Mollusc World

March 2018 • Issue 46

Discovery of the egg capsule of *Trivia arctica*

Cambridge regional meeting

Land snails from Peru

The Conchological Society of Great Britain & Ireland

Helping to understand, identify, record and conserve molluscs

From the Hon. Editor

This issue features reports from the Conchological Society regional meeting in Cambridge as well as from a Symposium organised by Nederlandse Malacologische Vereniging (NMV) on African molluscs in memory of the distinguished conchologist Dr. A. C. van Bruggen. Reports of two of the field meetings held last year remind us about the meetings diary for this year on the back cover which features an interesting mix of planned marine and non-marine meetings. Further meetings may be organised and so please check the website for any updates.

The excellent Phil' Palmer shell collection is now in the Society's care and we are very grateful to Paula Lightfoot for its housing and ongoing curation. Paula has contributed an article to bring us up to date.

Readers may be interested in a BBC Radio 4 broadcast about Cephalopods in the discussion series 'In our Time', hosted by Melvyn Bragg which aired on 1st February. This fascinating programme is well worth a listen and can be access and downloaded at http://www.bbc.co.uk/programmes/b09pjgrn.

Just before going to press we heard the sad news of the death of David Long, a past Hon. President and long-time active member of this Society. He will be much missed by many of us. A field meeting is being organised in his memory (see back cover). The photo (right) shows David, as he would probably have liked to be remembered, on his hands and knees looking for molluscs (Flitwick Moor, Beds., 2011).

Once again, many thanks to those who have sent me contributions of articles and shorter pieces for this issue. My usual plea for material for the July and future issues of Mollusc World still stands!

Peter Topley

Mollusc World

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

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

The Conchological Society of Great Britain & Ireland

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ISSN 1740–1070

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

Front Cover: A female *Trivia arctica* depositing and shaping an egg capsule (see page 8). (photo: Stefan Verheyen)

Mountain dwellers: some land snails from the Cuzco region, Peru

Janet Ridout-Sharpe

Nearly 50 years ago I found myself part of a small insect-collecting expedition to Peru, sponsored by the then British Museum (Natural History) where I was working at the time. In six weeks we explored parts of the desert coast, the high Andes and the cloud forest and jungle on the eastern slopes of the mountains in southern Peru – and I collected snail shells as we went. This was not a systematic collection and had no purpose other than personal interest. For the greater part of our stay we were the guests of Francisco Carrasco, then professor of entomology at the Universidad Nacional San Antonio Abad del Cuzco, and it was during excursions in this area that I collected most of the shells. It was July and August 1971, the end of the dry winter season in the mountains, and the only live snails I saw were hibernating on vegetation and in the crevices of old Inca terrace walls; most of my specimens were empty shells.

On return I made some tentative but largely abortive attempts to identify my shells from collections held at the National Museum of Wales and Haslemere Museum in Surrey with the help of June Chatfield who had connections with both establishments. I found some close matches, but these weren't close enough and so time passed and the shells slept quietly and undisturbed in a cabinet drawer. But they were not entirely forgotten. I recently made a more concerted and successful attempt to identify my specimens with the aid of a descriptive paper on the land snails of the Cuzco region (Flórez, 1968) presented to me by its author, who was perhaps the foremost malacologist working in Peru at that time and, as luck would have it, then teaching at the university in Cuzco. I was able to supplement his descriptions and line drawings from the many superb coloured photographs of Neotropical land snails that are now available on the internet.

Ramírez et al. (2003) list 763 species of terrestrial molluscs in Peru, most of which are endemic, so this was no mean task. For comparison, only 238 species have been recorded from Argentina and a mere 150 from Chile, and the whole of North America has so far yielded only around 850 species (Paredes et al., 1998). The greatest diversity of species is found on the lush eastern slopes of the Andes, followed by the western slopes, Amazonia, the desert coast (with its snow-fed river valleys and fog-fed oases or lomas) – and finally the high mountains. Relatively few families and genera can survive at or around 3500 m, just 14 of the 94 genera tabulated by Ramírez et al. (2003), and so my task was made easier by the altitude.

The nomenclature remains a problem. The only published checklist of Peruvian Mollusca (Ramírez et al., 2003) is now out of date and genetic studies are beginning to upset some long-established assumptions (Breure et al., 2010). Of Peru's 763 land snails, 442 (58%) species belong to the Bulimulidae, followed by the Clausiliidae with 75 species and the Systrophiidae with 55. Overall, 30 different families of terrestrial molluscs are represented in Peru, and my assemblage from Cuzco looks very different from what one might expect to find in Europe: the high elegant shells of the Bulimulidae predominate and the only 'familiar' Helicoidea are members of the family Helminthoglyptidae which is restricted to the New World and includes the well-known colourful *Polymita* shells from Cuba. The discoidal shells of the Rhytidoidea families Haplotrematidae and Systrophiidae appear to fill the niches occupied by the Oxychilidae in Europe. None of the species I have identified from the Cuzco region are cited in MolluscaBase.

These species are listed in table 1 which shows what was found at different altitudes. The local geology was a mixture of sedimentary and metamorphic rocks with outcrops of limestone and calcareous sandstone. The climate is temperate but with a high degree of ultraviolet exposure, and the temperature drops below freezing at night. *Drymaeus* tree snails were not found above 2500 m. On the other hand, four species representing three families were frequent above 3700 m, although only one was collected above 3800 m. The collection sites, numbered in the table in ascending order of altitude, are described below from the notes I made at the time:

Loc.1: Cuya (2500 m) was reached after a 90 km drive west from Cuzco through the mountains and after negotiating some spectacular hairpin bends. It is by the river Apurímac ('Great Speaker' in the Inca tongue) and then consisted solely of a bridge and a shop that served as a focus for the folk living in scattered dwellings on the mountainsides. We found little down by the river except hordes of vicious biting flies but in a nearby papaya plantation snails were hibernating on the tree trunks and a little further up the track large numbers of empty shells were found under cacti and among the rocks (figures 1 and 2).

figure 1: The author at Cuya.

figure 2: *Bostryx columellaris* from Cuya (scale in mm).

Loc.2: Pisac (2969 m) is a bustling market town 32 km north-east of Cuzco on the north bank of the river Vilcanota, which further downstream becomes the Urubamba which flows past Machu Picchu and eventually joins the Amazon.

Loc.3: Lucre (3200 m), 30 km east of Cuzco, was then a picturesque village with pigs in the main square, set in countryside somewhat reminiscent of the English Lake District. Here I collected hibernating snails from an adobe-brick wall and followed a track up a small valley to find 'heaps of snails under agaves' which were mostly empty shells. Nearby a large shallow lagoon largely overgrown with reeds supported a remarkable bird life and here I found the ramshorn planorbid *Biomphalaria andecola* (d'Orbigny, 1835) in abundance and a hydrobiid, *Heleobia* sp. (Peru hosts 18 species in this genus).

Loc.4: The San Jerónimo road (3300 m) runs south out of Cuzco and we stopped by a small farmstead about 8 km outside the city (figure 3). The road was flanked by gently sloping fields rising up to thorny scrub and eventually giving way to quebradas (rocky gorges) on the mountainsides. Here I collected shells alongside an earthen bank which served as a field boundary.

Loc.5: Cuzco (3400 m) was built in a bowl in the mountains, the 'Navel of the World' according to the Incas, and like any city it is fringed with suburbs that give way to open countryside and satellite villages. We explored this countryside on foot, in particular the Quebrada Salinera to the north. This is so-called because its stream leaves crusty white saline deposits on the rocks and further downstream salt pans had been constructed. The dominant vegetation was *Eucalyptus*, which has been introduced as a fast-growing source of timber and fuel that tolerates high altitude but is environmentally detrimental as it sucks the moisture out of the thin soil cover. Despite the salinity, the lymnaeid pond snail *Fossaria viatrix* (d'Orbigny, 1835) was collected in a side channel of the main stream.

figure 3: A farmstead in countryside just outside Cuzco (photo taken in 1971).

figure 4: Sacsayhuamán with the collection site in the foreground (photo taken in 1971).

Loc.7: Sillustani (3830 m) was the furthest point we reached on our excursions from Cuzco. This site overlooks Lake Titicaca some 250 km south-east of Cuzco and is famous for its pre-Inca stone burial towers or chullpas. Only one species of bulimulid was found here.

Notes on the species

Clausiliidae: This family has an interesting global distribution, being well represented in Europe and Asia, and in the Caribbean and South America although it is absent from North America (Cameron, 2016: 309). A molecular phylogenetic study has placed the origin of the extant Clausiliidae in the Late Cretaceous/Early Caenozoic of western Eurasia, after South America separated from Africa. It has also shown that the Caribbean (Greater Antilles) clade is an older lineage only distantly related to the South American clade, inferring two separate transoceanic dispersals, most probably aerial dispersals by migrating birds when the Atlantic was much narrower than today.

The two Neotropical clades are distinct from those in the Old World and fossil evidence from eastern Brazil shows that South American clausiliids were established by the Early Caenozoic (Uit de Weerd and Gittenberger, 2013). Subsequently these clausiliids reached their greatest diversity in the Andes and 12 of the 17 genera present in Peru are endemic (Loosjes and Loosjes-Van Bemmel, 1984;

Ramírez et al., 2003). Nevertheless, only the genus *Temesa* is found at high altitudes, and *Temesa balnearum* was found near Cuzco. Clausiliids were not found at any of the other collection sites considered here, and I did not encounter the group again until we reached Machu Picchu in the cloud forest on the eastern slopes.

Bulimulidae: The Orthalicoidea is a more ancient group than the Clausiliidae and is thought to have originated in Gondwana before this land mass split into the continents of the southern hemisphere. Representatives of this superfamily are found not only in South America but also in southernmost Africa, Australasia and parts of Melanesia. Of the 442 species of Bulimulidae recorded from Peru, the genus *Bostryx* is the most diverse with 141 species, followed by *Drymaeus* with 123 and *Scutalus* with 51. Most species of *Bostryx* are found in the lomas and river valleys on the coast but several species occur in the Andes and *Bostryx radiatus* was common around Cuzco. Many species of bulimulids look very similar and are distinguished by rather subtle differences (figure 5). Several species of *Bostryx*, however, have evolved remarkably elongated tube-like shells and one of these, *Bostryx columellaris*, was found beneath cacti and hibernating on rocks at Cuya (figure 2).

figure 5: Variations on a theme. From left to right: *Bostryx derelictus ascendens; Bostryx radiatus; Scutalus altorum; Scutalus culmineus; Scutalus revinctus* (scale in mm).

The genus *Scutalus* predominates in the high Andes but I encountered only four species, of which *Scutalus revinctus* was the most abundant species of all, being found almost everywhere at altitudes above 3000 m. *Scutalus culmineus* was a particularly interesting find at Sillustani overlooking Lake Titicaca. This high-altitude species was also recorded by G.I. Crawford formerly of the British Museum (Natural History) who took part in the Percy Sladen expedition to Lake Titicaca in 1937 (Crawford, 1939); he described it as 'very common on rocky ground (limestone or sandstone)'.

In contrast, *Drymaeus* tree snails proliferate in the cloud forest of the eastern slopes but are not found at high altitude. A single species was found in abundance at Cuya where it was hibernating on the trunks of papaya trees: this species appears to be identical to the *Drymaeus scitulus* figured by Abbott (1989: 100) which has a wide distribution both within and beyond Peru.

Haplotrematidae: This family may have originated in North America where some 20 species of *Haplotrema* are described as 'rapacious carnivores' (Abbott, 1989: 89). Ramírez et al. (2003) list two species of *Austroselenites* from Peru which appear to be restricted to the cloud forest and jungle to the east. Neither of these is the *Austroselenites weyrauchi* (figure 6) described by Flórez (1968) from Sacsayhuamán and some other sites in the Cuzco area. I found this species in abundance at Sacsayhuamán and elsewhere (table 1): the shell is a translucent flattened disc with a wide umbilicus and reaches a maximum diameter of 18 mm.

figure 6: *Austroselenites weyrauchi* (scale in mm).

Micromolluscs: I didn't intensively search for micromolluscs but a leaf litter sample from Quebrada Salinera yielded a wealth of small discoidal shells with large umbilici, about 2 mm in diameter, together with some larger look-alikes that were juveniles of *Austroselenites weyrauchi*. The small shells resolved themselves into two species on close examination. More frequent was the tightly-coiled *Ptychodon cf. florezi*: Flórez (1968) lists two species of *Ptychodon* from the Cuzco area at c.3400 m and my specimens conform most closely to his description of the species named in his honour by Wolfgang Weyrauch. This genus belongs to the family Charopidae in the superfamily Punctoidea and it is also found in New Zealand, suggesting a Gondwanan origin. The other species has a thinner shell and a relatively more expanded body whorl: this is *Wayampia trochilioneides* which belongs to the Systrophiidae, superfamily Rhytidoidea, which according to Ramírez et al. (2003) also has a Gondwanan origin. A larger species about 6 mm in diameter, *Wayampia incara*, was found at Cuya.

Helminthoglyptidae: I also collected some helicoid shells of the type we are more familiar with in Europe. This family is believed to have colonised South America from the north (Ramírez et al. (2003). There are 32 species of *Epiphragmophora* in Peru and the depressed three-banded *Epiphragmophora diluta* was common in the Cuzco area, where it exists in two forms which are accorded subspecies status (figure 7).

figure 7: *Epiphragmophora diluta*, ssp. *urubambensis* above, ssp. *semiaperta* below (scale in mm).

E. diluta urubambensis, in which the adult parietal lip obscures the umbilicus, was found at Sacsayhuamán and elsewhere. In *E. diluta semiaperta* the lip only partially covers the umbilicus in adults and this was also found in the Cuzco area although it does not appear to coexist with *E. diluta urubambensis*. A much larger depressed species, represented by a single shell 33.6 mm in diameter with a single dark band just above the periphery, a large umbilicus (6.5 mm in diameter) revealing the internal coiling, and an everted lip was found at Cuya: *Epiphragmophora hemiomphalos*. The Helminthoglyptidae is the only family of Helicoidea recorded in Peru – apart, of course, from the introduced *Cornu aspersum* (Helicidae) which is expanding its range and has already reached the eastern slopes of the Andes: it is farmed as a food source on the coast (Ramírez et al., 2003).

Contributions to the knowledge of Peruvian land snails have been made by relatively few authors and most European and North American collectors have deposited their material in museums in their home countries. A national collection is now being established at the Natural History Museum in Lima and one of the founder collections of this was that of my former contact in Cuzco, Angel Flórez. There remains a great deal of work to be done on Peruvian land molluscs and next to nothing is known about their ecology. Most species descriptions have been based on shell characteristics alone and their internal anatomy is poorly known. However, the advent of molecular phylogenetics seems poised to change our understanding of their taxonomy and nomenclature (Breure et al., 2010). Abraham Breure at the National Museum of Natural History in Leiden is one of the leading contemporary authorities on Neotropical land snails and the Orthalicoidea in particular. He is currently working on a major revision of the land snails of Peru with his Peruvian colleague Valentín Mogollón. Once that is published, I shall probably have to rewrite this article. Anyone who is particularly interested in this topic will enjoy 'Bram's snail blog' which can be found at https://breure.wordpress.com/tag/Peru.

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table 1: Land snails collected in the Cuzco region according to altitude (in metres). See text for details of the numbered localities (Loc.1-7).

Species	Loc.1 2500	Loc.2 2969	Loc.3 3200	Loc.4 3300	Loc.5 3400	Loc.6 3701	Loc.7 3830
CLAUSILIOIDEA							
Clausiliidae							
Temesa balnearum (Crawford, 1939)					+		
ORTHALICOIDEA							
Bulimulidae							
Bostryx columellaris (Reeve, 1849)	+						
Bostryx derelictus ascendens Pilsbry, 1944			+				
Bostryx cf. modestus (Broderip, 1832)				+			
Bostryx radiatus (Morelet, 1863)			+		+	+	
Bostryx sp.	+						
Drymaeus cf. scitulus (Reeve, 1849)	+						
Scutalus altorum (Haas, 1951)			+				
Scutalus culmineus (d'Orbigny, 1835)							+
Scutalus cuzcoensis Weyrauch, 1967		+					
Scutalus revinctus (Hupé, 1857)			+	+	+	+	
RHYTIDOIDEA							
Haplotrematidae							
Austroselenites weyrauchi Haas, 1963				+	+	+	
Systrophiidae							
Wayampia incara (Crawford, 1939)	+						
Wayampia trochilioneides (d'Orbigny, 1835)					+		
PUNCTOIDEA							
Charopidae							
Ptychodon cf. florezi Weyrauch, 1968					+		
HELICOIDEA							
Helminthoglyptidae							
Epiphragmophora diluta semiaperta Weyrauch, 1964			+		+		
Epiphragmophora diluta urubambensis Pilsbry, 1926				+	+	+	
Epiphragmophora hemiomphalos Haas, 1951	+						

The Shell House, Albuferia, Portugal

from *Paul and Rosie Dansey*

Paul emailed the Editor in December to say that he and Rosie had recently returned from a holiday in the Algarve where Paul discovered a bar in Albufeira called the Shell House covered with shells. Rosie took the photos.

An article posted at http://portugalresident.com/new-house-of-shells-created-in-albufeira is appended here:

'[The original House of Shells] disappeared in the name of progress in the 1970s, but now local man Hélder Bailote has single-handedly revived one of Albufeira's much-loved treasures. The 'House of Shells' used to stand on the site that now boasts the well-known Hotel Rocamar. It was a piece of Albufeira's history, and many were very sad to see it go. That's why Hélder had the 'brilliant idea' of creating a new House of Shells, at his family run Bar Portas da Vila in Rua da Bateria. He constructed it bit by bit over the years with shells he collected from the beach – and now it is finally 'ready' to be appreciated in all its glory. As one of the many fans of his handiwork told us, the bar is 'rapidly becoming one of the top tourist attractions in Albufeira' – and the bonus of this particular novelty is that you can enjoy a drink or snack as you take photos and marvel at Hélder's staying power.'

(Posted by PORTUGALPRESS on June 11, 2014)




Discovery of the egg capsule of *Trivia arctica* (Pulteney, 1799)

Stefan Verheyen (images) *and Ian F. Smith* (text).

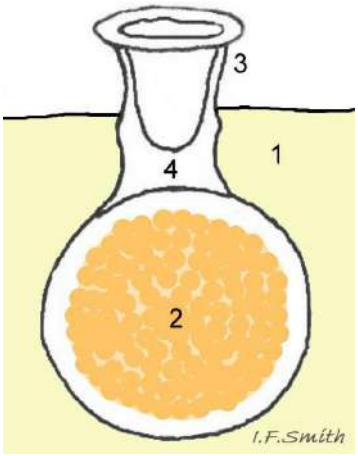
In 1981, Fretter and Graham wrote, 'The breeding [of the Arctic cowrie, *Trivia arctica*] has been described by Lebour (1933, 1935, 1937), though the eggs and egg capsules are still unknown and can only be presumed to be laid in ascidian tests.' Uncertainty persisted for a total of 80 years as Wigham & Graham (2017) could only state that, 'reproduction is presumed to be like that of T. monacha'.

On 23rd March, 2017, Stefan Verheyen took underwater photographs at Zierikzee, Netherlands, of a female *T. arctica* depositing and shaping an egg capsule. A search on the web has failed to find any photographs of this event for *T. arctica*, or even for *T. monacha* which had line drawings made of it by Fretter & Graham (1962) (figure 1).

figure 1:

T. monacha egg capsule, based on Fretter & Graham (1962).

1: ascidian.
2: ova.
3: capsule neck.
4: plug to exit from egg chamber.



These photographs may be the first to show the process and have it recognised. They confirm the assumption that it is similar to that of *T. monacha*, and they form the basis of the following.

Description

The female has yellow slit on the sole of her foot, at about a quarter of its length from the front, that leads to a cavity containing the ventral pedal gland (figure 2).

figure 2: Yellow slit in the sole is the opening to the cavity containing the ventral pedal gland. (photo: Ian Smith)

The ventral pedal gland can be brought to the front for use in capsule production by transverse folding of the foot, (figures 3 & 4).

figure 3: Foot folded to bring ventral pedal gland forward. (photo: Ian Smith)

figure 4: Ventral pedal gland protruding from sole. (photo: Stefan Verheyen)

The female seeks a prey species of compound ascidian; *Diplosoma listerianum* in these images, a species favoured by both *T. arctica and T. monacha*. She bites a hole into the ascidian and inserts a transparent, colourless, spheroid egg-capsule, showing the crowded orange ova within. The orange ventral pedal gland is protruded and used to push the capsule into place and form the plug to the exit hole of the egg chamber (figure 5).

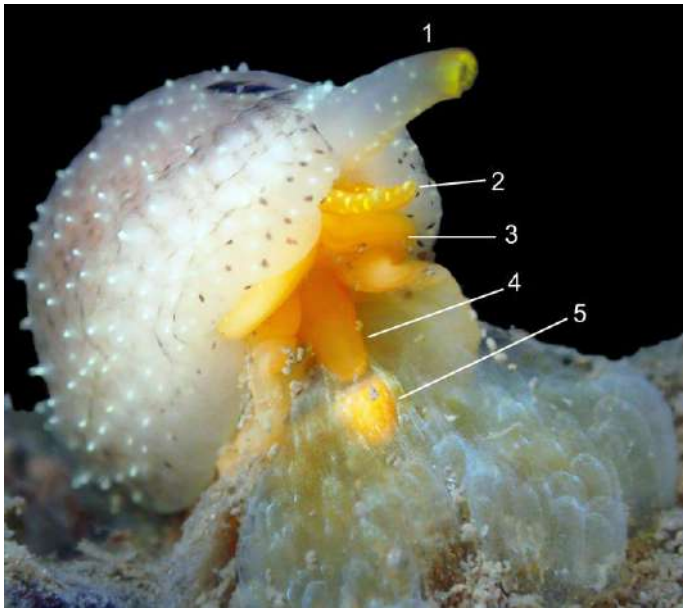


figure 5:
1: respiratory siphon. 2: cephalic tentacles. 3: anterior edge of foot. 4: ventral pedal gland protruded and shaping the egg capsule (5) deposited in a hole bitten into the compound ascidian prey, *Diplosoma listerianum*. (photo: Stefan Verheyen)

A transparent, colourless, funnel-shape neck that protrudes well above the surface of the ascidian is formed with the flexible tip of the ventral pedal gland figure 6.

figure 6: Ventral pedal gland shaping the neck of the egg capsule. (photo: Stefan Verheyen)

The long delay historically in recognising the egg capsule is probably due to the colourless transparency of the neck making it almost invisible to divers and shore workers. In figures 7 and 8, dots have been added to close up sections of figures 5 and 6 to help distinguish the capsule.

Larger versions of these images can be viewed on line in the detailed illustrated account of *Trivia arctica* at https://flic.kr/s/aHsks6yBbo (see also front cover).

figure 7: Ventral pedal gland in capsule forming plug to exit from egg chamber. (photo: Stefan Verheyen)

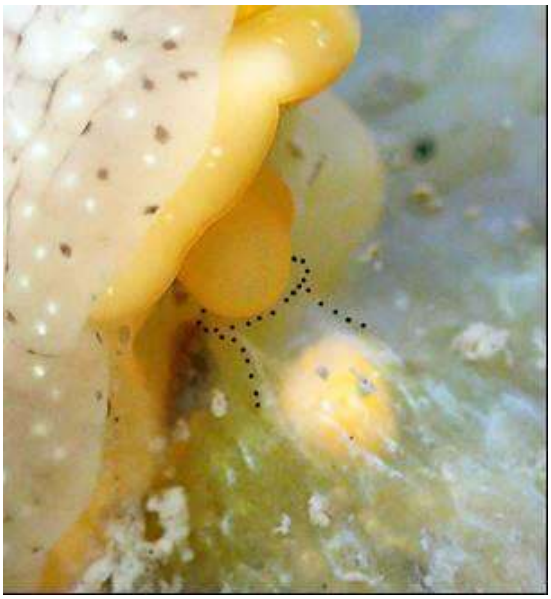


figure 8: Ventral pedal gland forming funnel shape neck of egg capsule. (photo: Stefan Verheyen)

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Conchological Society regional meeting, Cambridge University Museum of Zoology, November 17th 2017

Peter Topley

figure 1: Some of the Cambridge regional meeting attendees in discussion.

This meeting took place in a new meetings/seminar room in the Cambridge University Museum of Zoology (CUMZ) (figure 1), which has been undergoing a major redevelopment including a new glass whale hall (to display their 70ft long finback whale skeleton), new gallery displays and new stores to house the rich, historically and scientifically important collections. The meeting was organised by Dr. Tom White, Dr. Martin Willing and Dr. Richard Preece, who all chaired sessions. The following summaries of the talks are taken from my notes and recordings made on the day; so any inaccuracies that may have slipped in will be entirely mine.

Leonard Jenyns - Tom White

The first talk, given by Tom White (now Senior curator, Natural History Museum, London) was entitled 'Leonard Jenyns: founding father of the University Museum of Zoology.' Revd. Leonard Jenyns (1800 − 1893) (who later changed his name to Blomefield) was an important naturalist who, together with John Stevens Henslow (1796 − 1861) and their friend Charles Darwin (1809 – 1882), made significant natural history records and collections in Cambridgeshire. Jenyns also collected important meteorological and phenological data in the vicinity of his parish at Swaffham Bulbeck. Both Jenyns and Henslow declined the offer of a position as naturalist on HMS Beagle, recommending their friend Darwin to go in their place – the rest is history! Jenyns and Henslow intended to publish their observations but both left the county before finishing the project, although Jenyns included some of these observations in a hand-written manuscript from 1869 entitled 'Contributions towards a *Fauna Cantabrigiensis*' which covered vertebrates and molluscs (figure 2). An annotated transcript with commentaries was published by the Ray Society (Preece and Sparks eds., 2012). Jenyns' specimens were to form the basis of the collections at the University Museum of Zoology at Cambridge. Species named by Jenyns include the pea mussels *Pisidium nitidum* Jenyns, 1832 and *P. pulchellum* Jenyns 1832 and these form part of his mollusc collection which is housed in a deteriorated state at the Bath Royal Literary and Scientific Institution; unfortunately the types are not identifiable.

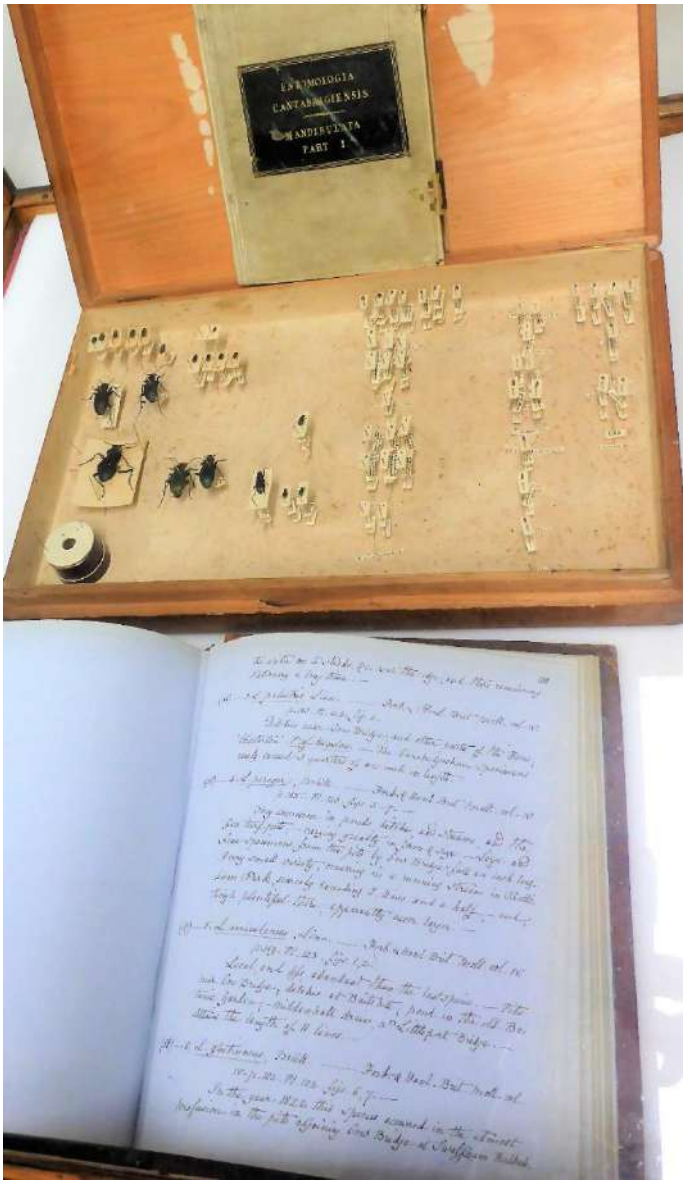

figure 2: Manuscript of Revd. Leonard Jennings' *Fauna Cantabrigiensis* and beetle specimens on display at the meeting.

Other specimens in the collection include the now very rare and restricted glutinous snail (*Myxas glutinosa*) collected from his parish in 1822. Tom had been working on assembling a dataset of insects, molluscs and other groups in Cambridgeshire recorded prior to some of the major landscape and environmental changes, including the intentional drainage of Whittlesea Mere in the 19th century, which have subsequently adversely affected species distribution. A recently discovered letter from Jenyns to the Eaton schoolmaster Thomas Preston, who was cataloguing the lepidoptera in the Cambridge museum, confirmed that all the local records of the now extinct British subspecies of the Large Copper butterfly (*Lycaena dispar ssp. dispar*) were collected by J.C. Dale from Whittlesea Mere. Tom also highlighted some of the species which have become more common since Jenyn's time, following drainage for farmland, including the Speckled Wood butterfly (*Pararge aegeria*) and more recently Roesel's Bush-cricket (*Metrioptera roeselii*). The talk finished with a description of the aim to standardise and integrate databases to make species records directly comparable and improve the ability to track species biodiversity over time.

East Anglian marine molluscs – Simon Taylor

Simon Taylor (Conch. Soc. Hon. Marine Recorder) discussed the 'East Anglian Marine Scene', which for Simon's purposes is the area comprising the counties of Norfolk, Suffolk and Essex (where he lives). For marine recording the area stretches from the Thames at Barking Creek to the boundary with Lincolnshire on the Wash. Simon then explained the geology of the area, and that the resulting coastline isn't the most exciting regarding habitat for marine molluscs, with very little rocky shore, a lot of flinty pebble shore, saltmarsh and estuarine conditions (with brackish species 'rather a speciality'). There are two marine conservation zones: in Norfolk the offshore Cromer chalk beds and in Essex a conservation zone based on the preservation of the native oyster (*Ostrea edulis)*.

Simon explained that fossiliferous tertiary beds in East Anglia provide an interesting record of the past marine fauna of the area, in some cases up to 4 − 5 million years ago (the Coralline Crag, in which around 65% of the mollusc taxa are still extant). As the beds become more recent the proportion of extant taxa increases, through to almost 90% in parts of the Norwich Crags (age 1.4 − 2.8 million years), where specimens can be found that still have colouring and patterning on them. There are some other offshore subfossil beds about which little is known; a small section of shore at Jaywick has dead shells of such species as *Lutraria angustior* which don't look very old. There are archive collections of molluscs in museums in Norwich, Ipswich and Colchester in addition to written records (for example the Essex Field Club has digitised records dating back to 1880). Of the Conchological Society digitised records, Simon explained that there are 2393 from Essex, 366 from Norfolk and 78 from Suffolk (reflecting the poor coastline for mollusc habitats), however there are many older records that are yet to be digitised.

Incidental introductions of invasive marine molluscs in East Anglia include the slipper limpet (*Crepidula fornicata)*, the first record of which was in 1891 from Brightlingsea in Essex, although there are mentions of earlier anecdotal records. The Atlantic oyster drill (*Urosalpinx cinerea*), was first recorded in the Blackwater estuary in Essex in 1920. Some of the older books say that this introduced predator of commercial oyster beds was quite common in East Anglia and in the Thames estuary but Simon said that when he was younger it was not common at all because it suffered greatly from the cold weather in the 1950 − 60's and from the use of the anti-fouling agent tributyltin which interfered with their breeding, but it is now making a recovery. The first record in the UK of Jenkins's spire snail (*Potamopyrgus antipodarum*) was from Grays in Essex in 1852; Simon's understanding is that it came here in ship's drinking water.

Deliberate introductions for the shellfish industry include the hard clam or quahog (*Mercenaria mercenaria*) which generally does not survive well in the UK but there are some sites for it, such as in the Solent and in Essex (Simon exhibited a large specimen from Essex, see figure 3). The Manilla clam (*Ruditapes philippinarum*), deliberately introduced into Poole harbour, was first recorded around 2000 in the Thames estuary and there are now no longer any native species of Venerupids in East Anglia. Studies show that the species hasn't brought with it any disease (unlike, for example, the grey squirrel) and is known to be vulnerable itself to certain diseases, apparently thriving least well in its native habitat because various things have evolved alongside to exploit it. It can survive in very high densities, growing and maturing very quickly, outcompeting other species as it has done so worldwide. Other more incidental invasive species include the American razor clam (*Ensis leei*, previously known as *E. directus*), first recorded in the UK in Norfolk in 1989 and the American piddock (*Petricolaria pholadiformis*) with the first UK record from Essex in 1890.

figure 3: Large Essex specimen of *Mercenaria mercenaria* exhibited by Simon Taylor at the UMCZ meeting.

There was a thriving East Anglian native oyster (*Ostrea edulis*) industry, particularly in southern Suffolk and Essex. At its peak, around 1850, about 500 million oysters passed through London's Billingsgate Market every year, not to mention all the others that were eaten locally and went elsewhere. The industry was just about sustainable but then demand became too high and the breeding oyster beds were damaged. The UK population has apparently declined by 95% and the native oyster bed is classed as one of the most endangered native marine habitats in Europe. A project has been set up called ENORI (the Essex Native Oyster Restoration Initiative) where 25,000 mature specimens are being used to re-establish traditional oyster beds where there

is a build-up of dead shells (often referred to as 'cultch') which the spat can settle on. The mature oysters have been planted in what is called 'restoration boxes', which are areas of seabed where no disturbance is permitted. Of the 25,000 oysters, 10% were marked, an undertaking carried out by various organisations including the Essex Wildlife Trust. Other partners include Selfridges and Seasearch (who have volunteered to use their diving expertise to help monitor the beds).

Another project in Essex is looking for the lagoon sea slug (*Tenellia adspersa*), most records of which are from Essex. The habitat that is searched for are sluices between saltmarsh and the borrowdykes behind the sea wall. When water builds up in the marshes that were drained as a result of the creation of the sea wall, the use of sluices drains the excess freshwater into the sea. Sometimes the sluices become fouled or damaged and at high tide salt water can drain into the freshwater behind and hydroids (the food of the seaslug) can grow. Searchers have been looking for *Tenellia* in locations where it has been found in the past, however the specific conditions for the seaslug tend to be quite temporary and the populations are ephemeral. A further species that is searched for is the looping snail (*Truncatella subcylindrica*); dead shells only have been recorded so far, but one specimen was found with an operculum in the aperture at Bradwell-on-Sea, suggesting that they are alive somewhere.

The collapse of native oyster beds resulted in the introduction of foreign oysters to try to sustain the industry. The Eastern oyster (*Crassostrea virginica*) did not establish, however the Pacific oyster (*Crassostrea gigas*) was successful. This Pacific species was originally brought in from Portuguese stock (and so they were sometimes misleadingly called Portuguese oysters). The Blackwater estuary was first stocked in the 1920's. Immediately the introduction brought in diseases, but the oysters do well themselves and are resistant to some things that effect *O. edulis*. The idea was that the cold-water conditions in the winter would prevent the oysters from breeding; unfortunately, that wasn't the case. The shore at West Mersea, for example, is now covered in closely packed *C. gigas*. There are serious habitat implications for other marine organisms. This is also the case with *C. fornicata* which indulges in 'eco-engineering', changing the environment in which it lives. As well as the very dense areas of the introduced oysters there are areas of sludgy muddy patches in between which were previously muddy gravel which is quite rare in East Anglia. There are resulting opportunities for 'new' species and faunal changes. Seasearch have recorded new occurrences of sea squirts relating to the *Crepidula* and *Crassostrea* 'reef' habitat.

Will the vast populations of introduced species experience a 'boom and bust' situation in the future, as has happened in freshwater with the Asiatic clam (*Corbicula fluminea*) and the Zebra mussel (*Dreissena polymorpha*)? There are some signs of native Venerupid recovery in Kent, where they might be fighting back against *R. philippinarum*, but there is no sign of this yet with *C. gigas*; indeed it continues to spread, for example along the south coast, being found in Cornwall and as far north as Scotland. In Kent someone was employed to go around and smash them with a hammer; he got up to over 30,000 smashed before he gave up counting but it didn't really make any difference, indeed the broken shells just provided habitat for new ones to settle on.

A discussion then followed about the native oyster industry and the possible ages of subfossil shells found on the shore, in archaeological sites including Pleistocene channels (up to 20,000 years old) on the foreshore and offshore at Clacton.

Pearl oysters in the River Ehen – Ian Killeen

The third talk was given by Ian Killeen (consultant, Malacological Services, Dublin), entitled: 'Recent research and conservation of the River Ehen freshwater pearl mussel population.' *Margaritifera margaritifera* fulfils all the criteria as a species for conservation concern, being an 'indicator', 'flagship', 'keystone' and 'umbrella' species. They are the only animal species in the UK that lives longer than man and have a very wide distribution globally but are heading for extinction throughout their range. They have a long cultural history and produce pearls in some mainland rivers in the UK. Pearl mussel life history is associated with a larval stage on salmonid fish. The UK therefore has an international responsibility for their worldwide protection.

The talk focussed on one river, the river Ehen in the western Lake District which flows 27 km downstream out of Ennerdale Lake into the Irish Sea. The relevant Special Area of Conservation (SAC) is 13 km downstream of the lake in a low intensity land use catchment with the surrounding upland areas being mainly moorland, forestry and rough grazing. Importantly, the river has a regulated flow regime with compensation flow. Ian said that the population of *M. margaritifera* there is the largest in England, around half a million individuals, 95% of which live in the SAC. The river Ehen is one of the top ten rivers in the UK in terms of population numbers. There is some (wholly inadequate) recruitment to the mussel population, whilst the river, although not in a favourable condition, is recoverable. In context, the next largest population in England is up to 20,000 in the North Tyne in Northumberland. The river Clun in Shropshire has 500 − 1000 while all other remaining populations in England have only between 50− 2000 animals or less and there is one river in Wales with less than 1000. Scotland is generally sited as the 'hotspot' in the UK for pearl mussels and there are many rivers with mussels in them, with 19 designated as SACs; but only five of those rivers have populations over half a million individuals and very few of the populations are in a viable condition. Ian therefore emphasised that in conservation terms the Ehen is an extremely important river.

Work on the river began in 1995, when English Nature (as it was then) commissioned a nationwide survey to try to identify rivers for conservation designation and the Ehen was highlighted as worthy of attention. In 1996 two months were spent identifying the mussel beds and performing accurate counts. Very high densities of pearl mussels were recorded at the time of 5−600/m^2 and on that basis the river was selected for SAC designation and a similar follow-up survey was carried out ten years later. A large team of specialists, particularly geomorphologists and hydrologists as well as ecologists and the mussel experts have committed to a catchment-wide restoration plan, in conjunction with a locally led scheme called 'Wild Ennerdale'. Permanent monitoring transects for mussels were set up and work carried out with the Forestry Commission (from 2007) in tree felling and removal of trees both from the river and from the riparian zones. Data loggers were installed, to monitor for any turbidity issues and point sources of silt pollution, as well as water samplers to measure phosphorus.

figure 4: Meeting attendees visiting a lab in the CUMZ collections store.

A further major re-survey was carried out in 2012. Currently land cleared of conifers is regenerating with juniper, birch and thorn, providing a protective riparian zone to the river with small natural wetlands which provide the food for the pearl mussels.

Before 1970 there was a mountain stream called Ben Gill which flowed directly into the river. In that year the water company obtained an abstraction licence and diverted the stream into Ennerdale Lake to maximise water supplies. Conservation work identified that the upper part of the river was becoming starved of coarse and fine sediment previously delivered by the stream. Consequently, much of the river bed had become very compacted and would not have been able to support pearl mussels. Therefore, a major project was initiated to divert Ben Gill back to the river on its old course. This was reconnected in 2014 and is already delivering large amounts of fresh rock and gravel into the upper part of the river; good patches of gravel are now being delivered further downstream and the environment for pearl mussels is very much improved. In some parts of the river water has been abstracted since 1949 to provide water to the town of Whitehaven. The weirs have undergone various changes since then and there have been large mortalities of pearl mussels related to the construction works. In 2012 the water company did some work with the sluices on the weir and water flow had reduced to 33ML/day (the lower limit of flow allowed) for a long period. The result was that the mussels suffered a 'stress event' where the low flow rate caused an increase in interstitial phosphorus levels, a proliferation of filamentous algae and an increase in smothering fine sedimentation. The mussels, some of which had been buried for 40 to 50 years, started digging themselves out of the substrate, the smaller ones being particularly vulnerable. This was indicated by the exposure of areas of yellow periostracum on parts of the shells that had previously been buried in well-oxygenated sediment for many years. This event contributed to an increase in the average age of the population. Subsequently the authorities proposed to revoke the abstraction licence, but due to overriding public interest (the supply of water) abstraction has been allowed to continue to a full revocation in 2022, by which time various supply changes can be made. This was a legal decision based on articles under the EU Habitats Directive. The water company couldn't prove that the integrity of the mussel population would be maintained and they were asked by DEFRA to come up with a package of compensatory measures to look after the pearl mussel population. These have included taking land out of agricultural use and funding relevant research. Increased water flow rates (to around 80ML/day) have resulted in a corresponding reduction in levels of algae. The detailed monitoring work has shown that the pearl mussel is a more complex and fragile animal than was realised in the past and functioning populations can only hope to be maintained by potentially very costly major catchment management schemes.

The UK's slug invasion – Ben Rowson

After a coffee break, Dr Ben Rowson (Senior Curator: Invertebrate Biodiversity (Terrestrial Mollusca), National Museum, Cardiff) gave a talk entitled 'The UK's slug invasion: is all quiet on the Eastern Front?' Following research and recording around the time of publication of the FSC slug guide (Rowson *et al.*, 2014) it was realised that there are even more slug species present in this country than were previously known. More recently the Alsatian semi-slug *Daudebardia rufa* was discovered in a wood in Caerphilly (Owen, Rowson & Wilkinson 2016). The species appears to be confined to two forestry compartments planted with trees imported from a particular place at a particular time. There is a perceived 'Eastern Front' regarding the invasion of the UK by introduced and/or spreading slug species, with more species being first recorded in the West of the UK; however, there is potential for recording more of these species in eastern counties.

SlugWatch, an initiative from the John Innes Centre, focuses on the monitoring of the spread of the invasive Spanish slug (*Arion vulgaris*). NBN records show that this species is now widespread across the UK and Northern Ireland. A lot of the earlier records have been imported over from what was called *Arion lusitanicus* which included at least two species, one of which is the green-soled or Durham slug, *Arion flagellus* which is widespread, particularly in the west, making some of the western records of *A. vulgaris* (e.g. in South Wales) suspect, whereas others are definitely genuine, for example those from Devon and Cornwall and the central lowland belt of Scotland. *A. vulgaris* tends to breed earlier

in the year than *Arion ater* or *Arion rufus*; the species is a little smaller than full-grown *A. rufus*, usually dark or 'sooty', often with a black rim around the respiratory pore and tends not to have a brightly contrasting foot fringe and usually has a dark sole. There is good evidence that *A. rufus* and *A. vulgaris* can to some extent hybridise with one another, however it is almost impossible to identify a hybrid because it wouldn't necessarily be in any way morphologically intermediate between the two parent species. Ben then explained the key features of the species identifiable by dissection, and that a further species (*A. sp.* 'Davies') is only discernible from pale-soled *A. vulgaris* by this method. This further species, highlighted through studies that Stella Davies performed in her garden in Croydon in the 1980s, appears also to have a different mating behaviour and has been found in other localities in eastern England.

In East Anglia there is also a very good chance of finding the northern dusky slug (*Arion fuscus*) and more occurrences of the Balkan threeband slug (*Ambigolimax nyctelius*). Ben mentioned further examples that are problematic including the shelled slugs, *Testacella scutulum* and *Testacella 'tenuipenis'* which can only be separated by dissection, although *Testacella haliotidea* is the more usually encountered species in the East. DNA analysis of *Testacella* has been problematic. Appearances of the ghost slug (*Selenochlamys ysbrida*) are also very sporadic in the UK. The peak number of sightings are in the autumn which Ben assumed corresponds to increased mobility of the species on damp soil surface and also the likelihood of people digging more deeply in their gardens. A record of 53 individuals of this species were found in one day in the secondary woodland of an abandoned colliery site in southeast Wales. There have been more than 100 records of this species in 2017, many from Wales and the southwest, but there were records from elsewhere, including Welwyn Garden City, Herts. and Sheffield, so the species appears to be spreading although this expanding distribution may not necessarily be indicative of changes in climate. There are clearly other slug species in East Anglia that are probably under recorded and worth looking out for.

figure 5: Specimen of the sun shell, *Astraea heliotropium* (Martyn, 1784) brought back from New Zealand by HMS Resolution, Captain Cook's ship on his 1773 voyage. Shown to meeting attendees during a tour of the new Cambridge collections store.

The tragic tale of Captain Cook's *Partula* – Justin Gerlach

Dr Justin Gerlach (Affiliated Researcher, UMCZ) then followed with a talk on 'the tragic tale of Captain Cook's *Partula*'. *Partula* tree snails exhibit an extraordinary radiation of species across the Pacific, the great focus of attention has always been the Society Islands with a large number of species compared to the remainder of the Pacific. Within the Society Islands there is quite a wide variation in the number of species per island, from Bora- Bora with one to Raiatea with 23 (Justin's recent revision reduced the number of species to this number from 34 (Gerlach, 2016)). *Partula* snails were of interest mainly because of Henry Crampton's work in the early 1900s on the species of Tahiti (Crampton, 1916) and Moorea (Crampton, 1932). This uncompleted work inspired the geneticists Bryan Clarke and Jim Murray and later Mike Johnson to work mainly on the species of Moorea, establishing genetic research populations and working on them until 1987. The whole story became the now familiar tragic one following the introduction of the carnivorous *Euglandina rosea* in 1974 which wiped out the vast majority all the *Partula* species in the space of twenty years. From then on the whole *Partula* story became one of conservation. Some species survive through captive breeding (London Zoo being the main breeding centre).

figure 6: The now extinct *Partula faba* from Raiatea (height 25.5 – 26.4 mm). Specimens from an old collection (ex Janet Crowley).

The first record of *Partula* is from 1768, collected on Captain Cook's first voyage to the Pacific on HMS Endeavour. This was the transit of Venus expedition, the very first international scientific collaboration, so *Partula* snails were right at the beginning of modern science. Joseph Banks was naturalist on this voyage (the first dedicated naturalist on a British vessel), but did not do much collecting himself, concentrating on studying the customs, food and language of the Polynesians. Most of the collecting was carried out by Daniel Solander (Carl Linnaeus' adopted son). The very first record of *Partula*, *Limax* (now *Partula*) *faba*, was illustrated by Thomas Martyn in the *Universal Conchologist* (1789). Martyn obtained his material from the expedition and bought a lot of the material collected by Solander, so we can be fairly certain that this was one of Solander's shells. Justin said that he had spent a long time trying to find this specimen (which has a distinctive shaped aperture) but had been unable to discover its whereabouts. A more typical specimen from Solander's collection is illustrated in the 1795 volume of Chemnitz' *Neues systematisches Conchylien-Cabinet* and the specimen exists in Copenhagen.

Justin's involvement with *Partula* began in the early 1990's, with a doctoral thesis on *Euglandina* and he was on Raiatea in 1992 and found that in most valleys *Euglandina* had wiped out the entire *Partula* population, perhaps missing the

last survivors by only a couple of days. He managed to collect the last 80 wild surviving *Partula faba* (figure 6) from places where *Euglandina* had not yet arrived, and these went to London Zoo (to join a small number that had been collected the previous year). These were kept going until the beginning of 2016; but tragically the last one died in Edinburgh Zoo on 21st February. Keeping *Partula* in captivity is often an experience of trying to control 'boom and bust' populations, juveniles being especially vulnerable to changes in humidity and bacterial infection despite the adults being long lived (c. 14 years).

Justin had moved away from *Partula* research but came back in 2013, partly after a student doing an MSc. project on rates of *Partula* extinction asked a question about his thesis. Justin couldn't remember the answer and had to go back and reread his theses. This brought up questions in his mind; he had also not finished a taxonomic revision of the Raiatean species. In order to sort out the species on Raiatea they needed to be put in the context of the Society Islands as a whole so he decided to include all *Partula* species in the revision. To work with there are many thousands of shells from early collections; plus, in Philadelphia there are 250,000 shells collected by Crampton as well as bodies that he preserved in formalin on which Justin could carry out anatomical dissections and gut content assessments. Following publication of the revision, in 2017 he went back to Polynesia for the first time in 25 years to see what still survived. Across the separate islands, he knew there were reports of some relic populations on Tahiti, a few on Morea, a rumour of a species surviving on Huahine and probably nothing on Bora-Bora. Raiatea was the most interesting island with a species possibly surviving at the top. The current wild status is that there are four species still surviving on Tahiti but Justin couldn't get to the localities to confirm this as they are in extremely difficult terrain which erosion has made increasingly dangerous. Morea has two surviving species. He confirmed that *Samoana annectens* still survives on Huahine but could not get to the locality on Raiatea and the others are extinct.

Partula species are being reintroduced. 1500 *Partula* (mostly *P. nodosa*, the most abundant captive species and also *P. affinis*) had been put out in the wild on Tahiti a couple of weeks before Justin's talk. There are reintroductions happening on Morea where a wild born subadult *Partula tohiveana* was refound in August 2017 after release of marked individuals in 2016. The main problem is with finding snails in a forest with 30−40 m high trees a year or so after releasing them, however some are being found. The good thing was that the ground wasn't completely littered with shells, so presumably they are still alive. However similar work on Raiatea has completely failed due to a new problem, the New Guinea flatworm (*Platydemus manokwari)* which was found first on Tahiti in 2006 and is very common on Raiatea. When the *Partulas* were released there in 2016 they were all dead by the next day. When the shells were picked up there were flatworms coming out of them. *P. manokwari* eats earthworms as well as snails and has been spreading in Malaysia and the Philippines; it has been found in Florida and there was a record from a greenhouse in France. It won't survive the northern European winter but it will survive in the Mediterranean. For *Partula* the flatworm may actually be a solution because *P. manokwari* eats *Euglandina*, but it could also be the final 'nail in the coffin'. Although *P. manokwari* climbs trees like *Partula* and *Euglandina*, it may be seasonally limited because it does not survive dry conditions. There is a suggestion on Guam that the flatworm might be quite good for some of the *Partula* species, but *Partula gibba* that lives low down is in a really bad state but some of the other species that live high up in the trees are actually thriving.

William Benson's snail collection – Richard Preece

The final talk of the day was by Richard Preece (Curator of Malacology, UMCZ) and entitled 'William Benson's collection of snails from India: a jewel in the Museum's crown'. The bulk of the mollusc collection in UMCZ was amassed by Robert McAndrew, who bequeathed it, along with a valuable library, to the University in 1873. He was a wealthy shipowner, a keen exponent of dredging and friend of Edward Forbes with whom he formed a 'dredging committee' in the British Association. They awarded themselves an annual bursary to carry out ever deeper dredging expeditions. He wanted to know how deep in the oceans life extended. The MacAndrew Collection, which contains over 2,000 genera and nearly 16,000 species, was assembled from a variety of sources. McAndrew was keen to keep growth series of shells which he stuck on characteristic blue card. The localities given are sometimes rather vague but he was keen to collect in the North Atlantic, Mediterranean and in particular in the Gulf of Suez (prior to the cutting of the Suez Canal, giving an important 'baseline' of species). With his wealth he was able to also purchase other important collections that became available, including the Jane Saul collection (shells from which were illustrated in the Reeve/Sowerby *Conchologia iconica* (1843−78)). Another collection that McAndrew acquired shortly before his death was that of William Benson, who was born in 1803. Benson was admitted to East India College and so destined to spend his entire career with the East India Company. He arrived in India within six months of graduation in 1821 and began publishing scientific work, mostly on molluscs in 1829. He spent 26 years travelling in India as a magistrate and judge, dispensing justice and collecting snails! He subsequently contracted polio and was quite severely disabled, returning to the UK in 1847, visiting spa towns for therapy and he died in 1870.

Benson was a pioneer of Indian malacology and a network of naturalists supplied him with specimens. He worked in conjunction with Haversham Godwin Austen to publish the first of three volumes on land snails in the *Fauna of British India* series. Godwin Austen was a passionate devotee of land snails and former president of the Conchological Society who mapped the Karakoram glaciers and fixed the height and position of K2 (the second highest mountain in the world, originally called mount Godwin Austen) for the first time. Another researcher very much involved with the fauna of British India was the Dutchman G.K. Gude, who worked in what was then the British Museum (Natural History) in London, and the author of the two further volumes on land snails in the *Fauna of British India* series (1914 and 1921). Much of Benson's collection ended up in the Cambridge Museum with further material in London and probably India. Richard's predecessor at the Cambridge Museum, Martin Bishop, started the process of trying to identify species that Benson described and potential type specimens. Fred Naggs and Dinarzarde Raheem at the Natural History Museum, London, encouraged Richard to look into this question further.

Compiling a list of species described by someone can be done by searching *Index Animalium* (a compendium of zoological taxonomic species nomenclature from 1758 to 1850, available online at http://www.sil.si.edu/Digital Collections/indexanimalium/). For molluscs the *Index to the species of Mollusca introduced from 1850-1870* by Florence Ruhoff (1980, Smithsonian) can be consulted. From these sources it can be seen that Benson introduced the names of 460 taxa. Richard and colleagues have been able to trace around 85% of this taxa in Cambridge and 15% in London. Most of the taxa are from 'British India', which also included Afghanistan, Pakistan, Nepal etc, but Benson also collected 'en route' to India: from far flung places such as St. Helena, Cape Verde Islands and Mauritius. Benson had a network of contacts and species that he described from China were collected during the first opium war; he also had contacts who worked in the penal colony on the Andaman Islands who collected material there. The problem with Benson's descriptions are that they are brief, in Latin and have no illustrations, so an aim of the project was to provide some high-quality images.

Prior to the McAndrew collection's arrival in Cambridge it went through the hands of Sylvanus Hanley. He thought that the locality labels were not important and cluttered up the collection's arrangement and therefore discarded much vital information. A lot of localities were degraded to 'Ind.' for India. McAndrew himself caused damage by gluing many specimens on his characteristic cards and some have been attacked by fungus. An evaluation was therefore carried out of the status of the collection; for example: 'does the specimen match the original description', 'is the condition of the specimen consistent with what is described in the literature', 'does the specimen come from the type locality' and 'is it unequivocally part of the Benson collection'? In an ideal world Richard would have liked to see an original label in Benson's handwriting stating that it is a type specimen but this is a rare occurrence. Shells that are clearly type specimens were found although they are completely unlabelled. Richard showed an example of a feather quill that was used as a specimen tube while in the field, on which is written '*Carychium'* followed by the locality 'Taj Agra' that may be part of the type series of *Carychium boysianum* Benson 1864b (see figure 7 in Naggs, 1997). Richard explained that locality data cannot always be believed even when it is present; an example of 'muddled labels' occurring in Benson's lifetime being some Cyclophorid snails labelled as from the Swan river in Western Australia where this family does not occur. Further problems occur with specimens that have been mis-identified as types by previous curators.

Some of the species in the Benson collection are special because they are either critically endangered or totally extinct. An example Richard gave from Mauritius, where Benson found forest species in habitat which no longer exists, is a snail from the family Cerastidae, *Rhachistia sanguineus*, which is now extinct. A genus of Vertiginid landsnails from Japan/Indonesia called Bensonella are named after Benson. These very small snails have many denticles in a protruding aperture as a defence against predators (Wada and Chiba, 2013 and in Cameron, 2016). Benson also collected the giant African land snail *Lissachatina fulica* on Mauritius. He was very excited by this and took two specimens with him back to India. Just before he left India in 1847 he turned them out in a botanical garden. This species is a major pest throughout Asia and recent genetic work points to the Indian ocean as their origin (Fontanilla et al., 2014). Therefore the exact timing and location of the introduction and its consequences are known. Benson himself was later very excited that these snails had become established, without realising that they would be such a disastrous horticultural pest. The plan with the project in which Richard is involved is to eventually produce an illustrated catalogue of the species described by Benson.

The meeting concluded with a tour of the new lab and collections store and a viewing of some of the important specimens in the collection. Some photos of the tour and specimens are shown in figures 4,5,7 and 8. Many thanks are expressed to the organisers of the meeting and to all who gave this very interesting series of talks.

figure 7: Richard Preece with attendees in the CUMZ collections store.

figure 8: Barnacle preparations by Charles Darwin in the CUMZ collections.

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Preparing *Carychium* for identification

Adrian T. Sumner

The herald snails, genus *Carychium*, are among our smallest snails, growing to no more than about 2 mm in shell height; they are, however, conspicuous as they are white and stand out clearly from the leaf litter or other vegetation in which they are found. In places they can be quite numerous; a small bag of leaf litter from a favourable habitat may yield hundreds of specimens. Formerly there was believed to be only one species of *Carychium* in Britain, but as Watson & Verdcourt (1953) showed, there are actually two: *C. minimum* and *C. tridentatum*. There are various differences between the two species, most of them rather subtle, and there is some degree of overlap. *C. tridentatum* is taller and slimmer than *C. minimum*, and on average has slightly more whorls. The shell sculpture tends to be more prominent in *C. tridentatum*, while the shell aperture is slightly smaller than in *C. minimum*. In addition, *C. minimum* prefers damper habitats than those where *C. tridentatum* is usually found, though both species do occur together. Although these differences may be useful when dealing with a population of shells, they are not entirely clear-cut. However, there is one character that that enables one to distinguish between these species without any uncertainty. This is the parietal fold inside the last whorl of the shell, which forms a smooth curve in *C. minimum*, but which has a double flexure in *C. tridentatum* (figure 1). Unfortunately, this feature cannot usually be seen without breaking open the shell, although in really fresh shells that retain some transparency the parietal fold can actually be seen through the shell. In my experience, however, most shells are too opaque for internal details to be visible. Note that this difference in the parietal fold is only seen properly in mature shells with a fully developed lip and teeth in the aperture.

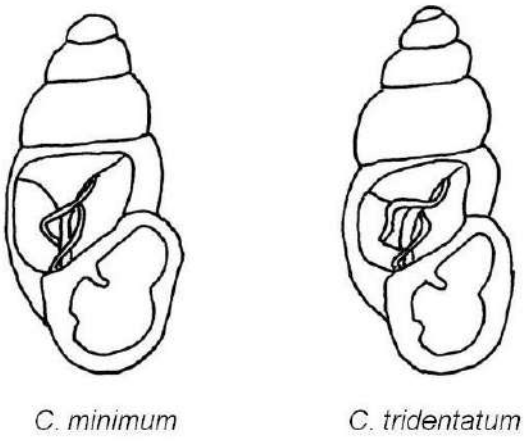

figure 1: Cut-away views of the shells of *Carychium minimum* and *C. tridentatum* to show the parietal folds. Redrawn from Watson & Verdcourt (1953).

Opening a minute shell to show its internal structure is fraught with difficulties, not least the problem of holding the shell securely while trying to make a neat hole in it.

The method to be described is one I have developed over the years, and while it could no doubt be improved, it works in most cases. The following are required: a substrate to mount the shells on; a medium to attach the shells to the substrate with; fine forceps; a fine dissecting instrument; a binocular microscope; and a lamp to illuminate the specimen. Apart from the microscope, all the materials should be readily available at a modest cost. Except where specified otherwise below, the necessary materials and equipment can be obtained from suppliers such as Watkins & Doncaster (www.watdon.co.uk) and NHBS (www.nhbs.com).

The substrate. My initial experiments used microscope slides, but now I use black rubber matting, which can be obtained from any hardware or DIY shop. One side of the mat needs to be flat. Among other things, it provides a dark background against which the details of the shell show up better.

The mounting medium. When I was experimenting with microscope slides, I also experimented with microscopical mountants. These seemed to have the disadvantage of drying rather slowly, so that the specimen was not ready for dissection for some considerable time. Nowadays I use the widely available glue Copydex. This has a cream colour when fluid, but dries almost transparent.

Forceps. A pair of fine round-ended forceps seems best for handling very small shells. Mine have a very light touch and are ideal for the purpose. Pointed forceps do not seem satisfactory.

Dissecting instrument. I use an old (but previously unused!) hypodermic needle, which combines stiffness with a sharp cutting edge. Such an item will not be generally available, but a mounted dissecting needle should suffice.

Binocular microscope. This is the one relatively big item required, both to open up the shell, and to observe the detail of the parietal fold. A magnification of at least 20× is needed.

Lamp. A small, powerful lamp that can be directed on the specimen at a variety of angles is essential. There are some good LED lamps available, with flexible stems. I also have a tungsten-halogen lamp, which, however, produces quite a lot of heat.

The procedure is as follows:

1. Cut out a piece of the black rubber mat about 3" × 1" (75 × 25 mm). The size is not critical, but this is the same size as a microscope slide, and is convenient to handle. Turn it with the flat side uppermost, and place it under the microscope. The mat I use has small squares on it, ½" or 12.5mm across, delimited by raised lines (figure 2); this is very useful, but not essential.

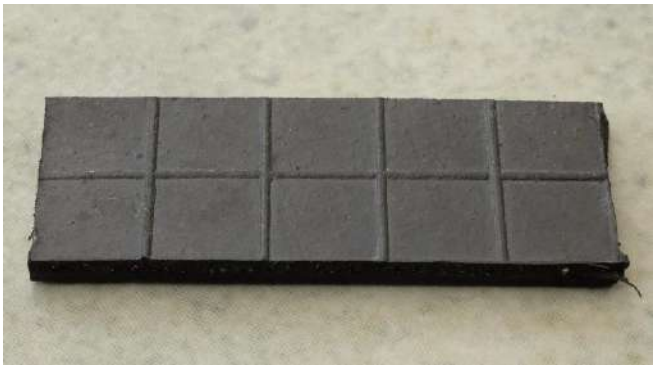

figure 2: A piece of rubber mat, showing the square compartments.

figure 3: *Carychium* shells placed on the piece of rubber mat.

2. Get your shells ready, making sure they are not in a place where they might be knocked on the floor and lost. Take a few and place them on the piece of rubber mat (figure 3).

3. Place a drop of Copydex on the rubber mat (to the left of the shells if you are right-handed, and to the right if you are left-handed). The thickness of the drop should be such that it does not quite cover the shells when they are placed in it; if you use too little Copydex, the shells will not be held firmly enough (figure 4). Getting it right is a matter of practice.

figure 4: *Carychium* shells placed on the piece of rubber mat next to a drop of Copydex.

4. Very carefully pick up a shell with the forceps, making sure the aperture faces directly upwards. Place the shell in the Copydex, making sure it is largely below the surface, but that the uppermost parts of the shell are still clear of the adhesive. Wipe the forceps with your fingers or a rag (not a tissue or paper towel), and repeat the procedure. After a time, when you have placed perhaps 6 to 10 shells in position, you will find that the surface of the adhesive is beginning to dry, and that the forceps pull a string of it away when you withdraw them. At this stage place another drop of Copydex on the piece of rubber mat, and continue.

5. When you have placed enough shells in the Copydex on the piece of rubber mat, put it aside to dry overnight. Leave space to add a label, which can also be attached with Copydex. Do not use heat to dry the Copydex, as this may result in a crust below which the Copydex does not set adequately. The next day the individual shells will be visible, held in place by the Copydex, which is now nearly transparent (figure 5).

figure 5: *Carychium* shells mounted in dry Copydex.

6. At this stage it is often possible to see the interior of the more transparent shells, without any further treatment. Using a magnification of at least 20×, adjust the angle of the lighting so that detail shows up best. If a thin layer of the dry Copydex covers the shell, this is all to the good, as it greatly reduces reflections and refraction caused by the surface sculpture of the shell (figure 6).

figure 6. A shell of *C. tridentatum* in which the parietal fold is visible through the shell, which is here covered with a thin layer of Copydex.

7. Most shells have to be opened up to reveal the internal detail. If you think the procedure so far has been quite fiddly, now comes the really delicate part of the procedure. Take your piece of rubber mat with the shells mounted on it, and place it under the microscope (minimum magnification 20×), and centre a particular shell in the field of view.

8. While holding the piece of rubber mat firmly, take your dissecting instrument and scrape away at the final whorl of the shell, above the aperture. Do not attempt to stab at the shell, or lever parts of it away, as this will almost certainly destroy the shell. Note that the Copydex does not dry solid, so there will be some give in the shell as you attack it. It may take some time before you have scraped a hole in the shell – just be patient!

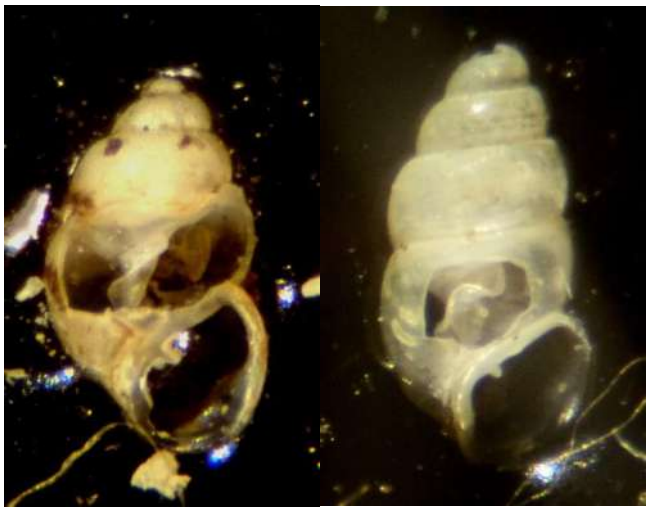

figure 7: Shells of *C. minimum* (left) and *C. tridentatum* (right) opened up to show the parietal fold.

Continuing in the same way, without stabbing or levering the shell, enlarge the hole until it is big enough to see the whole of the parietal fold. You should now be able to identify which species of *Carychium* you have (figure 7). Continue with the rest of the shells you have mounted – remember that you might have a mixed population.

Two words of warning. Unless you are more skilled at the opening up of these minute shells than I am (which you are quite likely to be!), a proportion of the shells will be too damaged to identify. Remember also that it is easy to damage the parietal fold, with the result that the fold in a shell that is really *C. tridentatum* looks as if it might be from *C. minimum*.

Finally, if you are going to keep your specimens for reference – always a good idea if you have space – note that the dried Copydex tends to attract dust, and may have a sticky feel. It is probably best to keep each piece of rubber mat bearing the shells in a small polythene bag.

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Snail Poem – the Saga Continues…

Clive Craik

The snail depicted on the sign in Kent seems to have a sinistral shell (see article and picture by Colin Mcleod, *Mollusc World* **45**:10-11, November 2017). Perhaps another case of accidental image reversal, coincidentally described on pages 8-9 of the same issue? The snail in the sign mentioned by Colin, at Blair Castle, Perthshire, seems to have a normal, dextrally-coiled shell (*Mollusc World* **40**:29, March 2016).

At several beauty spots near Oban in west Scotland, notices display a similar picture and the same four-line verse by 'H. T.' These Argyll snails also have normal shells. Well-made and long-lasting, the notices appeared about 20 years ago

At one of the sites, other poets have been developing the subject...

Here is that original verse:

RESEMBLE NOT the slimy snails
Who with their filth record their trails.
Let it be said where you have been
You leave the face of Nature clean.

Someone, who shall be nameless, has added:

DO NOT MALIGN the humble snail.
Gentle rain removes her trail.
Human beings aren't as clever.
Plastic rubbish lasts for ever.

Under this, someone called 'Helix' has written in mucus, slowly but clearly:

You may be BIG but you're not BRIGHT.
Homo 'SAPIENS'?? Not quite right!
You'll all be gone in a nuclear war,
And WE will rule the world once more!

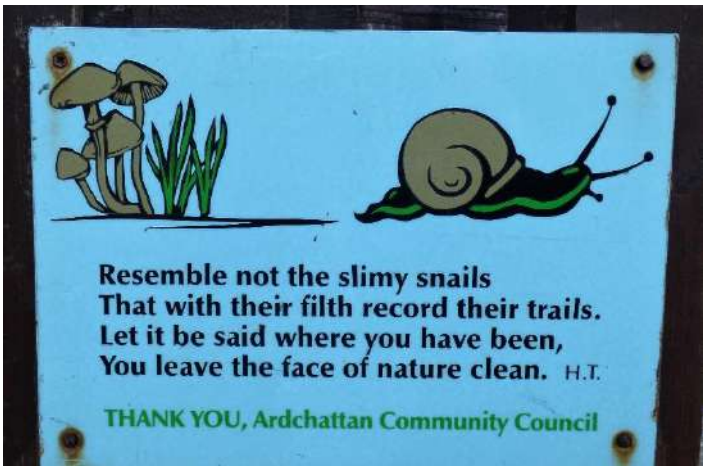
Then 'Arthropod' has added:

You, Snail, and your slimy kind
To sodden places are confined.
We insects run, swim, climb and fly
In regions hot, cold, wet or dry.
If humans vanish, insects rule
(As every larva learns at school).

Finally, in a crisp military style, 'Formica' has written:

You lower forms of insect life -
You may survive the nuclear strife.
But then, post-war, we'll win the day
With our soldier castes and acid spray.
One truth above all others know:
ANTS will rule when humans go!

That appears to be the last word in this improbable ode to zoological one-upmanship, but who can be sure.....?



Mollusca from a field meeting at Llangorse Lake, Brecon Beacons National Park

Ben Rowson and Hannah Shaw

figure 1: Llangorse Lake, with the Brecon Beacons in the background (Photo: Ben Rowson).

This report concerns a joint PondNet and Conchological Society one-day non-marine field meeting held at Llangorse Lake on 8th Sep 2017. The meeting was an opportunity to share skills in fieldcraft and identification and to revisit some old records. This was organised by Hannah as part of the Freshwater Habitats Trust's Heritage Lottery Funded PondNet project, which has been funding a series of freshwater-related identification training courses in Wales since 2015, and Ben from the National Museum of Wales (NMW) was on hand to assist with the identification expertise. The purpose of the meeting was to engage with interested persons in the locality, provide identification training in wetland molluscs, and enthuse a new audience about how wonderful molluscs are. The attendees included Conchological Society members and guests from the Brecon Beacons National Park Authority (BBNPA) and Llangorse Lake Action Group who were all very keen to learn more about the biological interest of the lake. Most were first-time mollusc hunters.

Llangorse Lake (Llyn Syfaddan, or Breconmere) is the largest natural lake in south Wales and lies at around 155 m above sea level on the Old Red Sandstone of the Brecon Beacons National Park. Formed by retreating glaciers around 10,000 years ago, it is a shallow (c. 7 m deep), naturally eutrophic lake with a rich aquatic plant flora for which it is designated a SAC and SSSI (Duigan et al., 1999). It is also notable for being the site of a crannóg, an artificially-enlarged island on which stood wooden buildings attributed to the 9th century king of Brycheiniog - the only such structure in England or Wales (Redknap & Lane, 1999). Today, Llangorse Lake is a popular boating, angling and tourist destination with a campsite, cafe and sailing club, and a thatched interpretation building.

Thanks to the ecological, paleoenvironmental and archaeological interest, mollusc species of the lake and surrounding area are relatively well-recorded and have played a part in reconstructing its history. Sediment cores reveal at least eight aquatic gastropods and seven bivalves had colonised by 8,000 years ago, in the early post-glacial (Walker et al., 1993). By 1954 and 1983 when the SSSI citations were made, at least 15 aquatic gastropods were recorded, as were the duck mussel *Anodonta anatina*, swan mussel *A. cygnea*, and painters' mussel *Unio pictorum* (Duigan et al., 1999). By August 2017, data from the Society's recording scheme and the NBN Atlas included records of at least 25 aquatic gastropods and 14 bivalves.

With this information in hand, and also a list of the 36 terrestrial species in the area, we could see how many could be re-found and whether any new records were added during our short day visit. Llangorse Lake Action Group and Sailing Club very kindly provided the use of a small rowing boat which allowed us to collect molluscs from the lake bed, and in particular to use Ben's homemade metal mussel dredge (figure 1). Natural Resources Wales and the BBNPA gave us permission to take a small number of specimens where necessary for identification purposes. On such a calm day, live mussels and snails were beautifully easy to observe in the clear water. To reach the deeper parts, we used Ben's dredge which hauled up several species including a live *U. pictorum* (Figure 2). Live *A. anatina* were abundant, but no *A. cygnea* were encountered, although the sailing members informed us that there are large mussel beds in some areas where people can cut their feet on the broken shells. Two of us unable to fit in the boat had longer to investigate the margins of the north shore, disturbed only by the occasional splash of a pike (or other lake beast). Including some sieve-on-stick samples from the reedy margins of the Afon Llynfi stream, via which the lake drains towards the River Wye, we found a total of 14 aquatic gastropod species and six bivalves. These included the Lake Orb Mussel *Musculium lacustre*, which somewhat surprisingly appeared to be the first record for the lake and the 10 km square.

Figure 2. Live *Unio pictorum* from the dredge.
(Photo: Hannah Shaw)

Collecting on land was hampered by showers that drove us into the alder woodland on Llangorse Common. Here we found a few disturbance-tolerant species including the girdled gnail *Hygromia cinctella*, tawny soil slug *Arion owenii*, green-soled slug *Arion flagellus* and worm slug *Boettgerilla pallens*. These were all new Llangorse records for species spreading in the UK, some only recently recorded nearby by Imogen Cavadino during her Natural Talent traineeship with NMW (2016-2017). We also got a new record – courtesy of a first-time snailer – of the hairy snail *Trochulus hispidus*. When the rain eased, it became (just) dry enough to use the suction sampler (e.g. see *MW* **44**: 28-29) on the rough, frequently flooded grassland of the Common where a few smaller species were retrieved, although not the marsh whorl snail *Vertigo antivertigo*, first recorded in 2005. This brought the day's total to 42 species, seven of which were new records for Llangorse.

Good days out always end too soon, and we clearly did not spend long enough to find every species at this rich, well-studied site. One old record remains especially tantalising: the shining ram's-horn *Segmentina nitida*, recorded by S. P. Dance near the landing stage on 10 July 1969. This is a UK BAP Priority Species widely thought to be extinct in Wales (e.g. Kerney's 1999 *Atlas* gives no post-1965 records). The Dance material at the National Museum of Wales appears to include no *Segmentina* from Llangorse or the canal at nearby Talybont, where he recorded *S. nitida* on the same day. But the Talybont shells do include the flat ram's-horn *Hippeutis complanata* – surely the species most similar to *S. nitida* – which we found to be common at Llangorse. However, this may not be enough to rule out the presence of *S. nitida*, since apparently favourable drainage ditches occur on the Llangasty shore of the lake. Unfortunately, these were out of bounds on the day of the meeting as cattle were present and time was short – perhaps the ditch molluscs could be the focus of a field meeting next year. It would be perilous to assume that Llangorse Lake has given up all its mysteries.

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Field meeting to Sweeney Fen SSSI and Trefonen Marshes SSSI, Shropshire, August 12th 2017.

Mags Cousins

Sweeney Fen SSSI was selected for a field meeting in an attempt to re-find the rare *Vertigo lilljeborgi* (Lilljeborg's whorl snail), which was recorded here in 1992 by Robert Cameron, but with no records since despite repeat visits and searches by other surveyors. This species has a boreo-arctic distribution, occurring in habitats subject to natural flooding/saturation but with a tolerance to a range of acidity. There is an alkaline seepage at Sweeney Fen and a stream running through the site but it is not known precisely where the snail was found in 1992. Trefonen Marshes SSSI is nearby with a more extensive area of tufa forming alkaline flush and thought to also be a potential candidate, although it was searched in 1992 and no *V. lilljeborgi* was found then. Both sites lie in an area of Carboniferous Limestone south-west of Oswestry.

Mags Cousins and Rosemary Hill of the Conchological Society and five local naturalists attended on 12th August 2017, spending 2.5hours at each site. Surveying was by a combination of hand searching, beating vegetation into a tray and sieving litter, with a bag of litter taken from each site for later examination by Rosemary. Mags Cousins returned on 6th October 2017 with a suction sampler and spent a further 1.5h at each site, collecting more litter and also netting the streams.

Sweeney Fen SSSI

The area of Sweeney Fen (figure 1) targeted first was a relatively open area of flush on the north-east side, where the path passed through, with abundant Carnation sedge, Glaucous sedge, occasional Marsh Valerian and Marsh Helleborine and the bryophyte *Calliergonella cuspidata*. The soil was saturated, with a soil water pH7.19 and conductivity of 686µs and 341ppm with visible calcareous deposits. This vegetation type graded into Marsh Cinquefoil mire towards the wood and into taller Sharp-flowered Rush mire towards the more central part of the site. The following mollusc species were found here; *Galba truncatula* (dwarf pond snail), *Nesovitrea hammonis* (rayed glass snail), *Oxyloma elegans* (Pfeiffer's amber snail), *Potamopyrgus antipodarum* (spire snail) and large numbers of *Pisidium nitidum* and occasional *P. subtruncatum*, *P.castertanum* and *P.milium* (pea clams). These are all common but obligate wetland species.

figure 1: Sweeney Fen SSSI, alkaline fen at SJ2753525046.

The woodland edge and tall herb fen were also searched which yielded *Ashfordia granulata* (silky snail) (figure 3) and *Zenobiella subrufescens* (brown snail), which have a more restricted distribution.

figure 2: The group at Sweeney Fen SSSI examining snails found in the stream and tall herb fen.

Only 12 species were found during the August 2017 visit (figure 2) and none in the genus *Vertigo*, but *V. antivertigo* (marsh whorl snail) was found on the second visit in October and the list of taxa increased to 19 species, using suction sampling, taking more litter samples and netting the stream. Not all species were found alive, and since the encrusting calcium deposits could act to preserve the shells for a considerable period of time some specimens could have been quite ancient subfossils.

Robert Cameron found 22 species including *Vertigo antivertigo, V. pygmaea* (common whorl snail) and *V. lilljeborgi*. It is not known how different the habitat or management were 25years ago, or whether the slight reduction in species richness reflects environmental changes or is simply an artefact of sampling. *V. lilljeborgi* would have been extremely vulnerable to hydrological changes, artificial or otherwise at this small isolated site but only repeated sampling can determine with any certainty the continued presence of the species here.

figure 3: *Ashfordia granulata* (silky snail) showing the hairy periostracum.

Trefonen Marshes SSSI
This is a larger SSSI and the main area targeted was the alkaline flush (figure 3).

figure 4: Trefonen Marshes SSSI, alkaline flush NVC community M10 *Carex dioica-Pinguicula vulgaris* mire, SJ2459626530, with stream running through the woodland in the background.

The flush (figures 4 and 5) was hand searched and litter sieved on site with 21 taxa found in August and an additional four species added to the list on the return visit in October with the use of the suction sampler and with more litter being taken for later examination back at the lab.

figure 5: Hand searching the alkaline flush at Trefonen Marshes SSSI, Aug. 2017, Grass of Parnassus flower in the foreground and below.

figure 6: *C*ommon Butterwort with tufa deposits where *Vertigo antivertigo*, *V. pygmaea* and *V. substriata* (striated whorl snail) were recorded, SJ2461226530, Trefonen Marshes SSSI, Oct. 2017. Three species of Vertigo were found in the flush by sieving the tufa rich sediment in wet cattle hoofprints; *V. antivertigo*, *V. pygmaea* and *V. substriata* (striated whorl snail). *Euconulus* cf *alderi* *Oxyloma elegans* and *Vitrea crystallina* (crystal snail) were discovered by hand searching the sedge litter.

The group also entered the wood along the stream in the hope of re-finding *Leiostyla anglica* (English chrysalis snail), a species restricted to damp places and ancient woodland in the west. However, it was not found and the majority of the woodland in this area was heavily poached and disturbed. Several other species were present in the alder wood including *Balea sarsii* (a tree snail), *Cochlicopa* cf *lubrica* (slippery moss snail), *Aegopinella nitidula* (smooth glass snail), *Discus rotundatus* (radiated snail) and *Trochulus hispidus* (hairy snail).

Robert Cameron (1992) found 33 species at Trefonen Marshes compared to our 25 in 2017. Again, it is not known how much this change reflects environmental factors or the vagaries of one off invertebrate surveying. The fen at Trefonen is currently cattle grazed in an environmental scheme that restricts the intensity of use and application of fertilisers but surrounding land continues to receive agricultural inputs and this is likely to be affecting the shallow surface groundwater that issues along the spring line at this site. Also, atmospheric levels of ammonia are elevated in north Shropshire which could be affecting both Trefonen Marshes and Sweeney Fen SSSIs flora and fauna. The latter site is also in sympathetic management by Shropshire Wildlife Trust and is managed by a combination of rotational cutting and raking and periodic grazing. Although achieving grazing is difficult on this small site it is likely to be highly beneficial for maintaining the rich flora and fauna.

All 2017 mollusc records were submitted to the national recording scheme held by the Conchological Society of Great Britain and Ireland and to the Shropshire Ecological Data Network.

Acknowledgements
Thanks go to local landowners and to the Shropshire Wildlife Trust for access to the land for the purposes of survey.

Reference
Cameron, R.A.D. (1992) A survey of six marshes in Shropshire for land molluscs. *JNCC Report No. 130*

A conference about African molluscs

Ben Rowson

Conchological Society members were well-represented at a recent symposium in The Hague, the Netherlands. Organised by our sister society, the Nederlandse Malacologische Vereniging (NMV) (figure 3). The symposium was held to honour Dr. A. C. 'Dolf' van Bruggen (1929−2016), a member of Conch. Soc. for over 50 years and NMV for almost 70 (figure 1). Dolf was an immensely prolific author on African non-marine molluscs (see Breure et al. 2009; 2016), whom most of the speakers had worked or corresponded extensively with during his time at the Naturalis Biodiversity Center in Leiden (figure 2). A lively programme updated the 60-strong audience on recent studies and gave an opportunity to acknowledge Dolf's encouragement and legacy.

The late Dolf van Bruggen at an NMV meeting, 18/4/2009. (Photo: A.S.H. Breure)

Edi Gittenberger (Leiden) began with a photo of a young van Bruggen adopting the 'snailer's salaam' position in the Texel dunes, fieldwork that led to Dolf's first molluscan publication in 1950. Peter Tattersfield (Derbyshire) then presented results of a malacological survey in KwaZulu-Natal, South Africa with Mary Seddon and Dai Herbert in 1998. Particularly intriguing were the faunal differences between the two elevational transects the team undertook. Jon Ablett (London) gave a biography of Arthur Morelet (1809-1892), who never travelled to tropical Africa but nonetheless described many new snails from its coasts and islands, just as the interior was first becoming known to Europeans. Ben Rowson (Cardiff) detailed another 1997 expedition by Seddon, Tattersfield, and Charles Lange (Nairobi) to the remote 'sky island' forests above the northern desert of Kenya. The mountains are home to many endemic Streptaxidae, a favourite family of Dolf's.

figure 2: Three Achatinidae from Chimaliro Hill, Malawi, photographed by Dolf's collaborator Hazel Meredith (see *J. Conch.* **41**: 785-787). Clockwise from top: *Achatina zanzibarica*; *A. fulica*; *A. nyikaensis*.

After a chance to explore the venue, Muzee Scheveningen (a gem of a museum with exhibits on fishing history, and marine biology including shells), Dai Herbert (South Africa) charted the wildly differing histories of African mollusc faunas. The freshwater fauna is better-studied due to its role in human and animal disease (schistosomiasis), while frontiers remain in Africa's offshore and terrestrial faunas. Ton de Winter (Leiden) explained how careful conchological observations may have far-reaching results, as shown in *Punctum* and its lookalikes across the continent. Mary Seddon (Okehampton) outlined developments to the IUCN's Red List, and how molluscs, despite huge advances including a review of the African freshwater fauna, remain under-assessed compared to better-studied taxa. Edi Gittenberger then broadened the subject to ornamentation and coiling in land-snails, and the thought-provoking concept of 'prime' species (where one species has a far wider range than its congeners). Dolf's widow and snailing companion, Wenda van Bruggen, closed the meeting with a vote of thanks, followed by local beers and a dinner by the North Sea.

Despite the huge scale of African malacology as a subject, this was a rare public discussion dedicated to it; certainly the first in Europe in many years. It is hard to think of a more suitable memorial to Dolf, and one that he would surely have enjoyed.

Particular thanks are due to the NMV's Hannco Bakker, Sylvia van Leeuwen, and Aart Dekker; and to Wenda and Naturalis for their support of the meeting.

References

Breure, A. S. H., Gittenberger, E., Maassen, W. J. M., & de Winter, A. J. 2009. In and out of Africa: Dr. A. C. van Bruggen, keen educator and eminent biologist. *Zoologische Mededelingen Leiden* **83**: 509-524.

www.zoologischemededelingen.nl/83/nr03/a03

Breure, A. S. H., Gittenberger, E., & de Winter, A. J. 2016. In memoriam Dr. A. C. van Bruggen 1929-2016. *Basteria* **80**: 161-1

figure 3: 'Contributions to African Malacology – a symposium in honour of Dr. A. C. van Bruggen', The Hague, 3rd February 2018. Left to right: Wenda van Bruggen, Mary Seddon, Edi Gittenberger (back), Ton de Winter (front), Peter Tattersfield, Ben Rowson, Dai Herbert, Jon Ablett. (Photo: Rob Vink (NMV))

Snail chainsaw sculpture in a Bedfordshire wood

Peter Topley

Baulk Wood in Henlow, Bedfordshire is a small area of woodland with trails on land that was a rubbish dump in the 1960s. During the 1980s the area was restored to a public open space and nature has now reclaimed it. The woodland is largely coniferous but has an interesting mix of other trees, all now maturing into woodland.

In 2012 a local chainsaw sculptor, Andrew Barton, was commissioned to make a series of animal sculptures to add to the interest of the area. One of them is of a snail (figure 1). Since that time some of the sculptures have either decayed or sadly been vandalised (the snail has lost its lower pair of tentacles), but they are still fairly impressive. Someone by the name of Peter Wicks (I have been unable to find out anything about him) has posted a poem about the carvings on the site's notice boards, which has a verse that reads:

'The Fox and the Hare, just motionless, look to the East
As the Badger and Rabbit eye the woods for a feast,
But the snail leaves a trail of silver on the woodland floor,
Food for the birds in abundance, with snails galore…'

The majority of the snails in question are *Cornu aspersum* with plenty of *Arion ater* agg., but the sculpture perhaps hints at further species that might be found!

figure 1: Snail sculpture by Andrew Barton in Baulk Wood, Henlow, Beds. The larger image was taken in 2017, the smaller one just after completion in 2012.

The Phil' Palmer Collection – inspiring a new generation of conchologists

Paula Lightfoot

The last issue of *Mollusc World* contained a fascinating and moving article about Charles Philip (Phil') Palmer (figure 1, below), a palaeontologist at the Natural History Museum and long-time member of the Conchological Society (*Mollusc World* issue 45 pp. 16-19). This appreciation of Phil' Palmer, written by Conchological Society members Jan Light and John Whicher and by Phil's daughter Caroline Palmer, portrays an intelligent and gifted scientist who was nevertheless modest and fundamentally shy. A natural teacher, full of wisdom and enthusiasm for the natural world, Phil' was helpful and encouraging to beginners, and was clearly an extremely influential figure in the lives and careers of those he mentored. The accounts also show that Phil' was a bit of a maverick with a wonderful sense of humour – how I wish I had met him!

On his death in September 2016, Phil' left behind a substantial shell collection. Housed in two large cabinets and several additional boxes, the collection comprises an estimated 100,000 shells, predominantly British marine species (figures 2 and 3). The majority are stored in small cellophane and polythene bags, all meticulously and clearly labelled, most including date and locality information. In addition, some collections of juveniles and growth series are beautifully presented on slides (figure 4). Some groups of larger specimens have been mounted on card to display a particular taxonomic group (figure 5) or ecological phenomenon, such as mollusc shells as a substratum for other organisms. A few boxes contain large collections of a single species, such as *Aequipecten opercularis* or *Modiolus modiolus*, which have been used for biometric studies.

It was Phil's daughter's wish, and no doubt what Phil' himself would have wanted, that the collection should stay together, to remain identifiable as the Phil' Palmer collection and to be made available for research and education. An arrangement was therefore made in autumn 2017 that the Conchological Society would take ownership of the collection and appoint one of its members as curator, with responsibility for housing the collection securely and making it available to other members and researchers. I was honoured to be approached by Bas Payne and Jan Light to be the curator of this collection. I had some initial reservations about taking on such a responsibility, but when I went to see the collection with Phil's daughter Caroline, I realised what a wonderful and valuable resource it is and wanted to do everything I could to look after it and make it available to others.

figure 2: Eight-drawer cabinet containing mainly gastropods.

figure 3: Eighteen-drawer cabinet containing mainly bivalves, and a four-drawer cabinet containing assorted British and foreign shells.

figure 4: Juveniles and growth series mounted on slides.

figure 5: A display of the superfamily Veneroidea.

A notebook stored with the collection explains in Phil' Palmer's own words how the collection began:

> 'When he retired, colleague Cyril Castell gave me his recent shell collection: three standard museum drawers full. He had introduced me to the Conchological Society of Great Britain and Ireland, arguing that if I was to understand fossil molluscs I should study the living molluscs. I joined and learned the wisdom of his words. Cyril, like me, disliked killing an animal for its shell, so the shells were all beach-worn, the animal long since dead. Over the years, colleagues leaving or retiring, seeing the three drawers untouched on a table, thought I was a shell collector and presented me with their shell collection. The three drawers became five and I, with no effort, became a 'shell collector', still not really approving. Specimens labelled 'old colln' are from this period, though most of it was discarded as too poorly preserved until someone pointed out that most fossil molluscs were in no better condition. It was L. R. Cox and, as usual, he was right, so I relented and started collecting dead shells from the strandline and actually looking at them. The principal propounded by the geologist Charles Lyell 'The present is the key to the past' suddenly acquired a real meaning and application, not just a slogan.'

I took delivery of the collection at the end of November 2017, the transport from London to York having kindly been paid for by the Conchological Society. To familiarise myself with the collection and help locate specimens quickly in the event of enquiries, I have made a list of the species represented in each cabinet drawer and box: a total of 385 British species in 119 families. My next steps will be to add the foreign species to this list, and then to make a proper catalogue of the collection. I hope to use the Natural History Museum's Scratchpads software (http://scratchpads.eu/) to make details of the collection, including photographs of specimens, publicly available via a website and to make records with date and location data available via the NBN Atlas (https://nbnatlas.org/). Given the size of the collection, this will take some time, but I will keep the Society updated on progress.

Sadly, I never had the opportunity to meet Phil' Palmer, but studying the collection gives me some insight into the type of person he was. The thousands of packets of shells demonstrate his passion for his subject and his meticulous and rigorous approach to collecting and processing samples. The labels indicate that most samples were collected on the shore or by dredging, but a *Sepiola* specimen taken from a seafood salad at a retirement dinner shows that Phil' was never 'off duty' (figure 6)! Some beautiful *Callista chione* shells are accompanied by a label stating that they had been thrown 'into a skip by N. Tebble, for lack of exact data, with many more' – I think I can sense Phil's frustration as he wrote those words (figure 7). Most of all, the beautifully mounted exhibits demonstrate his wonderful ability to engage and educate others about molluscs.

figure 6: *Sepiola* specimen collected from a seafood salad.

figure 7: *Callista chione* shells rescued from a skip by Phil' Palmer.

Accessing the Phil' Palmer Collection

Any members wishing to access the collection should contact me on p.lightfoot@btinternet.com or 07539 340128.

In addition to its potential for research, elements of the collection could perhaps be used in exhibits, for example when the Conchological Society takes part in public-facing events. In his lifetime, Phil' inspired a number of conchologists; it is hoped that the Phil' Palmer collection will continue to do so.

Moving Molluscs: a case history

Pip Seccombe and Robert Cameron

We know that slugs and snails get carried about by us, sometimes deliberately but more often by accident. Many slugs in particular have been spread across the country, presumably mainly in horticultural trade and exchange. Some snails are involved too, and the case of the girdled snail *Hygromia cinctella* is well known. It is rarely that we find the exact site of an introduction of this kind, because the successful ones spread rapidly, at least locally.

In late June 2017, Pip was working in her Doncaster garden, attempting to rid a raised bed of Spanish Bluebells. While digging, she found a snail shell buried about 3 inches down. She immediately recognized it as the round-mouthed snail *Pomatias elegans.* It was complete with its operculum (figure 1). She contacted Robert, as the record seemed odd. *P. elegans* is a species with a marked preference for loose, lime-rich soils. Her garden lies on Coal Measures sandstone, and the rocks in her garden were made of this.

She initially assumed that the snail was dead, but when brought indoors and put into a pot with moist tissue, it demonstrated the contrary by escaping and leaving droppings on the tissue! Given soil, and with the lid now firmly screwed down, it buried in the soil during daylight, but left evidence of night-time activity. After a couple of weeks, Pip returned the snail to that part of the garden where she had found it. No others were found, and it has not been seen since. It seems unlikely that it will reproduce. Operculates have separate sexes, and even if the snail was a female with fertilized eggs, it is unlikely that the young would find enough calcium to grow.

There are records of *P. elegans* further north. Adrian Norris has recorded it alive from Forge Valley on the edge of the North York Moors. Fossil shells are known from some chalky sites in East Yorkshire, and empty but fresh-looking shells have been found repeatedly at Grassington in the Yorkshire Dales. It is missing from the much closer White Peak of Derbyshire. Sites in the northern half of England and Wales are few and far between.

It seems certain that it has been introduced from somewhere further south. Pip has tried to see if she can try to trace the source. Her son and daughter-in-law visit her each summer and help to maintain the garden. They bring plants from the garden in Essex where members of the daughter-in-law's family live. As yet she does not know if *P. elegans* is present there; family have been given instructions to look out for it. Fortunately, it is very distinctive.

Almost certainly, this will be an unsuccessful introduction. But such incidents do illustrate the way in which snails and slugs get carried about by us. Even if only a small proportion succeed, it gives the molluscs a means of spreading they lacked before we became a nation of gardeners.

Thanks to Adrian Norris for giving us information about *P. elegans* in Yorkshire.

figure 1. Live *Pomatias elegans* with the operculum closed. (photo: Robert Cameron).

More image reversal

Colin Mcleod

Further to the articles about image reversal by June Chatfield (2017) and Tom Walker (2017), even notable malacologists can be let down by book designers. All the shells shown on the cover and dust-jacket of the original Dutch edition of Rykel H. de Bruyne's *Illustrated Encyclopedia of Shells* (2003) were reversed. One can imagine the author's delight at seeing his latest book published turning to horror when he unwrapped the first copy from the printers! Fortunately, the contents of the book were unaffected, and the opportunity was quickly taken to correct the cover for the English translation which appeared later that same year.

However, when the two editions are shelved together, the mirror-image picture of *Tibia fusus* on the spine draws attention to the mistake, as can be seen from the photo on the right.

References

Chatfield, J. (2017) Sinistral shells from image reversal: can we believe it? *Mollusc World* Issue 44: 20.

Walker, T. (2017) Sinistral shells – some further musings. *Mollusc World* Issue 45: 8–9.

de Bruyne, R.H. (2003) *Geïllustreede Schelpen Encyclopedie*. Rebo Productions, Lisse.

de Bruyne, R.H. (2003) *The Complete Encyclopedia of Shells*. Rebo International, Lisse.

Yorkshire Naturalists' Union

Marine and Coastal Section

2018 Field Meetings

The Yorkshire Naturalists' Union runs regular field meetings to record marine and coastal wildlife at sites along the Yorkshire coast. These trips are a great way to learn and practice species identification and survey skills, while gathering valuable information to help conserve our marine wildlife and habitats. Everyone is welcome!

This year we are happy to be supporting the **Capturing our Coast** seashore bioblitzes.

Sunday 1st April: Saltwick Bay

Low water 0.88 metre at 11.40am

Meet at 10.00am in the grass car park at Whitby Holiday Park off Hawsker Lane, grid reference NZ915107

Saturday 19th May: Thornwick Bay, Flamborough

Low water 1.1m metres at 2.30pm

Meet at 12.00pm in the grass car park before the café car park, TA233719.

Saturday 16th June: North Bay, Scarborough

Low water 0.78 metres at 1.00pm

Meet at 11.00am in the car park (pay and display) next to the Sealife Centre, TA035907.

Sunday 15th July: Filey Brigg

Low water 0.6 metres at 1.20pm

Meet at 11.00am outside the café in Country Park car park (pay and display), TA120814.

Saturday 4th August: Spurn

Low water 1.9 metres at 5.30pm

Meet at 11.00am at Yorkshire Wildlife Trust's Spurn Discovery Centre, TA416153.

Sunday 12th August: Sandsend

Low water 0.4 metres at 11.40am

Meet at 10.00am in the car park next to Wits End café (pay and display), NZ860129. Joint meeting with the YNU Conchological Section.

Sunday 9th Sept: Boggle Hole

Low water 0.6 metres at 10.40am

Meet at 9.00am in the car park on Bridge Holm Lane, NZ952037.

Saturday 27th October: South Landing, Flamborough

Low water 0.9 metres at 1.10pm

Meet at 11.30am at Yorkshire Wildlife Trust's Living Seas Centre, South Sea Road, Flamborough, TA230695.

CAPTURING OUR COAST

The Yorkshire events are seashore bioblitz days organised by the University of Hull as part of the Heritage Lottery funded project 'Capturing our Coast' and supported by the YNU. All events are free to attend.

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For further information visit: www.ynu.org.uk or contact Paula Lightfoot on: p.lightfoot@btinternet.com

Put your wellies on and join us!

50 years ago, from The Conchologists' Newsletter (no. 24, March 1968)

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

Succinea putris in a Pigeon's crop
H.E.J. Biggs

In August 1967 some pigeons were shot at Hardham, near Pulborough, Sussex, early in the day. When these were cleaned in the evening, at least eight hours later, one contained two examples of a *Succinea* and another eight examples. In the case of the second bird at least two were found to be alive and were put in a plastic box with cabbage leaf where they lived actively for two days and continued somewhat inactive for another two. Some of the animals were partially digested.

Five of the shells which remained intact, including the two which were alive, were examined by me on 31st August and determined as *Succinea putris* (L.). Whether or not this could be a possible means of distribution of the species is a matter of speculation. To the best of my knowledge pigeons are not in the habit of regurgitating. The fact that the snails did remain alive for such a period of time is, however, worth noting. I am indebted to Mrs. Joy Pope for the above interesting facts.

[*As long ago as 1893 H.W. Kew, in his book* The Dispersal of Shells, *quoted the case of a taxidermist who took 13 mostly living* Candidula intersecta *from the stomach of a wood pigeon which had been shot three days previously. Ed.]*

Some collecting experiences in British Guiana
Tom Pain

Tom Pain was curator of the Georgetown Museum in what was then British Guiana for three years from 1938. During this time, he joined an expedition to Mt. Roraima, the great plateau at the junction of Brazil, Venezuela and Guyana. Some of Tom's conchological recollections of this time were published in this and a previous issue of the Conchologists' Newsletter. *The following extract includes a description of Mt. Roriama. Units of measurement are as in the original article.*

In Guyana the forest belt is followed as one proceeds westwards, by an almost flat grass-clad plain or savannah, elevated about 300ft. above sea level. Here the vegetation consists of grasses, dwarf shrubs and herb-like plants, trees are almost completely absent, except along the rivers, where forest galleries follow the water courses across the savannah...During the dry season the Rupununi River becomes very shallow…in the pools below the numerous rapids several species of *Doryssa*, including *D. devians* (figure 1) and *D. lamarckiana* occurred. The elongated usually black shells of these Melanids are frequently adapted by [local people] for attachment to anklets worn by the children.

figure 1: *Doryssa devians* Brot 1874.
Left: photo of the type specimens in the Brott collection, Geneva, taped into Tom Pain's copy of Brott, A.(1874) *Die Melaniaceen* with (Right) Brott's figure of one of the specimens. (photos: Peter Topley)

Towards the northwest the country becomes more undlulating, a successive series of terraces and broad plateaux, with bold and in some cases perpendicular sandstone escarpments varying in height from about 1200ft to over 3000ft. above sea level, and eventually forming a large undulating tableland culminating in Mount Roriama (8635ft.).

The elevated tableland of Mt. Roraima is about 12 square miles in area…This very remarkable mountain, together with Mt. Kukenaam, is a part of one of the most extensive sandstone formations on the globe, and they both rise with perpendicular cliffs of red sandstone 2000ft. in height above the base of the surrounding country. Many extraordinary high waterfalls descend over the vertical cliffs, having sheer drops of nearly 2000ft.

The summit of Mt. Roraima is a bare, exposed expanse of rock, between the crevices of which grow many rare and curious orchids and other flowering plants, besides some low bushes and extremely stunted trees. Snails, as may be expected, are extremely rare, but nevertheless the writer found *Plekocheilus fulminans linterai* (Sow.) in some nymbers, living amongst the roots of the stunted trees and bushes. Sowerby's type material collected by Sir Everard Imthurn in 1884, remained unique until the subspecies was rediscovered at the type locality in 1938. It is apparently endemic to the Roraima plateau, although the nominate race *P. fulminans fulminans* is widely distributed in the mountains of Venezuela.

Membership update

The following Conchological Society members have not previously been included in either this column of Mollusc World or in the latest edition of the Members' Guide (2016). Please note that to be included here members must sign a data protection consent form. If you have not been included and now wish to be please contact Carolyn Postgate at CIRCA subscriptions (details on page 31).

Codes after a member's address denote their interests: -
A Applied conchology; **B** Conchological books; **C** Conservation; **E** Ecology/pollution; **F** fossils; **G** General malacology; **Mb** British marine; **Mf** Foreign marine; **Nb** British non-marine; **Nf** Foreign non-marine; **P** photography; **Z** Captive breeding
.

(names and contact details removed)

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 260 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.

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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 Carolyn Postgate, CIRCA Subscriptions, 13-17 Sturton Street, Cambridge, CB1 2SN, (shellmember@gmail.com).
For UK residents we suggest payment by standing order, and if a UK tax payer, please sign a short statement indicating that you wish the subscription to be treated as Gift Aid. Another simple and secure way of paying for both UK and overseas members is by credit card online via PayPal from http://www.conchsoc.org/join. Overseas members may also pay using Western Union, but a named person has to be nominated, so please use the Hon Treasurer's name, Nick Light.

How to submit articles to Mollusc World

Copy (via e mail, typed or handwritten) should be sent to the Hon. Magazine Editor (contact details above). If sending copy using e-mail please include a subject line 'Mollusc World submission'. When emailing several large file attachments, such as photos, please divide your submission up into separate emails referencing the original article to ensure receipt. Electronic submission is preferred in Microsoft Word. Images and Artwork may be digitised, but we recommend that a digital image size 200Kb- 3Mb (JPEG preferred) be sent with your submission. All originals will be treated with care and returned by post if requested. Authors should note that issues of the magazine may be posted retrospectively on the Conchological Society's web site. Copy intended for the July 2018 issue should be with the Hon. Editor prior to 1st June 2018; inclusion in a particular issue is at the Hon. Editor's discretion and depends upon the space available but contributions are always welcome at any time.

Advertisements in Mollusc World

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

Conchological Society of Great Britain and Ireland
Diary of Meetings

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

Saturday 14th April 2018: ANNUAL GENERAL MEETING AND PRESIDENTIAL ADDRESS.
Speaker: The President: 'Beachcombing on Vancouver Island: giants and interlopers.'
14:00 – 17:30: Angela Marmont Centre, Natural History Museum, Cromwell Rd., London SW7 5BD.
(Council members please note that there will be a Council meeting before this meeting.)

Friday 15th June 2018: FIELD MEETING (marine and non-marine): NORTHAM BURROWS, Bideford, North Devon.
Part of Coastal Creatures 8-hour Bioblitz, organised by North Devon Coast AONB and Northam Burrows Country Park.
Leader: Bas Payne (bas.payne@gmail.com, 01647 24515).
The Country Park covers 253 ha of rocky shore, beach, dunes, mud flats, salt marsh and grassland.
Come at any time between 9:00-17:00 to the CS table in the Visitor Centre (EX39 1XS), where there will be free car parking.
Low tide at 13:42 (0.4m).

Sunday 17th June 2018: FIELD MEETING (non-marine): Flounders Folly, South Shropshire.
Joint meeting with Shropshire Invertebrate Group. Leader: Mags Cousins (07791505641, mags.cousins@naturalengland.org.uk).
Mix of grassland, woodland and scrub on limestone. Some parts of the site are quite steep.
Meet at 11.00 at roadside parking at SO 457 853, by the forestry road (right turn as you come from Lower Dinchope).

Saturday 23rd June 2018. FIELD MEETING (marine, non-marine and fossil): Deben estuary, Suffolk.
Leader: Simon Taylor (01621 810141, marine@conchsoc.org).
Hunting for *Littorina obtusata* f. *aestuarii* and other marine molluscs of very sheltered estuarine habitats, with opportunities for freshwater aquatic, terrestrial and even fossil sampling.
Meet at 10:00 at Woodbridge railway station (TM 274 487). Low tide at 15:19.

Saturday 11th August 2018: FIELD MEETING (non-marine): The Devil's Punchbowl, Hindhead, Surrey.
Leader: June Chatfield (01420 82214). Acid woodland and heath with spring seepages, in the footsteps of EW Swanson, who collected molluscs here a century ago. Meet at 11:00 at the NT Visitor Centre / café in the NT car park (SU 891 358).

Saturday 8th – Saturday 15th September 2018: FIELD MEETING (marine): Mullet Peninsula, Co. Mayo, Ireland.
Joint meeting with Porcupine and Seasearch. Leader: Julia Nunn (jdn@cherrycottage.myzen.co.uk).
Remote area of NW Ireland with good variety of shores and diverse fauna; shore visits and diving.
For further information see Mollusc World 45: 32-33, or contact leader.

Saturday 22nd September: FIELD MEETING (non-marine): Wharram Percy, North Yorkshire.
Leader: Terry O'Connor (0779 4040684, osteoconnor@gmail.com). Varied chalk grasslands on a mix of slopes and some woodland. Meet at 10:30 at parking area just off minor road at SE86686442.

STOP PRESS: Saturday 29th September: FIELD MEETING (non-marine) In memory of David Long as a tribute to his memory and his work with mollusc recording and conservation in Gloucestershire. Cotswold Commons and Beechwoods NNR, Gloucestershire. Will probably visit Popes Wood and another site, particularly targeted on recording *Ena montana*. See web site.

Saturday 6th October 2018 10:00 – 16:00: SNAIL DENTIFICATION WORKSHOP. Elsecar Heritage Centre, Barnsley, South Yorkshire, S74 8HJ.. Leader: Robert Cameron. Sorby Invertebrate Group / Dearne Valley Landscape Partnership event. Free to CS members**; advance booking essential**. Contact Derek Whiteley (invertebrates@sorby.org.uk)

Saturday 6th October 2018: FIELD MEETING (non-marine and marine): Orfordness, Suffolk. Leader: Toby Abrehart (toby@abrehartecology.com). Terrestrial and saline lagoon molluscs. Meet at 10:00 at Orford Quay (TM4254749516).

Saturday 13th October 2018: FIELD MEETING (non-marine): Hawkbatch, Shropshire.
Joint meeting with Wyre Forest Study Group.
Leaders: Rosemary Winnall (01299 266489, mob 07732 203393, rosemary@wyreforest.net)
and Rosemary Hill (0118 966 5160, rosemaryhi@lineone.net)
Further distribution mapping of *Malacolimax tenellus*, and a look at some of the calcareous flushes in the woods.
Meet at 10:00 at Hawkbatch Car Park, SO761776, 2 miles NW of Bewdley on the B 4194.

Please note the following dates in 2018 for your diary:
Saturday 20th October 2018: INDOOR MEETING 14:00 (preceded by Council meeting)
Saturday 8th December 2018: INDOOR MEETING 14:00 (preceded by Council meeting)

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