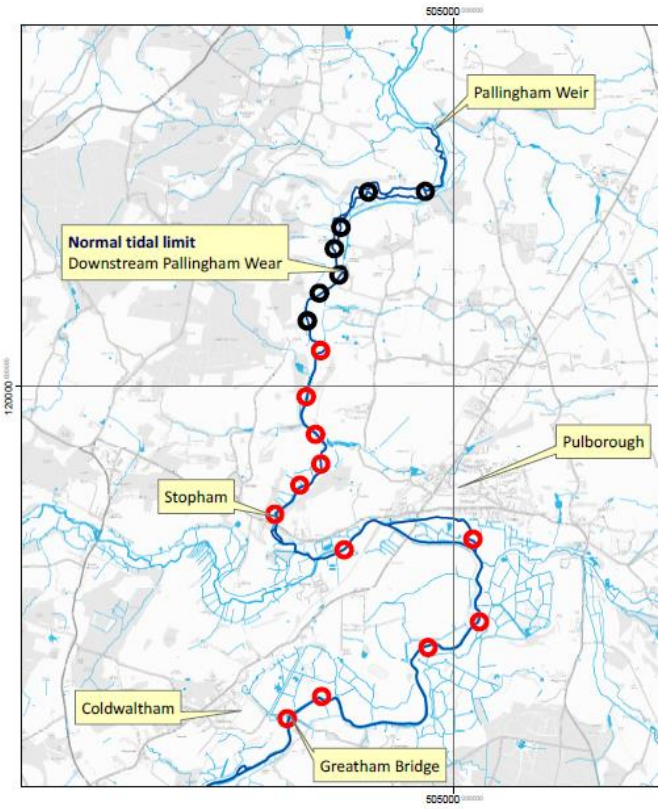


figure 6: *M. anatina*: survey results, River Arun, upper section (for key, scale and attribution see figure 4).

4.2 *Mercuria* on the Thames and River Bure, Norfolk

Summaries of *Mercuria* in the upper tidal Thames and on the River Bure in Norfolk are given in Appendix sections 9.5 and 9.6. below.

5. DISCUSSION

Mercuria lives at upper tidal levels on the River Arun, probably almost continuously, for about 24.3 km (figures 2 and 4–6). Only 7.6 km of this is occasionally influenced by low salinity inflow with an extreme saline limit near Houghton Bridge. Upstream of this point *Mercuria* is living in wholly freshwater conditions for 16.7 km. Even in the occasionally brackish zone of the Arun in the majority of upper shore locations *Mercuria* is living in association with wetland and aquatic molluscs and plants intolerant of brackish conditions (e.g. at Burpham Loop and South Stoke, tables 4 & 5, figures 7 and 8). Only two Arun survey sites, located at downstream end of the survey zone had *Mercuria* found associated with a few brackish associates. Thus firstly at Lyminster *Mercuria* was found with some brackish plants (e.g. *Bulboschoenus maritimus*, *Schoenoplectus tabernaemontani*) and Crustacea (e.g. *Sphaeroma* spp). Salinity of 0.7 ‰ was recorded in an adjoining connected ditch (2018 WSP: unpublished report).

figure 7: *M. anatina* habitat upstream of Arundel.

figure 8: *M. anatina* habitat near Offham showing upper tidal line on marginal reedbeds

Secondly *Mercuria* was recorded with low numbers of the brackish snail *Peringia ulvae* near Arundel close to its southern limit on the river (table 2). On the main river channel, waters in the vicinity of Arundel Town Bridge are regularly slightly brackish. From just downstream of this point the saltmarsh snail *Myosotella myosotis* appears with increasing frequency at upper tidal levels, evidence of the increasingly brackish water. Even in the zone of occasional low salinity inflow on the Arun, it is unlikely that brackish water reaches upper tidal limits as denser saline water typically forms a wedge flowing upstream toward the base of the river channel. Water only just reaching the extreme upper tidal levels where *Mercuria* lives is likely to be least saline or indeed remain fresh. Thus, the wide wetland lying on the upper tidal levels of the Burpham Loop (lying within the 'occasionally low-salinity zone') have a molluscan and plant community with no obligate brackish species.

In the Thames system *Mercuria* appears to be living in slightly brackish conditions by the Lower River Roding (Barking Creek) in Essex where it was recorded (Appendix 9.4) with the brackish water mollusc *Assiminea grayana* and plants such as *Aster tripolium* and *Atriplex prostrata*. Also, on the Thames, as on the Arun, the snail is also found living much further upstream in the tidal zone but at locations far above the upper saline limit. Thus, the snail is found on Oliver's Ait and the river banks at Syon Park (table**,** figure 9) in locations about 12.6 km and 15.5 km respectively above the normal upper saline limit at Battersea.

figure 9: Syon Park (upper tidal Thames) habitat.

On Broadland rivers such as the Waveney and Yare the snail is also predominantly living in freshwater conditions rarely, if ever, exposed to brackish water (Baker *et al* 1999, 2008, Baker & Howlett 2020). So although *Mercuria* is very occasionally found in brackish conditions, it is most frequently encountered in wholly freshwater situations.

Kerney (1999) states that *Mercuria* is, 'restricted to nearly freshwater (1 – 5 ‰ NaCl) 'a view similarly expressed by Ellis (1969). Studies in the Arun and elsewhere indicate that there is no requirement for such low salinities as the snail is found in wholly freshwater conditions for much of its range on the river. Perhaps Baker *et al* (1999) summarise the situation best when they state that, 'the snail is effectively a freshwater species with an ability to survive in very slightly brackish waters'. No exposure to salinity is required.

If *Mercuria* is shown to be able to live in solely freshwater conditions with no requirement for even occasional exposure to brackish water, then why is the species not found further upstream in the rivers where it is present? The answer may lie in the snail's apparent requirement for a regularly oscillating water levels typically provided directly or indirectly by tidal cycles. At all sites on the Arun, Thames and Norfolk rivers (e.g. Waveney, Yare) *Mercuria* only lives in tidal situations which, in all cases, extend well upstream of any marine saline influence. On the Arun, in addition to the upper riverbanks, there are many sites where *Mercuria* is living in inflow channels that, although draining into the river, do not receive water from it. This occurs because water outflow to the river is regulated by one-way sluices that cause a secondary tidal oscillation. The effect is caused by high tidal waters closing the sluice gates, preventing (or considerably reducing) water outflow, and so causing a water level rise in the channels. A later tidal fall in the river then releases the water pressure on the sluice gates allowing water flow into the river to resume with a corresponding and relatively rapid fall in the outflow channel levels. It is not known if these tidal effects operate in the channels on a daily basis or whether, during lower river flows and / or neap tides levels in the Arun, insufficient water pressure on the sluice gates fails to close them. These secondary tidal movements even allow *Mercuria* to live on the margins of a stream draining into the Arun from the chalk-spring fed Swanbourne Lake on the southern margins of the WWT reserve at Arundel. Such a secondary tidal oscillation was also observed in the completely freshwater ditch draining water into the Norfolk River Bure (Appendix 9.6).

In all locations on the Arun, whether on the main channel or in the side channels, the regular (mostly diurnal) tidal inundation has the effect of producing an area of bare mud sometimes lying between vegetation (e.g. *Glyceria maxima, Phragmites australis*). In this upper shore zone where *Mercuria* are present, they are only submerged for a relatively short period each day (typically < 1 hour) and so the snails live predominately out of water.

6. CONSERVATION

Mercuria is very sensitive to a number of environmental factors including vegetation structure, boat traffic, river bank maintenance, tidal and salinity changes and water pollution.

In assessing *Mercuria* on the Norfolk Broadland rivers (Yar, Waveney, Chet) Baker *et al.* (1999, 2008) consider 'the preferred Broadland habitat is one dominated by Reed Sweet Grass *Glyceria maxima'*. They document a decline in the plant there, linking this to several factors including *Glyceria* replacement by Common Reed *Phragmites australis* resulting from a decline of bankside mowing formerly providing cattle fodder. To remedy this situation and reduce reed dominance they advocate phased cutting. In other areas with suitable bank conditions, they also recommend cattle grazing. This benefits the snail by

creating an ideal habitat mosaic of trampled vegetation with small muddy pools, as also seen on stretches of the River Arun. A further threat to the *Glyceria* habitat in Norfolk has been the recent spread of Himalayan Balsam *Impatiens glandulifera*, a plant which shades it out resulting in a *Mercuria* decline (Baker *et al* 2008, Baker & Howlett 2020).

Mercuria is typically found in quiet sheltered situations only covered by water at high tide. There is strong circumstantial evidence that the snail is adversely affected on riverbanks subject to wash from boat traffic. This is noticeable at sites on the Arun near Arundel where the snail is scarce on river banks adjacent to lengths of channel regularly used pleasure craft but, by contrast, frequent on some side channels of the river (e.g. the Burpham Loop) rarely used by boats. Heavy boat traffic on the upper tidal River Thames may also be a factor in explaining why *Mercuria* is so scarce there on otherwise apparently suitable habitat. A decline in *Mercuria* on a stretch of the River Waveney has also been blamed on heavy boat traffic leading to bank erosion (Killeen 1992). Riverbank management, realignment and reinforcement can potentially damage *Mercuria* habitat. On the River Arun reinforcement work was undertaken on a section of bank near Arundel in 1996, following *Mercuria* surveys of affected areas (Abraham & Willing 1996). Repeat surveys undertaken a year later found a decline in snail numbers, but no loss of the population Abraham & Willing 1997). Further visits to the site in later years confirmed a full *Mercuria* recovery. In a similar situation in Norfolk, Baker *et al* (2008) concluded that 'the flood bank strengthening of the existing embankments shows that this work has had little, if any detrimental effect on *Mercuria confusa* communities'. *Mercuria* was once relatively common on sites bordering the Thames estuary in the 19th century (Appendix 9.5) but was considered extinct by 1896 because of industrial water pollution. Reasons for the very low numbers of the snail in the upper tidal Thames (much seemingly suitable upper shore habitat is present) may partly relate to water pollution. Raw sewage (legally released into the river during flood conditions!) derived artefacts are a common feature of upper shore flotsam. In Norfolk, by contrast, an improvement in water quality in the River Yare since the early 1990s is thought to be a factor in the increase in *Mercuria* populations there (Baker *et al* 2008).

River management schemes involving the construction of barrages that reduce or stop tidal oscillations will harm *Mercuria* populations. Kerney (in Bratton 1991) documents a ditch in Strumpshaw Marsh, East Norfolk which, 'supported this species [*Mercuria*] in 1977 became unsuitable when a dam was installed which isolated the ditch from the saline influence of the River Yare'. It is suspected that the loss of the snail was in fact due to the cessation of tidal changes rather than a decline of salt which *Mercuria* does not require. As described earlier, *Mercuria* is essentially a freshwater snail that can tolerate very low salinity water. There is a risk, with climate change, that sea level elevation will lead to saline intrusions in tidal rivers and so creating elevated and unsuitably high salinity conditions in the lower reaches of some *Mercuria* populated rivers such as the Arun.

Mercuria's regional conservation significance was recognised in London with the species being made a London Priority Species in 2007, with an associated Biodiversity Action Plan (not currently active on the GIGL website). A Species Action Plan was also written the *Mercuria* populations in Sussex (Willing 2003) but again the plan is no longer active. It is hoped that the present contribution to the snail's known requirements will assist in the future conservation of this fascinating species.

7. ACKNOWLEDGEMENTS

I am especially indebted to Roy Baker for numerous discussions and the supply of reports and papers dealing with Broadland presence of *Mercuria*. Frances Abraham gave valuable assistance in the field on many occasions and was of considerable help in undertaking identification of vascular plants from *Mercuria* sites on the Arun. Bob Foreman (Sussex Biodiversity Records Centre) is thanked for producing excellent *Mercuria* distribution maps. Paul Sterry (Nature Photographers) kindly supplied some excellent *Mercuria* images. Particular thanks are due to Southern Water, especially Adella Hepworth and Nick Ellis, both formerly with the company, for allowing use of data obtained during Arun surveys undertaken in the early 2000s and more recently to Nick Price for providing water quality information. Damon Block of The Environment Agency is thanked for helpful discussions and the supply of Arun salinity data and Jonathon Ramsey of WSP kindly provided records relating to habitat surveys associated with the proposed A27 Arundel Bypass. I am most grateful to Ben Rowson for making valuable suggestions that have improved this paper and to Peter Topley whose presentational skills have enabled it to appear in Mollusc World.

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9. APPENDICES.

9.1 *Mercuria* survey results summary on the River Arun (1996 – 2018)

Approximate summary	Grid. reference(s) (approx. in some cases)	River margin or side channel	*Mercuria* presence	Other information
Lyminster north[1,12]	TQ 01327 05609 TQ 01497 05857	side	✓	Ditches: some brackish water plants & Crustacea
Lyminster north[6]	TQ 01168 05675	main	✖	*Phragmites* lagoon; *Peringia ulvae* frequent
Arundel (north of bridge)[6,14]	TQ 02232 06876	main	✖	Upper riverbank. *Myosotella myosotis* present
Arundel (north of bridge)[6,14]	TQ 02491 06834 TQ 02851 07121 TQ 02908 07304	main	✖	Upper riverbank
Warningcamp[6,]	TQ 02964 07508	main	✓	Upper riverbank. Two *Peringia ulvae*
Wildfowl & Wetlands Trust Mill Stream[9]	TQ 02299 07725 TQ 02159 07773	side	✓	Muddy upper banks of chalk stream
Wildfowl & Wetlands Trust banks[10]	TQ 02340 07763 TQ 02466 08363	main	✓	Upper riverbank
WWT northern boundary[11]	TQ 02436 08351	side	✓	Muddy upper banks of outflow ditch
Burpham Loop[2,3,6,14]	**5 sites between** … TQ 03096 08279 & TQ 03646 08997	main	✓	Upper riverbank
Offham > Timberley Bridge[3,5,14]	**8 sites between** … TQ 02493 08160 & TQ 01855 13516	main	✓	Upper riverbank
Amberley ditches [8,13]	TQ 02882 13692 TQ 03080 14144	side	✓	Upper muddy sides of ditches
Watersfield[4]	TQ 02082 14999	side	✓	Upper muddy sides of ditch
Timberley > Hardham Watersfield[4,5,7,14]	**10 sites between** TQ 02702 13809 & TQ 03754 18141	main	✓	Upper riverbank
Upstream Stopham Bridge .> near Harwoods Green [6,7,14]	**6 sites between …** TQ 02968 18549 & TQ 03487 20406	main	✓	Upper riverbank
Upstream Harwoods Green > Pallingham Weir [6,7,14]	**8 sites between …** TQ 03338 20740 & TQ 04675 22210	main	✖	Upper riverbank

table 2: *Mercuria similis* records and associated information on the Arun (shown sequentially going upstream). **Data Sources**: [1]Abraham *et al* 1998; Abraham & Willing [2]1996, [3]1997; Willing, [4]1999, [5]2005 & later years, [6]2006a & later years,[7]2006b & later years; [8]Willing & Abraham 2008 and later years; Willing [9]2009, [10]2014,[11]Willing *et al* 2015, [12]WSP (for Highways Agency) 2019, [13]unpublished 1997, [14]unpublished 2007 – 2018.

9.2 River Arun: side channels supporting *Mercuria*

Location	Grid. reference	Notes	Surveyed
Lyminster	TQ 01327 05609	A low salinity brackish ditch flowing into Arun	Jan 1998[1]
Arundel (Wildfowl & Wetlands Trust)	TQ 02299 07725	Clear stream flowing from chalk-spring fed Swanbourne Lake and entering Arun on southern boundaries of the WWT reserve	June 2009[3]
Arundel (Wildfowl & Wetlands Trust)	TQ 02436 08351	Slow flowing fresh water dich partially fed from chalk springs and entering Arun on northern boundaries of the WWT reserve	October 2014[4]
Amberley Wild Brooks	TQ 02882 13692	IDB grazing marsh catchment stream flowing into the Arun	July 1997[5], 2008[6] June 2009[5]
Watersfield	TQ 02082 14999	Grazing marsh IDB stream fed ditch flowing into the Arun	May 1999[2]

table 3: Arun side channels with 'secondary tidal effects' with populations of *Mercuria anatina*.
References: [1]Abraham *et al* 1997; Willing [2]1999, [3]2009; Willing, [4]2015, [5]unpublished; [6]Willing & Abraham 2008.

9.3 Mollusca and plants associated with *Mercuria* on the River Arun

Associated mollusc species	Lym -inster (side brackish ditch)[1]	Arundel (Arun banks)[5,9]	WWT Reserve Mill Stream (inflow stream)[6]	Offham (Arun banks) [2,5,9]	WWT Reserve, Mill Road Ditch (inflow drain)[8]	Bur-pham Loop (Arun banks) [2,5,9]	South Stoke (Arun banks) [2,4,9]	Timber -ley Farm (Arun banks) [4,9]	Amber -ley Wild Brooks (inflow ditch) [7,9]	Cold-waltham (inflow ditch) [3]	Stopham (Arun banks) [5,9]
Aquatic species											
Anisus vortex					✓				✓		
Anodonta anatina					✓						
Bithynia tentaculata			✓		✓				✓		
Galba truncatula			✓	✓			✓	✓			✓
Gyraulus albus					✓				✓		
Peringia ulvae		✓									
Potamopyrgus antipodarum	✓		✓	✓	✓	✓		✓	✓	✓	✓
Physa fontinalis									✓		
Pisidium amnicum									✓		
Euglesa casertanum			✓								
Euglesa henslowanum					✓				✓		
Euglesa milium			✓		✓				✓		
Euglesa nitidum			✓		✓				✓		
Euglesa personatum								✓			✓
Euglesa pulchellum									✓		
Euglesa subtruncatum			✓		✓				✓		✓
Planorbis planorbis									✓		
Ampullaceana balthica			✓						✓		
Stagnicola palustris (agg.)			✓	✓		✓		✓	✓	✓	✓
Sphaerium corneum					✓				✓		
Valvata piscinalis					✓				✓		
Valvata cristata									✓		✓
Terrestrial species											
Carychium minimum						✓	✓				
Cochlicopa cf. *lubrica*							✓				
Euconulus fulvus						✓					
Oxyloma elegans						✓	✓				
Succinea putris					✓			✓			
Vallonia pulchella				✓			✓				
Vertigo antivertigo						✓	✓				
Vertigo pygmaea							✓				
Vitrea crystallina							✓				
Zonitoides nitidus						✓					✓

table 4: Mollusca associated with *Mercuria anatina* on the River Arun with sites listed sequentially running upstream
References: [1]Abraham *et al* 1997; [2]Abraham & Willing 1997; Willing [3]1999, [4]2005, [5]2006a, [6]2009; [7]Willing & Abraham 2008; [8]Willing *et al.* 2015; [9]unpublished site visits by author (numerous visits 1997 – 2018).

Plants associated with *Mercuria anatina*	Habitat summary (see below)	Brackish side channel (Lyminster, south of Arundel)[1]	Arun banks Arundel to Stopham [2,4,5,9]	Amberley Wild Brooks (inflow ditch)[7,9]
Alisma lanceolatum	A, E			✓
Alisma plantago-aquatica	A, E		✓	✓
Alopecurus geniculatus	WM	✓		
Apium graveolens	E, WM, B	✓		
Apium nodiflorum	E		✓	✓
Atriplex prostrata	B*, WM	✓	✓	
Berula erecta	E			✓
Bulboschoenus maritimus	E, B	✓		
Carex acuta	W			✓
Carex otrubae	W	✓	✓	
Carex riparia	W, B*	✓	✓	
Eleocharis palustris	W	✓		
Equisetum fluitans	E		✓	✓
Filipendula ulmaria	W		✓	✓
Glyceria maxima	W		✓	✓
Glyceria fluitans	A, W			✓
Juncus articulatus	W, M	✓		
Juncus gerardii	B, M	✓		
Lycopus europaeus	E, M		✓	
Mentha aquatica	E,M,W		✓	✓
Myosotis scorpiodes	E,M,W		✓	✓
Oenanthe fistulosa	E	✓		
Persicaria hydropiper	M		✓	
Persicaria maculosa	M		✓	
Phalaris arundinacea	W		✓	✓
Phragmites australis	B*, E, W	✓	✓	
Puccinella distans	B*, M	✓		
Ranunculus sceleratus	M	✓		
Rorippa palustris	M			✓
Rumex hydrolapathum	W, M			✓
Sagttaria sagittifolia	A, E			✓
Samolus valerandi	B, M	✓		
Schoenoplectus lacustris	E		✓	✓
Schoenoplectus tabernaemontani	B, M	✓		
Sium latifolium	E			✓
Sparganium erectum	E		✓	✓
Spergularia marina	B, M	✓		
Triglochin palustre	B, W	✓		
Veronica catenata	E, M			✓

table 5: Plants associated with *Mercuria anatina* on the River Arun with sites listed sequentially running upstream. References: see Table 4
Simplified habitat description: A = aquatic; E =emergent; B = brackish; B* = occasional brackish; W = wetland; WM = wetland/ bare mud.

9.4 Salinity from the River Arun

Location **(sites listed running downstream)**	**Salinity**	**Data source**
Houghton Bridge	**0.82 ‰** (5.8.2005 approx.); **1.0 ‰** brief spike from levels (15.8.2006) **0.2 – 0.3‰** (07 – 08/2006)	Atkins (2008)
Houghton Bridge	**0.14 – 0.26 ‰** range from three samples in 2018 and 2019 (no dates)	Environment Agency, Worthing (D. Block pers. comm.)
South Stoke	**0.6 ‰** brief spike on 9.8.2005	Atkins (2008)
Offham	**1.8 ‰** spike 25.7.2006; **7.1 ‰** spike 15.8.2006; **2.5 ‰** spike 25.8.2006	Atkins (2008)
Offham	**0.14 – 0.31 ‰** range from three samples in 2018 and 2019 (no dates)	Environment Agency, Worthing (D. Block pers.comm.)
Arundel (town bridge)	**0.16 – 1.03 ‰** from 7 samples08/2018 – 03/ 2019	Environment Agency, Worthing (D. Block pers.comm.)
Lyminster (side ditch draining into river @ TQ 01497 05857)	**0.7 ‰** (25.5.2018)	WSP (Arundel bypass surveys; unpublished report information)
Littlehampton	Various measurements ranging close to **35‰** (a typical sea water salinity)	Atkins (2008)

table 6: Salinity data from the lower River Arun.

Regular and detailed salinity measurements from the lower River Arun are scarce; it seems that no regular study has been undertaken on the river. Studies undertaken by Atkins over two summer months in 2005 – 2006 (Atkins 2008) occurred when there were apparently low river flows in the river. Occasional Environment Agency data was obtained from 2018 – 19. The water depth and tidal cycle state of the samples was not available for any data. In order to get a detailed understanding, salinity, readings need to be taken at different tidal periods (springs, neaps), from a range of water depths (as denser more saline water tends to form a wedge flowing along the bottom) and at periods of low and high river flow. In the Arun brackish water is regularly present in Arundel extending upstream to Offham. Salinity levels decline rapidly upstream of this point so that (except for infrequent brackish spikes) brackish water rarely, if ever penetrates upstream of Houghton Bridge. The Atkins report stated, 'calibration was only achieved at places where relatively high saline intrusion is experienced (Offham), but also at the extreme of the saline interface at Houghton. Atkins detected a saline intrusion in August 2006; during which they showed that at Offham salinity exceeded 2**‰** for a period between about 9.6.2006 and about 17.8.2006 with a short salinity peak of 7.1‰ in the middle of this period. During this atypical episode salinity peaked at only 1‰ for a short period upstream at Houghton Bridge suggesting that weakly brackish water rarely reaches this point.

9.5 *Mercuria* in the Thames – an update

Mercuria was widely recorded at River Thames estuary sites on both the Essex (Tilbury) and north Kent coasts (e.g. Erith, Gravesend, Woolwich, Charlton) in the middle and late 19th century (Conchological Society records). It was thought to have become extinct by 1899 due to industrial pollution (Castell 1962). In July 1984, the snail was rediscovered when a small population was discovered in a reed bed adjacent to the lower River Roding near Barking in Essex (Harris 1985) (figure 11). The snail was found with an association of other molluscs (*Potamopyrgus antipodarum*, *Galba truncatula*, *Assiminea grayana*) and plants (*Phragmites australis*, *Aster tripolium*, *Atriplex prostrata*) suggesting slightly brackish conditions. The snail was subsequently reconfirmed at the site by Adrian Norris in 1994.

A considerable range extension of known *Mercuria* distribution in the Thames was made in summer 2011 when the snail was found on Oliver's Ait and at Syon Park near Isleworth (Willing 2011, 2012) (figures 9 and 11).

Location & date	Results	Habitat & river distance above Battersea	Reference
Oliver's Ait, (Strand on the Green) TQ 19402 77647 9.5.2011	2 specimens (1 live, 1 fresh shell)	On firm mud lodged between embankment blockwork at extreme upper tidal margins	Willing 2011
Syon Park, Isleworth TQ 17444 76392 19.8.2011	3 live	Behind blocks of clay lying immediately below *Phragmites australis* bed at upper tidal levels	Willing 2012

table 7: *Mercuria* sites on the Upper Thames

These sites are significance because, although they are both in the tidal Thames (Normal Tidal Limit at Teddington Lock) they are also located well above the approximate upper limit for brackish water penetration in the Thames at Battersea (https://en.wikipedia.org/wiki /Thames_Estuary#Salinity) with Oliver's Ait and Syon Park lying 12.6 km and 15.5 km above this point respectively. No obligate brackish plants or Mollusca were found in association with *Mercuria* at these sites.

9.6 *Mercuria* new to the River Bure, Norfolk.

Before 2008 *Mercuria* was known in Norfolk at numerous locations on the Rivers Yare, Chet and Waveney as well as around Oulton Broad, but was not known from the River Bure system (Baker *et al.* 1999). In June 2008 a population of *Mercuria* was discovered in a freshwater ditch draining into the river Bure about 2.5 km to the east of Acle and lying immediately to the south of the A47 (Willing 2008). The snail was found on the muddy sides of a ditch in association with freshwater Mollusca (*Bithynia tentaculata*, *Potamopyrgus antipodarum*, *Physa fontinalis*, *Stagnicola palustris*, *Ampullaceana balthica*, *Hippeutis complanatus*, *Euglesa obtusalis*). A salinity reading taken in the ditch gave a reading of 0.1 ‰ confirming absence of brackish conditions. An unusual feature of the ditch was the fact that it had a tidal rhythm caused by a one-way tidal sluice causing water to back-up in the ditch due to high tide levels in the Bure. A later visit by survey team (Baker *et al* 2008) further confirmed this as the first recorded *Mercuria* site on the River Bure system.

figure 11: Location of lower Thames *Mercuria anatina* sites (1 = Barking Creek, 2 = Oliver's Ait, 3 = Syon Park)

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.

The Conchological Society of Great Britain & Ireland

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

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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 Catherine Jagger, 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- 1Mb (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 March 2021 issue should be with the Hon. Editor prior to 6th February 2021**; 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.

Membership update

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

Codes after a member's contact details denote their interests:
A Applied conchology (shell artefacts, shell money, cooking, decorations etc); **B** Conchological books;
C Conservation; **D** diving; **E** Ecology & pollution; **F** fossils;
G General malacology including genetics and physiology;
Mb British marine; **Nb** British non-marine;
Nf Foreign non-marine; **P** photography.

Dr T.G.J. Rayner [redacted]
A B C D E F G Mb Nb P

Mr Zhe-yu Chen [redacted]
C E Nf

Changes of address/email etc

Mr P. Chambers [redacted]
Mr I.J. Killeen [redacted]
Dr P. Tattersfield [redacted]
Dr D.T. Holyoak [redacted]
Mr P.E. White [redacted]

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Due to space constraints this summary index focuses on titles (abbreviated where necessary), first authors and species where these are the main subject of the contribution and excludes most editorials, announcements relating to meetings/sales, minor items in Recorder's reports etc. For page numbers, the first figure indicates the issue number (e.g. **40.**4 indicates page 4 for issue 40). Illustrations are generally not indexed unless they are not associated with an article. An asterisk (*) before a name indicates an author.

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.

Conchological Society indoor meetings

Due to the ongoing Covid-19 pandemic situation, it won't be possible to hold face-to-face indoor meetings this winter. However, we are very pleased to invite you to join the following interesting online meetings using the 'Zoom' platform. It might be possible to hold some later meetings 'face to face' depending on the situation. Please see web site for updates.

JOINING THE ONLINE MEETINGS: please e mail Catherine Jagger at CIRCA subscriptions (shellmember@gmail.com) preferably at least one week prior to the meeting, indicating your intention to attend. She will then send you full joining instructions and a meeting agenda. The meeting will open for joining from 13.45; please ensure that you join the meeting before the 14.00 start time as late admissions may not always be possible.

Saturday 12th December 2020: INDOOR MEETING (ONLINE) with 'exhibits' and lecture
Guest speaker: David Holyoak (speaking from central Portugal; Associate Editor of *Journal of Conchology*),
'Ten years of snail collecting in Portugal'.
13.45 sign in for 14.00, ends 16.00

Saturday 27th February 2021: INDOOR MEETING (ONLINE) with 'exhibits' and lecture
Guest speaker: Ben Rowson (NMW/Amgueddfa Cymru, Cardiff),
'Brought to the Surface: a new beginning for freshwater snail identification'.
13.45 sign in for 14.00, ends 16.00

Saturday 17th April 2021: ANNUAL GENERAL MEETING AND ADDRESS (either ONLINE or at NHM, London)
Guest speaker: Robert Cameron (University of Sheffield), **'At a snail's pace: how a New Naturalist got written'.**
If online: 13.45 sign in for 14.00, ends 16.00
Otherwise 14:00 – 17:30: Angela Marmont Centre, Natural History Museum, Cromwell Rd., London SW7 5BD.

Later meeting dates for your diary

Saturday 24th July 2021: INDOOR MEETING (ONLINE)
Guest speaker: Imogen Cavadino (Royal Horticultural Society), title to be announced.

Saturday 16th October 2021: INDOOR MEETING (ONLINE or at NHM, London)
Guest speaker: Jeremy Biggs (Director, Freshwater Habitats Trust), title to be announced.

ONLINE 'EXHIBITS': members are invited to address the meeting for a maximum of four minutes to show an exhibit or speak briefly on a mollusc-related theme. Anyone wishing to do this please e mail the Hon. Secretary, Rosemary Hill (secretary@conchsoc.org) in advance of the meeting. Note that for each meeting the number of speakers will be limited to the first five applicants.

PLEASE NOTE: a) many of us have been on a steep 'learning curve' regarding the use of online meeting software, so please be patient and prepared to forgive any glitches which may occur! b) We will be at the mercy of internet connections and cannot therefore guarantee connectivity; if for technical reasons the online meeting 'crashes' or is unable to take place we will endeavour to reschedule.

FIELD MEETINGS: the situation with regard to field meetings in 2021 remains uncertain and depends upon government advice and regulations, and the ability of the Conchological Society to obtain insurance cover. Please refer to the website and later issues of this magazine for updates.

To deal with ongoing 'meetings business' and as an interim measure (before appointing a new Programme Secretary), a small 'Meetings Team' consisting of Rosemary Hill, Peter Topley, Tom Walker and Martin Willing, will handle all meetings matters.
If you have any meetings-related questions please, in the first instance, make contact with Rosemary Hill our Hon. Secretary (see page 27 for contact details).