

The Conchologists' Newsletter

INDEX

to Volume 8

Numbers 133 to 144

Index to Volume 8, Numbers 133 to 144

A Cornish problem child – <i>Simnia patula</i>	739	<i>Ancylus fluviatilis</i>	627, 705, 892, 895
A case of predation on <i>Melanoides</i> <i>tuberculata</i> by the glossy ibis in Israel	783	<i>Angulus squalidus</i>	478, 495
A geological excursion to the Isle of Wight, 20-21 April 1996	735	<i>Angulus tenuis</i>	496, 909
A glass menagerie. The work of Leopold and Rudolph Blaschka	690	<i>Angustioestis kivuensis</i>	682
About <i>Planorbarius corneus</i> and introductions	947	<i>Anisus vortex</i>	627, 779, 894
<i>Abra nitida</i>	478, 864	<i>Anisus vorticulus</i>	653
<i>Abra prismatica</i>	864, 865	<i>Anodonta</i>	627
<i>Abra tenuis</i>	909	<i>Anodonta anatina</i>	543
<i>Acanthocardia</i>	909	<i>Anomia ephippium</i>	720, 733, 909, 923
<i>Acanthocardia echinata</i>	733, 867	<i>Antalis entalis</i>	838
<i>Acanthochitona crinitus</i>	863, 906	<i>Antiquilima antiquata</i>	945
<i>Achatina</i>	818, 932	An unusual pattern of stranding	946
<i>Achatina fulica</i>	498, 576, 657-8, 811, 813-14	<i>Aporrhais pespelecani</i>	478, 495, 907, 921-2
<i>Achatina fulica bloyeti</i>	886	<i>Arca barbata</i>	720
<i>Achatinella</i>	498, 771, 932	<i>Arca noae</i>	923
<i>Achatinella apexfulva</i>	577	<i>Arca tetragona</i>	864
Achill Island	495	<i>Archachatina bicarinata</i>	658
<i>Acicula fusca</i>	648-9	<i>Archachatina marginata</i>	785
<i>Acmaea mitra</i>	760	Archaeology	915, 915
<i>Acroloxus lacustris</i>	894-5	<i>Archidoris pseudoargus</i>	496, 742, 908
<i>Acteon tornatilis</i>	867	<i>Arcopagia crassa</i>	909
Additions and corrections to 'Recording Mollusca in Ireland: Achill Island, Co. Mayo'	495	<i>Arctica islandica</i>	849
<i>Aegopinella nitidula</i>	893	<i>Arcularia gibbosa</i>	717, 720
<i>Aegopinella pura</i>	706	<i>Arculus sykesi</i>	846
<i>Aeolidia papillosa</i>	497	<i>Arianta arbustorum</i>	587, 895
<i>Aequipecten opercularis</i>	732	<i>Ariolimax columbianus</i>	659
<i>Afroconulus</i> sp.	682	<i>Arion ater</i>	581, 890, 892
<i>Afroconulus concavispinus</i>	682	<i>Arion ater rufus</i>	749, 911
<i>Afroconulus iredalei</i>	682	<i>Arion circumscriptus</i>	893
<i>Afroconulus urguesensis</i>	806	<i>Arion distinctus</i>	708
<i>Afroguppya rumrutiensis</i>	682	<i>Arion flagellus</i>	581, 890
After the Sea Empress	866	<i>Arion intermedius</i>	890, 893
<i>Aguispira alternata</i>	598	<i>Arion lusitanicus</i>	581
<i>Aguispira alternata strongyloides</i>	598	<i>Arion oweni</i>	742
<i>Akera bullata</i>	862, 864	<i>Arion subfuscus</i>	890, 893, 895
ALEXANDER, K., Roman snails live on TV	942	<i>Arion sylvaticus</i>	581
<i>Alvania cancellata</i>	864	Arkansas, mollusca of	595
<i>Alvania carinata</i>	495, 729, 730	Artificial diets	557, 818, 875
<i>Alvania lactea</i>	729, 730, 845	<i>Ashfordia granulata</i>	542, 627, 653
<i>Alvania punctura</i>	495, 864, 907	<i>Aspatharia martensi</i>	683
<i>Alvania semistriata</i>	907	<i>Aspatharia wahlbergi baumanni</i>	683
<i>Amauropsis islandica</i>	848	<i>Asperita</i>	785
<i>Ammonicera rota</i>	863-4	<i>Astarte platymorpha</i>	945
<i>Ampullaria</i>	784	<i>Astraea rugosa</i>	920-22
<i>Amyclina corniculum</i>	923	<i>Atoxon</i> sp.	681
		<i>Atoxon hildebrandti</i>	681
		<i>Auricula</i>	572
		<i>Azeca goodalli</i>	892, 899
		<i>Azorinus chamaesolen</i>	478
		<i>Balea perversa</i>	661, 742
		<i>Barbatia barbata</i>	923
		<i>Barleeia unifasciata</i>	907
		<i>Bathyomphalus contortus</i>	627, 779,
			893-4, 897

Index to Volume 8, Numbers 133 to 144

<i>Bathypecten vulcani</i>	506	<i>Cardita sulcata</i>	923
<i>Beaniceras luridum</i>	945	<i>Carychium minimum</i>	892
<i>Bellamya unicolor</i>	677, 808	<i>Carychium tridentatum</i>	707, 892
Biodiversity	651, 763, 855-859	<i>Cathaica</i> sp.	744
Biodiversity Challenge: an agenda for conservation in the UK (second edition). A brief summary of this landmark in biodiversity conservation	651	<i>Catinella arenaria</i>	653, 658
Biodiversity: the UK Steering Group Report – a personal overview	763	<i>Ceciloides</i>	716
<i>Biomphalaria pfeifferi</i>	677	<i>Ceciloides acicula</i>	742
<i>Biomphalaria sudanica</i>	677	<i>Ceciloides callipeplum</i>	806
<i>Bithynia leachii</i>	779, 894-5	<i>Cellana rota</i>	757
<i>Bithynia tentaculata</i>	626, 891, 894-5	<i>Cepaea</i>	597, 839
<i>Bittium reticulatum</i>	864, 906, 922	<i>Cepaea</i> , variation	940-41
<i>Bloyetia simulans meruensis</i>	493	<i>Cepaea hortensis</i>	587, 893, 895
BOYCE, R., Conchological Society field meeting in Northern Northumberland, 5-9 October 1994	741	<i>Cepaea nemoralis</i>	582, 648, 741, 781, 891, 893
BOYD, J., New colony of <i>Cochlicella</i> <i>barbara</i> at Kenfig	781	<i>Cerastoderma edule</i>	496, 734, 866, 909, 923
<i>Bocageia</i> sp. juv.	679	<i>Cerastoderma glaucum</i>	653
<i>Bocageia elata</i>	678-9	<i>Cerastua bambuseti</i>	645
Book reviews: European Malacological Index 1994-5	665	<i>Cerastua lymnaeiformis</i>	678
Book reviews: The Lost Ark: new and rediscovered animals of the twentieth century	505	<i>Cerastua roosevelti</i>	645
<i>Brachystomia eulimoides</i>	864	<i>Cerastua trapezoidea masaica</i>	678
<i>Brachystomia rissoides</i>	908	<i>Cerithiopsis clarkii</i>	823
<i>Bradybaena</i>	812	<i>Cerithiopsis tubercularis</i>	907
British Antarctic Survey	663	<i>Cerithium</i>	721, 918
Brittany, marine mollusca of	728	<i>Cerithium rupestre</i>	922
BUCKLE, P. and BUCKLE, C., Field meeting in Somerset 30 August – 1 September 1996	749	<i>Cerithium vulgatum</i>	720, 921-22
<i>Buccinum undatum</i>	497, 732, 863, 907	<i>Cermuella virgata</i>	587, 742, 776, 786
<i>Bulimus</i>	570	CHATFIELD, J.E., Extracts on shells and collecting from <i>Jottings During</i> <i>the Cruise of HMS Curaçoa among</i> <i>the South Sea Islands in 1865 by</i> <i>Julius Brencchley</i>	566
<i>Burtoa nilotica giraudi</i>	679	CHATFIELD, J.E., Looking at cones	924
By-the-wind-sailors	475	CHATFIELD, J.E., Looking at limpets	755
<i>Caecum glabrum</i>	864, 905, 907	CHATFIELD, J.E., Molluscs of the northern Wey	625
<i>Calliostoma zizyphinum</i>	496, 863, 906	CHATFIELD, J.E., Reading molluscs 100 years on	889
<i>Callista chione</i>	910, 923	CHATFIELD, J.E., Where to go for shells – Exmouth, Devon	731
<i>Callochiton septemvalvis</i>	863	<i>Chama</i>	539
<i>Calyptogena magnifica</i>	506	<i>Chamacea</i>	539
<i>Calyptrea chinensis</i>	868	<i>Chamelea gallina</i>	734, 910
<i>Candidula intersecta</i>	519, 587, 741, 776, 781, 786	<i>Channel atlas</i>	728
<i>Candidula unifasciata rugosiuscula</i>	518	<i>Channel Islands</i>	837, 844-6, 851-54
<i>Caracollina lenticula</i>	716	<i>Charonia</i>	718, 720
<i>Cardium papillosum</i>	845	<i>Charonia sequenzae</i>	719, 721, 918, 921-22
<i>Cardinia attenuata</i>	945	<i>Charonia tritonis</i>	704, 936-7
		<i>Chauvetia brunnea</i>	907
		Cherchons les mollusques! (Field trip to Brittany – July 1996)	728
		<i>Chilostoma</i>	598
		<i>Chlamydarion hians</i>	802
		<i>Chlamydarion volkensi</i>	886
		<i>Chlamys</i>	720

Index to Volume 8, Numbers 133 to 144

<i>Chlamys opercularis</i>	908	<i>Conulinus daubenbergeri</i>	678
<i>Chlamys varia</i>	842, 864, 909, 921, 923	<i>Conulinus ugandae nyiroensis</i>	802
<i>Chondrula tridens</i>	515	<i>Conus, biology</i>	924
<i>Chrysallida indistincta</i>	864, 908	<i>Conus amadis</i>	925
<i>Chrysallida interstincta = obtusa</i>	864	<i>Conus arenatus</i>	926
<i>Chrysallida obtusa</i>	495, 864, 908	<i>Conus aulicus</i>	925
<i>Cima minima</i>	862, 864	<i>Conus australis</i>	925
<i>Cingula trifasciata</i>	907	<i>Conus bengalensis</i>	506
<i>Circumphalus casina</i>	910	<i>Conus betulinus</i>	925
<i>Circulus striatus</i>	907	<i>Conus bullatus</i>	926
<i>Cirrothauma murrayi</i>	506	<i>Conus capitaneus</i>	927
<i>Clanculus cruciatus</i>	922	<i>Conus coronatus</i>	925-6
<i>Clausilia bidentata</i>	518, 706, 892-3	<i>Conus ebraeus</i>	926
<i>Clausilia bidentata rugosa</i>	518	<i>Conus eburneus</i>	925-6
<i>Clausilia dubia</i>	653, 767, 902	<i>Conus episcopus</i>	925-6
<i>Clausilia dubia</i> Draparnaud, 1805		<i>Conus episcopus (photo)</i>	926
<i>monstr. dextrorum</i>	902	<i>Conus generalis</i>	925
<i>Clausinella fasciata</i>	910, 923	<i>Conus geographicus</i>	925-6
<i>Chione limacina</i>	495	<i>Conus geographicus, toxicity</i>	924
COLES, B., First impressions of		<i>Conus gloriamaris</i>	506, 927
the land snails of Arkansas	595	<i>Conus imperialis</i>	926
COLVILLE, B., <i>Clausilia dubia</i>		<i>Conus leopardus</i>	926
Draparnaud, 1805 <i>monstr.</i>		<i>Conus leopardus (photo)</i>	926
<i>dextrorum</i>	902	<i>Conus litteratus</i>	925
<i>Cochlicella acuta</i>	781	<i>Conus marmoreus</i>	927
<i>Cochlicella barbara</i>	781	<i>Conus marmoreus (photo)</i>	926
<i>Cochlicopa</i>	520	<i>Conus mediterraneus</i>	720, 917, 923-4
<i>Cochlicopa lubrica</i>	586-7, 892, 894, 899	<i>Conus milneedwardsi</i>	506
<i>Cochlicopa lubricella</i>	587, 892	<i>Conus monile</i>	925
<i>Colisella</i>	760	<i>Conus nussatella</i>	925-6
Collectors in East Africa No. 23: K.L.		<i>Conus originyi</i>	925
Pfeiffer (1874-1952)	490	<i>Conus scabrum</i>	927
Collectors in East Africa No. 24: E.A.		<i>Conus sulcatus</i>	926
Mearns (1856-1916)	642	<i>Conus textile</i>	927
Collectors in East Africa No. 25: A.B.		<i>Conus tulipa</i>	926
Percival (1875-1941)	795	<i>Conus virgo</i>	925, 927
Collectors in East Africa No. 26: G.		Coppicing	646
Volkens (1855-1917)	881	<i>Corbicula fluminalis</i>	744
Colonsay, map with recording sites	475	<i>Corbula gibba</i>	862, 864
<i>Columbella rustica</i>	716, 917-8, 922	<i>Corilla</i>	659
<i>Columella aspera</i>	707	Cornwall, field meeting	635, 903
<i>Columella edentula</i>	707	<i>Cosmetodon buckmani</i>	944
<i>Colus gracilis</i>	849	cowries	526, 918
Computer workshop: 8 April 1995	545	<i>Crassostrea gigas</i>	838
Conchological Society field meeting		<i>Crenella decussata</i>	603-4, 615
in Northern Northumberland,		<i>Crenella decussata (figures)</i>	614
5-9 October 1994	741	<i>Crenella prideauxi</i>	603, 617
Conchological Society, minutes of		<i>Crenella prideauxi (figures)</i>	616
meetings	509-11, 546-551, 589-	<i>Crepidula fornicata</i>	732, 907
	591, 628-630, 667-671,	<i>Crepidula fornicata (photo)</i>	734
	787-789, 824-829, 870-872, 948-9	<i>Ctena decussata</i>	923
Containers for small shells	710	<i>Curvella kretschmeri</i>	886
Controlled environment		<i>Curvella pertranslucens fallooni</i>	802
container, plans	556	<i>Curvella whitei</i>	679

Index to Volume 8, Numbers 133 to 144

<i>Cyclichna alba</i>	841	Endemic species	811
<i>Cyclope neritea</i>	922	<i>Enoplateuthis owenii</i> (model)	691
<i>Cypraea</i>	717	<i>Ensis arcuatus</i>	864
<i>Cypraea fultoni</i>	506	<i>Ensis ensis</i>	909
<i>Cypraea lactea</i>	567	<i>Ensis siliqua</i>	734, 867, 909
<i>Cypraea leucodon</i>	506	Entolium	945
<i>Cypraea moneta</i>	530, 573, 702	<i>Epitonium clathrus</i>	495
<i>Cypraea spurca</i>	921-22	<i>Erato voluta</i>	495
<i>Cypraea teuleri</i>	506	<i>Erosaria spurca</i>	921
<i>Cyprus</i>	715	Erycinaceae	563
<i>Cytharella coarctata</i>	907	<i>Etheria elliptica</i>	684
Data tables, dead shells on		<i>Euconulus</i>	599
Colonsay shores	480	<i>Euconulus alderi</i>	708
<i>Delecopecten vitreus</i>	841	<i>Euconulus chersinus</i>	600
<i>Dentalium</i>	538, 540, 715, 717, 920	<i>Euconulus dentatus</i>	600
<i>Dentalium dentale</i>	923	<i>Euconulus fulvus</i>	600, 893, 897
<i>Dentalium rubescens</i>	540	<i>Eucyclus subimbricatus</i>	945
<i>Deroceras caruanae</i>	893	<i>Euglandina</i>	576, 658, 773, 812, 928-930
<i>Deroceras laeve</i>	601, 627, 892-3	<i>Euglandina rosea</i>	498, 810, 811
<i>Deroceras reticulatum</i>	648, 749, 893, 895	<i>Eulima bilineata</i>	863-4
<i>Diaphana minuta</i>	864	<i>Eulimella laevis</i>	863-4
Diets, artificial	557, 818, 875	<i>Eulimella scillae</i>	863-5
<i>Dikoleps cutleriana</i>	845	<i>Eulimella ventricosa</i>	846
<i>Diodora funiculata</i>	757	<i>Euonyma achilles</i>	803
<i>Diodora graeca</i>	863, 906	<i>Euonyma arthuri</i>	803
<i>Diplodonta rotundata</i>	909	<i>Euonyma blayneyi</i>	803
<i>Diplomorpha</i>	811, 814	<i>Euonyma connollyana</i>	493
<i>Discostrobilops hubbardi</i>	600	<i>Euonyma fulgens</i>	803
<i>Discus patulus</i>	598	<i>Euonyma fulgens nyiroensis</i>	803
<i>Discus rotundatus</i>	706, 890, 892, 895	<i>Euonyma percivali</i>	804
DMAP	545	<i>Euonyma topazon</i>	804
DOMMIC project	728	<i>Euonyma topazon igembiensis</i>	804
<i>Donax variegatus</i>	845	European Malacological Index	
<i>Donax vittatus</i>	720, 734, 839, 864, 867, 909	1994-5 (book review)	665
Dordogne, mollusca of	522-525	<i>Euthria cornea</i>	922
Dordogne, map with collecting sites	516	Exmouth, Devon, mollusca of	731
<i>Doris areolata</i> (model)	693	Extinction	810, 931
<i>Dosinia exoleta</i>	910	Extracts from TENTACLE: The	
<i>Dosinia lupinus</i>	495, 720, 910	Newsletter of the IUCN/SSC	
DRISCOLL, R.J., <i>Pseudamnicola</i>		Mollusc Specialist Group	498
<i>confusa</i> (Frauenfeld) in the		Extracts on shells and collecting from	
Yare Valley, Norfolk	778	<i>Jottings During the Cruise of HMS</i>	
Earley, mollusca of	890, 894	<i>Curacao among the South Sea Islands</i>	
East Africa	795	in 1865 by Julius Brenchley	566
<i>Eatonina fulgida</i>	863, 907	Fatu Hiva, mollusca of	811
Edge effects	534	Fatu Hiva, species extinction	931
<i>Edentulina</i> (Marconia) <i>cylindrica</i>	493	<i>Favorinus branchialis</i>	497
<i>Edouardia athiensis</i>	802	Field meeting in Godalming, Surrey:	
<i>Edouardia subeminula</i>	678	3 June 1995	542
<i>Eledone cirrhosa</i>	844	Field meeting in Somerset	
<i>Elysia viridis</i>	908	30 August - 1 September 1996	749
<i>Emarginula fissura</i>	906	Field meeting: Northcot Brick and	
<i>Ena montana</i>	648, 653	Tile Company, Blockley,	
<i>Ena obscura</i>	742	Gloucestershire (SP 182369)	

Index to Volume 8, Numbers 133 to 144

8 November 1997	944	<i>Gonaxis pericivali</i>	807
Field trip report, Blockley, Gloucestershire	944	<i>Goniodoris nodosa</i>	496
Field trip report, Brittany	728	<i>Goodallia triangularis</i>	909
Field trip report, Cornwall	635, 903	<i>Granopupa granum</i>	515
Field trip report, Godalming	542	<i>Graphis albida</i>	564, 845
Field trip report, Isle of Wight	735	<i>Gryphaea depressa</i>	945
Field trip report, Northumberland	741	<i>Gregariella</i>	603, 619
Field trip report, Reading area	889	<i>Gregariella (figures)</i>	618
Field trip report, Somerset	749	<i>Gulella sp. juv.</i>	683
First impressions of the land snails of Arkansas	595	<i>Gulella sp. nov.</i>	683
First modern record from vice county 68 (Cheviot) of <i>Vertigo pusilla</i> Müller 1774	586	<i>Gulella arthuri</i>	802
<i>Fissurella barbadensis</i>	760	<i>Gulella baccata</i>	802
<i>Fissurella fascicularis</i>	760	<i>Gulella calva</i>	804
Flatworms	498	<i>Gulella cancellata</i>	804
Fossils, Gloucestershire	944	<i>Gulella candela</i>	804
Fossils, Isle of Wight	735	<i>Gulella claustrum</i>	802
Fossils, Israel	538	<i>Gulella commoda</i>	683
<i>Folinella excavata</i>	845	<i>Gulella conicodentata</i>	493
<i>Fusinus pulchellus</i>	923	<i>Gulella copiosa</i>	802
<i>Gaederopus gaederopus</i>	721, 923	<i>Gulella copiosa robusta</i>	803
<i>Galba truncatula</i>	784	<i>Gulella disseminata</i>	804
<i>Galeomma turtoni</i>	845	<i>Gulella funerea</i>	803
<i>Gari tellinella</i>	864	<i>Gulella funerea laevis</i>	803
<i>Gastrocopta contracta</i>	599	<i>Gulella globulosa</i>	493
<i>Gastrocopta holzingeri</i>	600	<i>Gulella gouldi globulosa</i>	493
<i>Gastrocopta sterkiana</i>	600	<i>Gulella gwendolinae porrecta</i>	493
Genetic analysis	816	<i>Gulella impedita</i>	804
Gentlemen and Players: Joint meeting between the Malacological Society of London, the Society for the History of Natural History and the Conchological Society	939	<i>Gulella ingloria</i>	803
<i>Geomalacus maculosus</i>	657	<i>Gulella kohllarseni</i>	683
GILLARD, C., Computer workshop: 8 April 1995	545	<i>Gulella laqueus</i>	803
<i>Gibbula</i>	720	<i>Gulella laqueus hercules</i>	803
<i>Gibbula adansonii</i>	922	<i>Gulella lima</i>	803
<i>Gibbula cineraria</i>	478, 496, 731, 863, 906	<i>Gulella ludwigi</i>	493
<i>Gibbula magus</i>	732, 863, 906, 922	<i>Gulella micans</i>	493
<i>Gibbula tumida</i>	863, 906	<i>Gulella mirifica</i>	803
<i>Gibbula umbilicalis</i>	497, 731-2, 906	<i>Gulella monticola</i>	803
<i>Glossus humanus</i>	841	<i>Gulella ngorongoroensis</i>	683
Glossy ibis	783	<i>Gulella nyiroensis</i>	803
Gloucestershire, fossils	944	<i>Gulella perlata</i>	805
<i>Glycymeris</i>	717, 720	<i>Gulella pervitrea</i>	803
<i>Glycymeris glycymeris</i>	908, 923	<i>Gulella pretiosa nyiroensis</i>	803
<i>Glycymeris violascens</i>	720, 923	<i>Gulella rectangularis</i>	803
Godalming, Surrey, mollusca of	542	<i>Gulella spatium</i>	803
<i>Gonaxis cylindrica</i>	493, 682	<i>Gulella suavisima</i>	803
		<i>Gulella subsellae</i>	683
		<i>Gulella translucida</i>	493
		<i>Gulella tudes</i>	886
		<i>Gulella unidentata</i>	493
		<i>Gulella usambarica</i>	493
		<i>Gulella viatoris</i>	803
		<i>Gulella (Gulella) conicodentata</i>	493
		<i>Gulella (Gulella) translucida</i>	493

Index to Volume 8, Numbers 133 to 144

<i>Gulella</i> (Molarella) <i>gwendolinae</i>		<i>Hiatella arctica</i>	864, 910
<i>porrecta</i>	493	<i>Hinia incrassata</i>	478, 496, 863, 907, 923
<i>Gulella</i> (Paucidentina) <i>micans</i>	493	<i>Hinia reticulata</i>	732, 864, 907, 923
<i>Gulella</i> (Paucidentina) <i>percivali kilimae</i>	493	<i>Hippeutis complanatus</i>	627
<i>Gulella</i> (Paucidentina) <i>unidentata</i>	493	<i>Hippopodium ovale</i>	945
<i>Gulella</i> (Paucidentina) <i>usambarica</i>	493	<i>Hippurites</i> (figures)	539
<i>Gulella</i> (Plicigulella) <i>perlata</i>	805	Hiva Oa, mollusca of	811
<i>Gymnariion aloysiisabaudiae</i>	682	Hiva Oa, species extinction	931
<i>Gyraulus acronicus</i>	893, 895	HONNOR, R., An unusual pattern	
<i>Gyraulus albus</i>	627, 705, 895	of stranding	946
<i>Gyraulus laevis</i>	705	HONNOR, R., Wet, Wet, Wet	
Habitat conservation	763-767	or The Cornwall marine field	
Habitat management	779	meeting	903
<i>Haedropleura septangularis</i>	842	HOWLETT, D., The existence of	
<i>Halolimnnohelix</i>	685	<i>Pseudamnicola confusa</i> (Frauenfeld)	
<i>Halolimnnohelix</i> sp.	680	living on the margins of Rockland	
<i>Halolimnnohelix</i> sp. <i>juv.</i>	680	broad, Rockland St Mary,	
<i>Halolimnnohelix</i> sp. ? <i>nov.</i>	680	Norfolk. TG 332 052	896
<i>Halolimnnohelix alticola</i>	680	<i>Homalopoma sanguineum</i>	922
<i>Halolimnnohelix angulifera</i>	805	<i>Homorus usagaricus monticulus</i>	494
<i>Halolimnnohelix discolorata</i>	802	<i>Homorus usambaricus</i>	493
<i>Halolimnnohelix esau</i>	680, 807	<i>Hydrobia neglecta</i>	654
<i>Halolimnnohelix gregorii</i>	680	<i>Hydrobia ulvae</i>	478, 868, 907
<i>Halolimnnohelix lateaperta</i>	680	<i>Hydrobia ventrosa</i>	654
<i>Halolimnnohelix cf. lateaperta</i>	680	<i>Hypolysia connollyana</i>	493
<i>Halolimnnohelix percivali</i>	802	ICZN. Case 2922 <i>Octopus vulgaris</i>	
<i>Halolimnnohelix planulata</i>	680	and <i>Loligo vulgaris</i> : proposed	
<i>Halolimnnohelix purpureocincta</i>	802	conservation of specific names	508
<i>Halolimnnohelix urguesensis</i>	807	ICZN. Case 2949 <i>Aplysia juliana</i> :	
<i>Halolimnnohelix venatoris</i>	805	proposed conservation of	
<i>Haminoea navicula</i>	862, 864	specific name	508
<i>Haplohelix</i> sp.	680	Introduced succineids in Britain	746
<i>Haplohelix</i> sp. <i>nov.</i>	680	In Fowler's footsteps: field meeting	
<i>Haplohelix kilimae</i>	886	to south-west Cornwall,	
<i>Haplohelix rufofusca</i>	887	12-16 July 1995	635
<i>Hawaia minuscula</i>	601	<i>Iothea fulva</i>	838
Hawaii, stranded opercula	946	<i>Irus irus</i>	475
Hebrides Islands, mollusca of		Islands and shellsand	835
	835-844, 851-854	Isle of Wight, fossils	735
<i>Helcion pellucidum</i>	478, 756, 863, 906	Israel, fossils	783
<i>Helicella itala</i>	520-21, 653, 776, 781	<i>Janthina</i>	475, 836, 840
<i>Helicigona lapicida</i>	599, 653	<i>Janthina janthina</i>	495
<i>Helicina musiva</i>	566	<i>Jordaniella nivosa</i>	639
<i>Helicodonta obvoluta</i>	515, 653	<i>Jujubinus</i>	846
<i>Helix</i>	818	<i>Jujubinus montagui</i>	478
<i>Helix aspersa</i>	518, 587, 716, 749,	<i>Jupitera minuta</i>	840
	781, 786, 943	Kazakhstan	744
<i>Helix ceratina</i>	773	<i>Kellia suborbicularis</i>	909
<i>Helix pomatia</i>	653, 942-3	Kenfig, mollusca of	781
<i>Helix tricolor</i>	570	Kenya, mollusca of	493, 645, 802, 886
<i>Hemicycla</i>	659	KILLEEN, I. and LIGHT, J.,	
<i>Heteranomia squamula</i>	864, 909	Cherchons les mollusques!	
<i>Hexaplex trunculus</i>	916	(Field trip to Brittany - July 1996)	728
HILL, K., Swimming slugs	911	Kouphonisi, Greece, archaeology	915

Index to Volume 8, Numbers 133 to 144

<i>Krapfiella magnifica</i>	805	List of molluscs described from	
<i>Krapfiella princeps</i>	805	material collected by A. Blayney	
<i>Lacuna pallidula</i>	906	Percival in Kenya and Tanzania	802
<i>Lacuna parva</i>	863, 906	List of molluscs described from	
<i>Lacuna vineta</i>	478, 863, 906	material collected by Edgar	
<i>Laevicardium crassum</i>	495, 732, 909, 923	Alexander Mearns in Kenya	645
<i>Lamellaria</i>	637	List of molluscs described from	
<i>Lanistes</i>	784	material collected by G. Volkens	
<i>Lanistes purpureus</i>	677	in Tanzania	886
<i>Lanternula elliptica</i>	664	List of molluscs described from	
<i>Lasaea adasoni</i>	869, 909	material collected by Karl Ludwig	
Latin descriptions	712	Pfeiffer in Tanzania and Kenya	493
<i>Lauria</i>	685	<i>Littorina</i>	866
<i>Lauria cylindracea</i>	518, 587, 892, 902	<i>Littorina compressa</i>	906
<i>Lauria cf. desiderata</i>	677	<i>Littorina fabalis</i>	906
<i>Lauria sempronii</i>	653, 654, 657	<i>Littorina littoralis</i>	732, 841, 907
<i>Leiostryla anglica</i>	648-9, 653-4, 657, 741	<i>Littorina littorea</i>	496, 731, 906
<i>Lepidochiton cinereus</i>	496, 742, 863, 906	<i>Littorina neritoides</i>	863, 907
<i>Leptaxis undata</i>	659	<i>Littorina nigrolineata</i>	868
<i>Leptochiton asellus</i>	863	<i>Littorina obtusata</i>	841, 907
<i>Leptochiton cancellatus</i>	863	<i>Littorina saxatilis</i>	732, 841, 907
<i>Leptochiton scabridus</i>	639, 640, 729	LONG, D., Field meeting: Northcot	
<i>Leucophytia bidentata</i>	638, 908	Brick and Tile Company, Blockley,	
LIGHT, J.M. and TURK, S.M.,		Gloucestershire (SP 182369)	
In Fowler's footsteps: field		8 November 1997	944
meeting to south-west Cornwall,		LONG, D., Gentlemen and Players	939
12-16 July 1995	635	LONG, D., Molluscan conservation:	
LIGHT, J., Field meeting in		a strategy for the 21st century	770
Godalming, Surrey: 3 June 1995	542	LONG, D., Twelfth International	
LIGHT, J., The distribution of		Malacological Congress,	
dead shells	562	3-8 September 1995	660
<i>Liguus</i>	658	<i>Loligo forbesii</i>	495
<i>Limacina retroversa</i>	495, 563	Looking at cones	924
<i>Limapontia senestra</i>	868	Looking at limpets	755
<i>Limaria hians</i>	845, 862, 864	<i>Loripes lacteus</i>	923
<i>Limaria loscombi</i>	845	<i>Lottia gigantea</i>	760
<i>Limax cinereoniger</i>	648-9, 707	<i>Lucinella divaricata</i>	846
<i>Limax flavus</i>	601, 749	<i>Lucinoma borealis</i>	478, 864, 909
<i>Limax marginatus</i>	532, 890	<i>Lutraria</i>	909
<i>Limax maximus</i>	893	<i>Lutraria angustior</i>	909
<i>Limax tenellus</i>	648, 654, 707	<i>Lutraria lutraria</i>	639, 909
<i>Lima lima</i>	923	<i>Lycoteuthis diadema</i>	506
<i>Limicola</i>	643	<i>Lymnaea</i>	783
<i>Limicola martensiana</i>	679, 805	<i>Lymnaea glabra</i>	654, 767,
<i>Limicola martensiana catharia</i>	645, 805	<i>Lymnaea minuta</i>	784
<i>Limicola martensiana volkensi</i>	887	<i>Lymnaea palustris</i>	627, 779, 892, 897-8
<i>Limicolariopsis inepta</i>	805	<i>Lymnaea peregra</i>	627, 892, 894-5
<i>Limicolariopsis nyiroensis</i>	805	<i>Lymnaea stagnalis</i>	627, 705, 891
Limpets	478, 918	<i>Lymnaea truncatula</i>	784, 891
Limpets, anatomy	760-761	<i>Lytoceras fimbriatum</i>	945
Limpets, biology	760-761	<i>Macoma balthica</i>	496
<i>Liothrella uva</i>	664	<i>Macrogastra rolphii</i>	542
<i>Liparoceras cheltiense</i>	945	<i>Mactra corallina</i>	720
<i>Liparoceras pseudostriatum</i>	945	<i>Mactra glauca</i>	923

Index to Volume 8, Numbers 133 to 144

<i>Macra stultorum</i>	867, 909	<i>Melanopsis praemorsa</i>	920, 923
<i>Mactromya cardioides</i>	945	<i>Melaraphe neritoides</i>	863, 907
Maiden Erlegh, mollusca of	892	<i>Mesodon</i>	597
<i>Maizania marsabitensis</i>	677	<i>Mesodon binneyanus</i>	598
<i>Maizania pyramidalis</i>	494	<i>Mesodon clausus</i>	598
<i>Maizania volkensi</i>	494, 677, 886	<i>Mesodon elevatus</i>	598
<i>Maizania (Micromaizania) volkensi</i>	886	<i>Mesodon indianorum</i>	598
Maldiv Islands, cowries	526	<i>Mesodon inflectus</i>	597
<i>Mangelia attenuata</i>	863-4, 868	<i>Mesodon perigraptus</i>	598
<i>Mangelia brachystoma</i>	863-4	<i>Mesodon thyroidus</i>	598
<i>Mangelia coarctata</i>	495	<i>Mesodon zaletus</i>	598
<i>Mangelia nebula</i>	838	<i>Mesomphix</i>	601
<i>Mangelia powisiana</i>	838	MIENIS, H.K., A case of predation	
<i>Manzonia crassa</i>	495, 864, 907	on <i>Melanoides tuberculata</i> by the	
Mapping	941	glossy ibis in Israel	783
Map of Colonsay with recording sites	475	MILLAR, A.J., Snail trails in the	
Map of current progress on the action		Dordogne	515
plan for the conservation of land		<i>Milax budapestensis</i>	893
and freshwater molluscs	822	<i>Mitra cornicula</i>	918, 923
Map of Dordogne with collecting		<i>Mitra ebenus</i>	923
sites	516	<i>Modiolarca tumida</i>	603, 611, 864, 908
Map of dredge sites in Mulroy Bay,		<i>Modiolarca tumida</i> (figures)	610
Co. Donegal	861	<i>Modiola cuprea</i>	823
Map of Maldiv Islands	527-528	<i>Modiolula phaseolina</i>	603-4, 606, 607, 623
Map of Ngorongoro Crater, Tanzania	676	<i>Modiolula phaseolina</i> (figures)	606, 622
Map of Treswell wood,		<i>Modiolus</i>	944
Nottinghamshire	533	<i>Modiolus adriaticus</i>	475
<i>Margarites helacinus</i>	863	<i>Modiolus modiolus</i>	603, 621, 654
<i>Margaritifera</i>	770	<i>Modiolus modiolus</i> (figure)	620
<i>Margaritifera auricularia</i>	654, 771-72	<i>Modiolus scalprum</i>	944
<i>Margaritifera margaritifera</i>	654, 706,	<i>Moerella donacina</i>	909
	767, 772	<i>Moerella pygmaea</i>	495
Marple, Cheshire, mollusca of	900	Molluscan conservation: a strategy	
Marquesas, species extinction	931	for the 21st century	770
<i>Mathilda</i>	945	Mollusca, evolution of	941
McMILLAN, N., About <i>Planorbarius</i>		Mollusca, history of	939
<i>corneus</i> and introductions	947	Molluscs from the Tien Shan	
McMILLAN, N., Molluscs from		Mountains, Kazakhstan,	
the Tien Shan Mountains,		Central Asia	744
Kazakhstan, Central Asia	744	Molluscs of the northern Wey	625
McMILLAN, N., The Winckworth		Mollusc conservation in the UK	
Collection of British marine		(second edition). A brief summary	
Mollusca	823	of this landmark in biodiversity	
MEECHAN, C., A glass menagerie.		conservation	651
The work of Leopold and		Mollusc conservation	651, 656
Rudolph Blaschka	690	<i>Monacha cantiana</i>	518, 777, 895
Mearns, list of molluscs described		<i>Monacha cartusiana</i>	515, 518, 521, 653
from material collected by	645	<i>Monodonta</i>	918
<i>Medusafissurella melvilli</i>	757	<i>Monodonta articulata</i>	922
<i>Megatebennus bimaculatus</i>	760	<i>Monodonta lineata</i>	497, 564, 869, 906
<i>Megathura crenulata</i>	757	<i>Monodonta turbinata</i>	715, 720, 922
<i>Megathura crenulata</i> (photo)	759	Moorea, mollusca of	810, 928
<i>Melanella frielei</i>	845	More children's conchological poems	751
<i>Melanoides tuberculata</i>	783	Mount Carmel, fossils from	538

Index to Volume 8, Numbers 133 to 144

<i>Murella</i>	491	Old and new in Shetland	705
<i>Murex brandaris</i>	716, 720, 916, 919, 922, 938	<i>Omalogyra atomus</i>	863, 908
<i>Murex trunculus</i>	916	<i>Onchidella celtica</i>	905, 908
<i>Musculus costulatus</i>	497	<i>Ondina diaphana</i>	840, 863-4
<i>Musculus discors</i>	603, 609, 864, 908	<i>Ondina divisa</i>	862-5
<i>Musculus discors</i> (figures)	608	<i>Ondina warreni</i>	840
<i>Mya arenaria</i>	910	<i>Onoba aculeus</i>	863, 907
<i>Mya truncata</i>	496, 864	<i>Onoba semicostata</i>	863, 907
<i>Mysella bidentata</i>	864, 909	<i>Opeas araeum</i>	806
<i>Mysia undata</i>	478, 838, 864	<i>Opeas euschemon</i>	806
<i>Mytilus</i>	783	<i>Opeas marsabitense</i>	806
<i>Mytilus edulis</i>	478, 603-4, 613, 731-2, 864, 866, 868-9, 905, 908	<i>Opeas psephenum</i>	806
<i>Mytilus edulis</i> (figures)	612	<i>Opeas (Nothapalinus) suavisissimum</i>	806
<i>Mytilus edulis</i> (photo)	734	<i>Oreohomorus nitidus</i>	679
<i>Myxas glutinosa</i>	653-4	<i>Oreohomorus zebra</i>	805
<i>Nacella</i>	757	Orkney Islands, mollusca of	848, 851-54
<i>Nacella concinna</i>	664	Oronsay, mollusca of	479
<i>Nassarius incrassatus</i>	923	<i>Ostrea edulis</i>	638, 654, 733, 908, 923
<i>Nassarius reticulatus</i>	923	<i>Otina ovata</i>	640, 908
<i>Naticarius hebraeus</i>	922	Ouse Valley, Bedfordshire, mollusca of	775
<i>Neopilina</i>	506	<i>Ovatella myosotis</i>	587, 638, 640, 705
<i>Nesovitrea hammonis</i>	893	<i>Oxychilus alliarius</i>	587, 890, 893
Nest boxes	537	<i>Oxychilus cellarius</i>	890, 895
New colony of <i>Cochlicella barbara</i> at Kenfig	781	<i>Oxyloma pfeifferi</i>	627, 895
Northamptonshire, mollusca of	775	<i>Oxyloma sarsi</i>	654
<i>Notacmaea</i>	757	Oyster	479
<i>Nothapalus</i> sp.	678	PAIN, C., Society visit to the British Antarctic Survey, Madingly and University of Cambridge Zoological Museum, Downing Street, Cambridge on 27 June 1995	663
<i>Nothapalus</i> sp. aff. <i>iredalei</i>	678	PAYNE, S., Containers for small shells	710
<i>Nothapalus</i> sp. indet.	678	Pacific Islands Land Snail Group Annual Meeting, 6 and 7 June 1996	810
<i>Nothapalus</i> sp. juv.	678	Pacific Islands Land Snail Group Annual Meeting, 23 June 1997	928
<i>Nothapalus iredalei</i>	678	Pacific Island Land Snail Annual Meeting, Jersey Wildlife Preser- vation Trust, 29 and 30 April 1995	575
NUNN, J., Additions and corrections to 'Recording Mollusca in Ireland: Achill Island, Co. Mayo'	495	<i>Palliolium striatum</i>	846
NUNN, J., Recording Mollusca in Ireland: a day's dredging in Mulroy Bay, Co. Donegal	860	<i>Palliolium tigerinum</i>	864
<i>Nucella lapillus</i>	478, 496, 654, 732, 767, 863, 866, 869, 905, 907	<i>Paludinella</i>	661
<i>Nucula nitidosa</i>	864-5	<i>Papustyla pulcherrima</i>	771
Nuku Hiva, mollusca of	811	<i>Parainoceramus ventricosus</i>	944
Nuku Hiva, species extinction	931	Parasites, protozoa	875, 932
Observations on the development of dentition in small juveniles of certain species of Mytilidae	603	<i>Parmocella</i>	659
<i>Ocenebra erinacea</i>	907	<i>Partula</i>	498, 575, 657, 773, 810, 816, 819, 928-33
<i>Ocenebrina aciculata</i>	845	<i>Partula affinis</i>	811
<i>Odostomia plicata</i>	908	<i>Partula arguta</i>	576, 814
<i>Odostomia turrita</i>	864, 908	<i>Partula clara</i>	811
<i>Odostomia unidentata</i>	908		
Oil spills	866-869		

Index to Volume 8, Numbers 133 to 144

<i>Partula faba</i>	580, 815	<i>Patella flexuosa</i>	757
<i>Partula gibba</i>	576, 578, 813	<i>Patella granatina</i>	757
<i>Partula langfordii</i>	579	<i>Patella granatina</i> (photo)	759
<i>Partula mirabilis</i>	933	<i>Patella granularis</i>	757
<i>Partula mirabilis x taeniata</i> births and deaths compared with RH and temperature	726-7, 877, 879	<i>Patella longicosta</i>	757
<i>Partula mirabilis x taeniata</i> population births and deaths for 1995	726	<i>Patella longicosta</i> (photo)	758
<i>Partula mirabilis x taeniata</i> population births and deaths for 1996	877	<i>Patella lusitanica</i>	719-20, 922
<i>Partula mirabilis x taeniata</i> population figures for 1995	724	<i>Patella mexicana</i>	760
<i>Partula mirabilis x taeniata</i> population figures for 1996	876	<i>Patella oculus</i>	757
<i>Partula mirabilis x taeniata</i> population trends for 1995	725	<i>Patella safiana</i>	757
<i>Partula mirabilis x taeniata</i> population trends for 1996	876	<i>Patella tabularis</i>	757
<i>Partula mirabilis x taeniata</i> 555, 723, 816, 875, 934		<i>Patella ulyssiponensis</i>	756, 906
<i>Partula mooreana</i>	578	<i>Patella vulgata</i>	478, 496, 731, 756, 866, 906
<i>Partula nodosa</i>	583, 933	Patelloidea	757
<i>Partula otaheitanana</i>	576, 811-12, 930, 932	Pathology	817
<i>Partula radiolata</i>	813	PEMBERTON, R., More children's conchological poems	751
<i>Partula simulans</i>	815	<i>Pecten jacobaeus</i>	923
<i>Partula suturalis</i>	815, 929, 933	<i>Pecten maximus</i>	732, 864, 909
<i>Partula suturalis strigosa</i>	583, 931-2, 934	<i>Percivalia nyiroensis</i>	806
<i>Partula suturalis vexillum</i>	812, 934	Percival, list of molluscs described from material collected by	802
<i>Partula taeniata</i>	576, 581, 812, 933	<i>Perforatella rubiginosa</i>	599
<i>Partula taeniata elongata</i>	934	<i>Petricola lithophaga</i>	923
<i>Partula taeniata nucleola</i>	578, 934	Pfeiffer, list of molluscs described from material collected by	493
<i>Partula taeniata simulans</i>	934	PHORSON, J.E., Observations on the development of dentition in small juveniles of certain species of Mytilidae	603
<i>Partula tohiveana</i>	579-81, 812, 933	<i>Phalium granulatum undulatum</i>	922
<i>Partula turgida</i>	814, 932	<i>Pharus legumen</i>	867
<i>Partula varia</i>	576, 933	<i>Phenacolinax major</i>	648
Partulidae, history	940	<i>Pherusina gulsonae</i>	908
<i>Partulida pellucida</i> = <i>spiralis</i>	864	<i>Philine catena</i>	839
<i>Partulida spiralis</i>	864, 908	<i>Philine punctata</i>	908
<i>Parvicardium</i>	909	<i>Philomycus carolinianus</i>	601
<i>Parvicardium exiguum</i>	864, 923	<i>Pholadomya costata</i>	945
<i>Parvicardium ovale</i>	863-4	<i>Pholas dactylus</i>	732
<i>Parvicardium papillosum</i>	923	<i>Physa acuta</i>	892
<i>Parvicardium scabrum</i>	478	<i>Physa fontinalis</i>	894
<i>Parypanta</i>	771	<i>Physa heterostrophia</i>	627, 891
<i>Passaloteuthis apicicurvata</i>	945	PILCHER, F. and FEU, C. DU, Tree slugs <i>Limax marginatus</i> (Müller 1774) in Treswell Wood	532
Past and present: shell collecting on Kouphonisi	915	PINN, F., Rudists and Dentalium on Mount Carmel	538
<i>Patella cochlear</i>	757	PINN, F., Shells on ancient coins	935
<i>Patella cochlear</i> (photo)	758	PINN, F., Shells on coins and bank notes	698
<i>Patella coerulea</i>	756, 922	PINN, F., The money cowrie of the Maldiv Islands - A miracle of reproduction (?)	526
<i>Patella concolor</i>	757	<i>Pila</i>	784
<i>Patella crenata</i>	756		
<i>Patella depressa</i>	732, 756, 906		

Index to Volume 8, Numbers 133 to 144

<i>Pila ovata</i>	677	for the conservation of land and	
<i>Pila wernei</i>	886	freshwater molluscs	821
<i>Pinna folium</i>	944	<i>Pseudamnicola confusa</i> (Frauenfeld)	
<i>Pirenella conica</i>	922	in the Yare Valley, Norfolk	778
<i>Pisidium</i>	503, 543, 779	<i>Pseudamnicola confusa</i>	654, 767, 778, 896-7
<i>Pisidium amnicum</i>	627, 894	<i>Pseudanodonta complanata</i>	654, 767
<i>Pisidium casertanum</i>	684-5	<i>Pseudochama gryphina</i>	923
<i>Pisidium conventus</i>	654	<i>Pseudoglessula</i> sp. juv.	679
<i>Pisidium henslowianum</i>	706	<i>Pseudoglessula ingloria</i>	806
<i>Pisidium kenianum</i>	684	<i>Pseudoglessula liederii</i>	679
<i>Pisidium liljeborgii</i>	706	<i>Pseudoglessula</i> aff. <i>liederii</i>	679
<i>Pisidium milium</i>	897	<i>Pseudoglessula monticola</i>	494, 679
<i>Pisidium nitidum</i>	897	<i>Pseudoglessula mutandana</i>	806
<i>Pisidium obtusale</i>	897-8	<i>Pseudoglessula solitudinum</i>	806
<i>Pisidium personatum</i>	892	<i>Pseudoglessula transenna</i>	806
<i>Pisidium pseudosphaerium</i>	654	<i>Pseudoglessula</i> (Kempioconcha)	
<i>Pisidium supinum</i>	543, 895	<i>monticola</i>	494
<i>Pisidium tenuilineatum</i>	654, 767	<i>Pseudopeas elachistum</i>	806
<i>Planorbarius corneus</i>	627, 891, 894	<i>Pseudopeas kekumeganum</i>	806
<i>Planorbarius corneus</i> , introduction, Ireland	947	<i>Pseudopecten acuticostata</i>	944
<i>Planorbis</i>	784	<i>Ptychotrema usambarense</i>	712
<i>Planorbis carinatus</i>	627, 894	<i>Punctum</i>	599, 685
<i>Planorbis planorbis</i>	627, 894-5	<i>Punctum</i> cf. <i>hottentotum</i>	681
Plans for 'environmentally		<i>Punctum minutissimum</i>	600
controlled container'	556	<i>Punctum pygmaeum</i>	600, 742, 892
<i>Platymya concinna</i>	945	<i>Puncturella noachina</i>	862-4
<i>Pleurobranchus membranaceus</i>	838	<i>Pupilla muscorum</i>	518, 587, 742
<i>Pleurotomaria debuchii</i>	945	<i>Pupisoma renschi</i>	494
<i>Plicatula spinosa</i>	945	Purple dye	915
POCOCK, B., A geological excursion		<i>Pusillina inconspicua</i>	863
to the Isle of Wight, 20-21 April		<i>Pusillina sarsi</i>	863
1996	735	Pyramidellidae	563, 908
<i>Pododesmus patelliformis</i>	495, 909	<i>Pyrene scripta</i>	922
<i>Polinices catena</i>	867-8	<i>Quickia</i> sp., anatomy	747
<i>Polinices montagui</i>	868	<i>Raphitoma linearis</i>	863
<i>Polinices polianus</i>	867	<i>Raphitoma purpurea</i>	863-4
Pollution	866-869	RECORDIT	545
<i>Polycera quadrilineata</i>	908	REYNOLDS, J.E., Pacific Islands	
<i>Polygyra dorfeuilliana</i>	599	Land Snail Group Annual	
<i>Polygyra leporina</i>	599	Meeting, 6 and 7 June 1996	810
<i>Polygyreulima polita</i>	495	REYNOLDS, J.E., Pacific Islands	
<i>Polytoxon robustum</i>	681, 887	Land Snail Group Annual	
<i>Pomacea</i>	498	Meeting, 23 June 1997	928
<i>Pomatias elegans</i> in the Ouse Valley,		REYNOLDS, J.E., Pacific Island	
Bedfordshire	775	Land Snail Annual Meeting,	
<i>Pomatias elegans</i>	775, 781-782	Jersey Wildlife Preservation	
Population trends <i>in vitro</i> , <i>Partula</i>	558	Trust, 29 and 30 April 1995	575
Porthgwarra, Cornwall, mollusca of	739	REYNOLDS, J.E., Report of the	
<i>Potamopyrgus antipodarum</i>	478, 587, 626,	Conchological Society Partula	
742, 778, 891-2, 895, 897-8		colony 1996	875
<i>Potamopyrgus jenkinsi</i>	478, 587, 626,	REYNOLDS, J.E., Report of the	
742, 778, 891-2, 895, 897-8		Conchological Society Partula	
Progress report on the action plan		colony, 1995	723
		REYNOLDS, J.E., Terrestrial Inverte-	

Index to Volume 8, Numbers 133 to 144

brate Taxon Advisory Group		<i>Scutus unguis</i>	757
mollusc sub group meeting,		<i>Segmentina nitida</i>	653-4
30 January 1996	656	<i>Sepia officinalis</i>	720, 731, 910, 923
REYNOLDS, J.E., The big slug day	785	<i>Sepiola atlantica</i>	864
REYNOLDS, J.E., The Conchological		SHARPE, J.R., Past and present:	
Society's Partula colony	555	shell collecting on Kouphonisi	915
Reading molluscs 100 years on	889	SHARPE, J.R., Shell collecting in the	
Recording Mollusca in Ireland:		ancient Mediterranean	715
a day's dredging in Mulroy Bay,		Shells on ancient coins	935
Co. Donegal	860	Shells on coins and bank notes	698
Rediscovery of <i>Azeca goodalli</i>		Shell collecting in the ancient	
in Cheshire	899	Mediterranean	715
Red List 1994	499	Shell sand	475, 562, 739, 835
Regeneration	816	Sieving	520
Report of a conference held at		<i>Simulipecten similis</i>	840
the Royal Geographical Society,		<i>Simnia patula</i> (figure)	739
Kensington, 16 June 1997	855	Sinistrorsity	902
Report of the Conchological Society		<i>Siphonaria</i>	756-7
Partula colony, 1995	723	<i>Skenea nitens</i>	906
Report of the Conchological Society		<i>Skenea serpuloides</i>	906
Partula colony 1996	875	<i>Skeneopsis planorbis</i>	863, 907
Research grant rules	624	Slugs, swimming	911
<i>Retinella</i>	601	SMITH, I.F., Rediscovery of	
<i>Retusa obtusa</i>	864	<i>Azeca goodalli</i> in Cheshire	899
<i>Retusa truncatula</i>	863-4, 908	SMITH, S.M., After the Sea Empress	866
<i>Retusa umbilicata</i>	846, 862, 864	Snail trails in the Dordogne	515
<i>Rhachidina festiva</i>	806	Society visit to the British Antarctic	
<i>Rhomboidella prideauxi</i>	603, 617	Survey, Madingly and University	
<i>Rhomboidella prideauxi</i> (figures)	616	of Cambridge Zoological Museum,	
Rising to the biodiversity challenge		Downing Street, Cambridge on 27	
– the next five years. A report of a		June 1995	663
conference held at the Royal		<i>Solenocurtus strigillatus</i>	720
Geographical Society, Kensington,		<i>Solen marginatus</i>	732
16 June 1997	855	Species conservation	764-7, 770-74
<i>Rissoa guerinii</i>	907	Species list, Achill Island	495
<i>Rissoa interrupta</i>	863, 907	Species list, Anthony, Cornwall	906-910
<i>Rissoa lilacina</i>	495, 863	Species list, Carlyon Bay	906-910
<i>Rissoa parva</i>	733, 835, 863, 907	Species list, Channel Islands	851-54
<i>Rissoella diaphana</i>	495, 863, 908	Species list, Colonsay	483-9
<i>Rissoella globularis</i>	864	Species list, Earley High Wood	890
<i>Rissoella opalina</i>	863	Species list, East Looe	906-910
Rockland Broad	896	Species list, Exmouth	733-4
Roman snails live on TV	942	Species list, Fowey	906-910
<i>Rostanga rubra</i>	640	Species list, Gorran Haven	906-910
Rudists and Dentalium on		Species list, Hannafore Point	906-910
Mount Carmel	538	Species list, Inner Hebrides	851-54
<i>Ryderia graphica</i>	944	Species list, Kouphonisi, Greece	922
Sacred chank	698, 935-6	Species list, Lias fossils, Blockley,	
<i>Samoana</i>	582, 811, 816, 928, 930	Gloucestershire	944-5
<i>Samoana</i> , extinction	931	Species list, Looe river estuary	906-910
<i>Samoana attenuata</i>	812	Species list, Maiden Erlegh	892-3
<i>Samoana fragilis</i>	813	Species list, Millendreath	906-910
Silly Isles, mollusca of	837, 846-7, 851-54	Species list, Mulroy Bay, Donegal	863-5
<i>Scrobicularia plana</i>	478, 496, 732, 909	Species list, Orkney Islands	851-54

Index to Volume 8, Numbers 133 to 144

Species list, Oronsay	483-9	<i>Striatura</i>	599
Species list, Outer Hebrides	851-54	<i>Striatura meridionalis</i>	600
Species list, Polkerris	906-910	<i>Striatura milium</i>	600
Species list, Polruan	906-910	<i>Strobilops</i>	599
Species list, Portwrinkle	906-910	<i>Strobilops aenea</i>	600
Species list, Rame, Cornwall	906-910	<i>Strobilops labyrinthica</i>	600, 737
Species list, Scilly Isles	851-54	<i>Strobilops texasiana</i>	600
Species list, Seaton, Cornwall	906-910	<i>Strombus gigas</i>	771
Species list, Talland Bay	906-910	<i>Strombus taurus</i>	506
Species list, Thames Business Park, Earley	894-5	<i>Subulina</i>	812
Species list, Warren Point, Cornwall	906-910	<i>Subulina taruensis</i>	807
Species list, Whitsand Bay, Cornwall	906-910	<i>Subuliniscus</i> sp.	679
Species list, Wilcove, Cornwall	906-910	<i>Subuliniscus adjacens</i>	807
Species list, Woodley water garden	891	<i>Subuliniscus cornu-orycis</i>	807
<i>Spermodea</i>	600	<i>Subuliniscus marsabitensis</i>	807
<i>Spermodea lamellata</i>	648-9	<i>Subuliniscus nyiroensis</i>	807
<i>Sphaeriola subglobosa</i>	945	<i>Subuliniscus urguessensis</i>	807
<i>Sphaerium corneum</i>	627, 742, 894-5	<i>Subulona egregia inflata</i>	805
<i>Sphaerium lacustre</i>	891	<i>Subulona usagarica monticula</i>	494
<i>Sphaerium rivicola</i>	895	<i>Subulona usambarica</i>	493
<i>Sphaerium solidum</i>	654	<i>Succinea</i>	521, 685
<i>Sphaeronassa mutabilis</i>	918, 922	<i>Succinea baumanni</i>	677
<i>Spisula elliptica</i>	909	<i>Succinea</i> cf. <i>baumanni</i>	677
<i>Spisula solida</i>	731, 734, 909	<i>Succinea putris</i>	627, 894
<i>Spisula solida</i> (photo)	734	<i>Succinea sainthelenae</i>	659
<i>Spisula subtruncata</i>	909	Swimming slugs	911
<i>Steinhausia</i> (flagellate)	932	TALLACK, R., Old and new in Shetland	705
STREET, C., A Cornish problem child - <i>Simnia patula</i>	739	Table of mollusca listed in UK Bio- diversity Steering Group Report	768-769
STREET, C., Islands and shellsand	835	Tahiti, mollusca of	810, 930
STREET, C., The distribution of dead shells on Colonsay shores	475	Tahuatu, mollusca of	811
<i>Stenotrema labrosum</i>	599	Tahuatu, species extinction	931
<i>Stenotrema pilsbryi</i>	599	<i>Tandonia budapestensis</i>	893
<i>Stenotrema unciferum</i>	599	<i>Tandonia sowerbyi</i>	749
<i>Streptostele</i> sp.	683	Tanzania, mollusca of	492, 675
<i>Streptostele clavulus</i>	807	<i>Tapes decussatus</i>	496, 734, 910
<i>Streptostele constricta</i>	807	<i>Tapes rhomboides</i>	864, 910
<i>Streptostele crassireticulata</i>	807	<i>Tayloria angustestriata</i>	494
<i>Streptostele crassiplicata</i>	682, 807	<i>Tayloria desiderata</i>	806
<i>Streptostele hasta</i>	807	<i>Tayloria marsabitensis</i>	806
<i>Streptostele iota</i>	807	<i>Tayloria urguessensis</i>	807
<i>Streptostele minor</i>	683	<i>Tectura virginea</i>	863, 906
<i>Streptostele nyiroensis</i>	807	<i>Tellinomya ferruginosa</i>	909
<i>Streptostele ordinaria</i>	807	Temperature, Partula	560
<i>Streptostele osculum</i>	807	<i>Tenellia adspersa</i>	654
<i>Streptostele patruelis</i>	807	<i>Teredo norvegica</i>	495
<i>Streptostele urguessensis</i>	807	Terrestrial Invertebrate Taxon Advisory Group mollusc sub group meeting, 30 January 1996	656
<i>Streptostele zambiensis</i>	683	<i>Thapsia bartaensis</i>	804
<i>Streptostele</i> (<i>Graptostele</i>) <i>iota</i>	807	<i>Thapsia marsabitensis</i>	804
<i>Streptostele</i> (<i>Raffraya</i>) <i>constricta</i>	807	<i>Thapsia nemorum</i>	804

Index to Volume 8, Numbers 133 to 144

<i>Thapsia pallidior</i>	804	<i>Trichia hispida</i>	599, 893, 895
<i>Thapsia urguesensis</i>	804	<i>Trichia plebeia</i>	518
<i>Thapsia vernhouti</i>	804	<i>Trichia striolata</i>	894-5
<i>Theba pisana</i>	781-782	<i>Tricolia pullus</i>	863, 906
<i>Theodoxus concavus</i>	737	<i>Tridacna</i>	572
<i>Theodoxus fluviatilis</i>	543, 894-5	<i>Tridacnidae</i>	771
The big slug day	785	<i>Tridonta montagui</i>	839
The Conchological Society's Partula colony	555	<i>Triodopsis</i>	597
The Cornwall marine field meeting	903	<i>Triodopsis alleni</i>	598
The distribution of dead shells on Colonsay shores	475	<i>Triodopsis fosteri</i>	598
The distribution of dead shells: a response to Christine Street	562	<i>Trivia</i>	637
The existence of <i>Pseudamnicola confusa</i> (Frauenfeld) living on the margins of Rockland broad, Rockland St Mary, Norfolk.		<i>Trivia arctica</i>	732, 863, 907
TG 332 052	896	<i>Trivia europaea</i>	496
The Lost Ark: new and rediscovered animals of the twentieth century (book review)	505	<i>Trivia monacha</i>	732, 863, 868, 907
The mollusca of Ngorongoro, Tanzania	675	<i>Trochomorpha</i>	811, 814
The money cowrie of the Maldiv Islands - A miracle of reproduction (?)	526	<i>Trochonanina</i>	501, 685
The problems of keeping rare snails in captivity in a domestic environment	555	<i>Trochonanina crassiplicata</i>	805
The reprint mailing list of Lt. Col. H.H. Godwin-Austen	501	<i>Trochonanina decussata</i>	797, 805
The Winckworth Collection of British marine Mollusca	823	<i>Trochonanina exquisita</i>	804
<i>Thracia convexa</i>	862, 864	<i>Trochonanina exquisita gudei</i>	804
<i>Thracia distorta</i>	640	<i>Trochonanina inflata</i>	805
<i>Thyasira flexuosa</i>	478, 864	<i>Trochonanina larogensis</i>	804
Tien Shan Mountains, mollusca of	744	<i>Trochonanina levistriata</i>	682
<i>Timoclea ovata</i>	478, 862, 864	<i>Trochonanina mozambicensis</i>	682
TOPLEY, P., First modern record from vice county 68 (Cheviot) of <i>Vertigo pusilla</i> Müller 1774	586	<i>Trochonanina nyiroensis</i>	805
<i>Tonicella marmorea</i>	840, 906	<i>Trochonanina obtusangulata</i>	887
<i>Tonicella rubra</i>	840, 906	<i>Trochonanina plicatula</i>	682, 805-6
<i>Tornus subcarinatus</i>	729-30	<i>Trochonanina simulans</i>	493, 887
<i>Trachycystis</i>	685	<i>Trochonanina solida</i>	806
<i>Trachycystis ariel</i>	681	<i>Trochonanina (Montanobloetia) simulans meruensis</i>	493
<i>Trachycystis lamellifera</i>	681	<i>Trochonanina (Montanobloetia) simulans simulans</i>	887
<i>Trachycystis lamellosa</i>	494	<i>Trochazonites prestoni</i>	807
<i>Trachycystis (Psichion) ariel</i>	681	<i>Trochus erythraeus</i>	922
Tree slugs <i>Limax marginatus</i> Müller 1774) in Treswell Wood	532	<i>Tropidophora anceps</i>	677
<i>Trichia</i>	518, 658	<i>Tropidophora letourneuxi</i>	677
		<i>Truncatella subcylindrica</i>	715
		<i>Truncatellina</i>	519
		<i>Truncatellina callicratis</i>	519, 654
		<i>Truncatellina cylindrica</i>	654
		<i>Trunculariopsis trunculus</i>	721, 916, 919-22
		<i>Trunculariopsis trunculus (photo)</i>	919
		<i>Tube worms</i>	564
		<i>Turbinella pyrum</i>	698
		<i>Turbo sandwicensis</i>	946
		<i>Turbonilla jeffreysii</i>	862, 864
		<i>Turbonilla lactea</i>	637, 864
		<i>Turbonilla rufescens</i>	862, 864
		<i>Turritella communis</i>	478, 732, 862-3, 922
		<i>Turtonia minuta</i>	868, 910
		<i>Tutcheria submulticostata</i>	945
		Twelfth International Malacological Congress, 3-8 September 1995	660

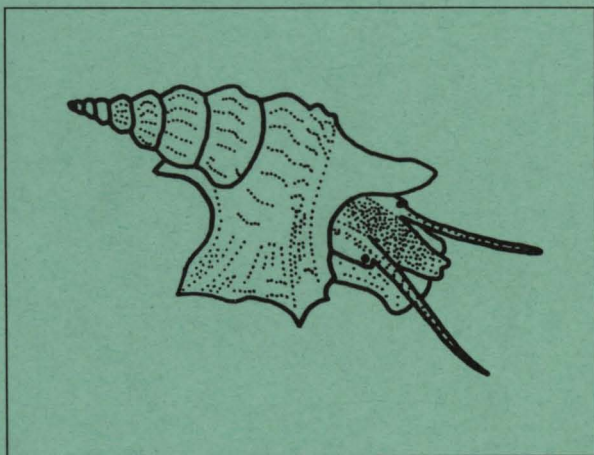
Ua Huka, mollusca of	811	<i>Vitreolina philippii</i>	908
Ua Pou, mollusca of	811	<i>Vitrina</i> sp.	681
Unionidae	771	<i>Vitrina nigrocineta</i>	887
<i>Unio pictorum</i>	543, 895	<i>Vitrina pellucida</i>	586-7
<i>Unio tumidus</i>	543	<i>Viviparus viviparus</i>	894-5
University of Cambridge Zoological Museum	663	Volkens, list of molluscs described from material collected by	886
<i>Vallonia costata</i>	587	WARDHAUGH, A.A., Woodland molluscs and coppicing	646
<i>Vallonia excentrica</i>	587, 708	Wet, Wet, Wet or The Cornwall marine field meeting	903
<i>Vallonia pulchella</i>	895	Where to go for shells - Exmouth, Devon	731
<i>Valvata cristata</i>	779, 897	WILLING, M.J., Biodiversity: the UK Steering Group Report - a personal overview	763
<i>Valvata macrostoma</i>	654, 749	WILLING, M.J., Rising to the bio- diversity challenge - the next five years. A report of a conference held at the Royal Geographical Society, Kensington, 16 June 1997	855
<i>Valvata piscinalis</i>	626, 893-5	WILLING, M., Biodiversity Challenge: an agenda for conservation in the UK (second edition). A brief sum- mary of this landmark in biodiversity conservation	651
<i>Vampyroteuthis infernalis</i>	506	Winkles	478
VERDCOURT, B., Collectors in East Africa No. 23: K.L. Pfeiffer (1874-1952)	490	Woodland molluscs and coppicing	646
VERDCOURT, B., Collectors in East Africa No. 24: E.A. Mearns (1856-1916)	642	Woodley water garden, freshwater mollusca of	891
VERDCOURT, B., Collectors in East Africa No. 25: A.B. Percival (1875-1941)	795	Yare Valley, Norfolk, freshwater mollusca of	778
VERDCOURT, B., Collectors in East Africa No. 26: G. Volkens (1855-1917)	881	<i>Zenobiella subrufescens</i>	648-9
VERDCOURT, B., Introduced succineids in Britain	746	<i>Zingis</i> sp.	682, 685
VERDCOURT, B., Latin descriptions	712	<i>Zonitoides arboreus</i>	601
VERDCOURT, B., <i>Pomatias elegans</i> in the Ouse Valley, Bedfordshire	775	<i>Zonitoides excavatus</i>	661
VERDCOURT, B., The mollusca of Ngorongoro, Tanzania	675	<i>Zonitoides nitidus</i>	601, 627, 894, 898
VERDCOURT, B., The reprint mailing list of Lt. Col. H.H. Godwin- Austen	501	□	
<i>Velella</i>	475, 836, 842		
<i>Venerupis senegalensis</i>	496, 734, 864, 910		
<i>Ventridens demissus</i>	601		
<i>Ventridens ligera</i>	601		
<i>Venus striatula</i>	923		
<i>Venus verrucosa</i>	495, 864, 910, 923		
<i>Vermetus cristatus</i>	922		
<i>Vermetus gigas</i>	922		
<i>Vertigo</i>	519, 599		
<i>Vertigo alpestris</i>	654		
<i>Vertigo angustior</i>	654, 771		
<i>Vertigo antiveritigo</i>	741-42, 897		
<i>Vertigo genesii</i>	654		
<i>Vertigo geyeri</i>	654		
<i>Vertigo liljeborgi</i>	654		
<i>Vertigo modesta</i>	654		
<i>Vertigo moulinsiana</i>	542, 654, 772, 897		
<i>Vertigo pusilla</i> (photo)	586		
<i>Vertigo pygmaea</i>	587, 707, 776		
<i>Vertigo substriata</i>	648-9, 708, 892		
<i>Vicarühelix gregorii</i>	806		
<i>Vitrea crystallina</i>	893		

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The distribution of dead shells on Colonsay shores

Christine Street

Barkingside, Ilford

Noting the position of dead shells is usually considered a less reliable guide to the true distribution of molluscs than the recording of live specimens, but as most of my collecting is done by tideline and shellsand, I have become fascinated by the distribution of these shells.

Just how reliable a guide to the distribution of live shells is their distribution when dead? I had the chance to keep records on the island of Colonsay in the Hebrides during August 1992. As we were there for three weeks I could make quite a close examination of the 17 beaches that we visited. What seems to be shown from my records is that shells are remarkably specific to areas. The island is obviously under the influence of the Gulf Stream as three shells picked up on western beaches showed. These are an entire *Janthina* with float, at Coite Creige, a valve of *Irus irus* at Kiloran and of *Modiolus adriaticus* at Port Lobh. Further evidence was provided by the appearance of *Velella*, By-the-wind-sailors, at beaches numbered 5, 8 and 9 on the map. Colonsay is 10 miles or so to the north of Islay and about the same distance west of Jura. Across to the north-east is the Firth of Lorne and Mull is about 10 miles to the north. To the west is America.

I know there are pitfalls in looking too closely at data obtained in this way and limitations to what may be inferred, it being a study over a short period. They do show, however, significant variation with, for example, some areas and populations being dominated by juveniles. Also, the condition in which the shells are found varies from place to place. The availability of samples depends on there being a tideline. The position varies from day to day as does the quantity and quality of shellsand deposits. Three weeks gave an opportunity to look at beaches several times to give a fuller picture, though those beaches lacking much shellsand of course have a lower shell count. I normally collect the best specimens of each species that I can find. This means that on beaches dominated by larger bivalves my figures are not truly representative as I am hampered by the amount I can carry.

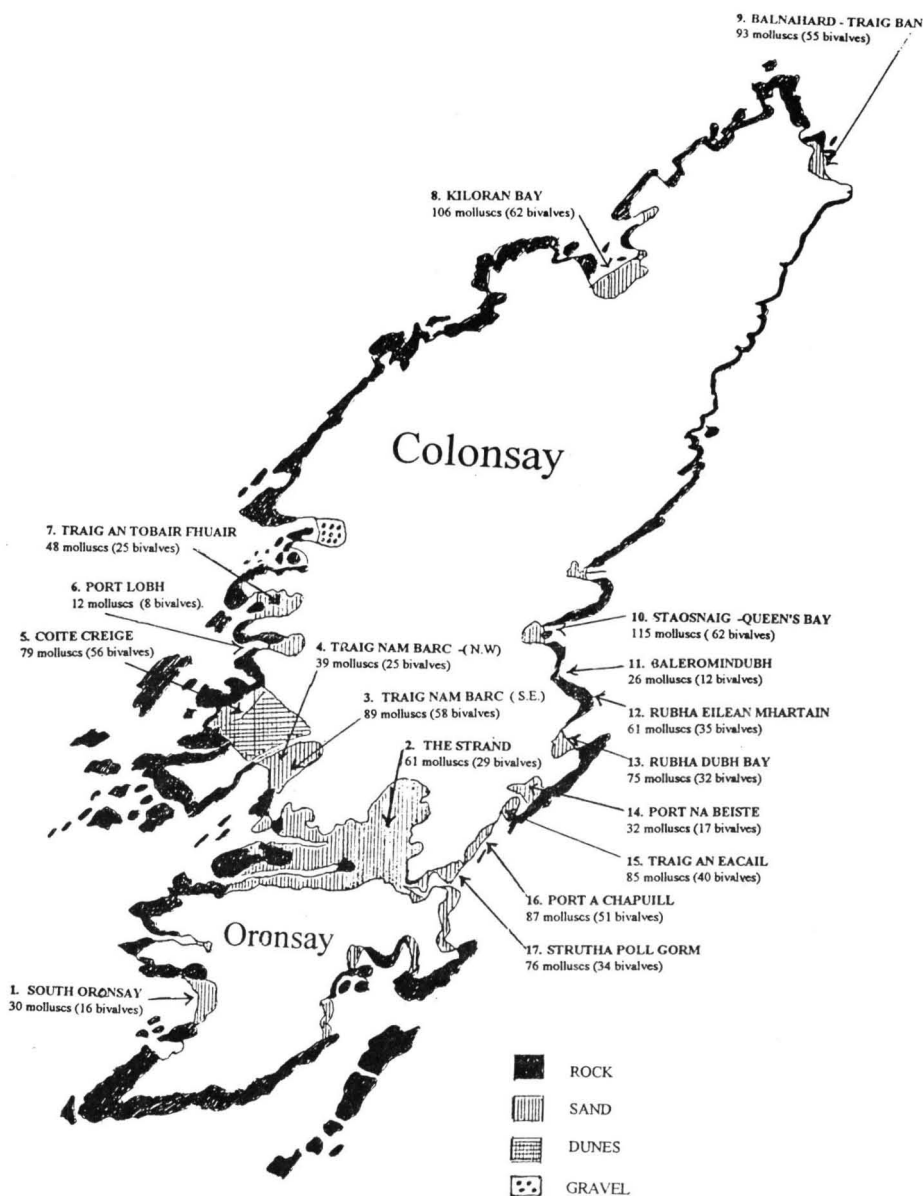


Fig. 1. Map of Colonsay with recording sites

So why do shells end up on different beaches? First, there are those which live intertidally on the beach or rocks, or just below the tide and in pools etc., which are likely to be well represented. These animals depend on the suitability of the site such as degree of exposure and type of substrate – rocks, mud, sand, gravel, etc. – and the availability of suitable food – animal, vegetable and detritus.

Secondly, there are those which live farther offshore but are brought in by the tide from their normal habitats. Where they end up on a beach depends on the topography of the shore in relation to the current and force of tide. Some shells are trapped by the shape of the coastline and some are sucked in by the positioning of offshore rocks and islands that then prevent their exit in the resultant mini-currents. In some areas the heavy winter tides throw shells high up on beaches that the tide rarely washes during the rest of the year. These shells are normally in poor condition from long exposure to sun and rain.

Another interesting feature of distribution is where particular species seem to be unique to particular locations. If this were studied together with feeding habits and habitat a clear pointer might be obtained to the whereabouts of the live animal. In all there were 21 species that were peculiar to one site only and a further 21 that were found at just two sites. Only two species were common to all 17 sites visited but a further 7 were present at 16 of the sites. To what extent do readers consider that the mixed populations agree (in habitat and food) with the characteristics of the sites at which they are found?

The most productive beaches in August 1992 were Queen's Bay with 115 species – shown as site No. 10 – the most northerly east-facing beach; Kiloran with 106 species – shown as site No. 8 – north-west facing; then Balnahard with 93 species – shown as site No. 9 – north-east facing. These are all large and sandy with rocks. When beaches with different characteristics are compared, the proportion of bivalve species to gastropods varies. The highest percentage at 71% is found on the sandy western beach Coite Creige which has many scattered rocks. Beaches 3, 4, 6, 8, 9, and 16 are all between 58–66%. Beaches with sand and mud, with gravel, or small in size – numbers 2, 11, 13, 15 and 17 – have percentages of bivalves to gastropods of between 42 – 48%.

It is difficult to compare the incidence of rock-dwelling

molluscs, as nearly all the beaches have rocks at sides, or rock ledges in front. This means that the gastropods associated with rocks and crevices such as winkles and limpets are among the most evenly distributed in my records. *Mytilus edulis* and *Gibbula cineraria* are present at all 17 sites. *Patella vulgata* is absent only from beach No. 4 with less rock and more dune and *Helcion pellucidum* from No. 14 a muddy sandy inlet. I did not find *Nucella lapillus* on the Strand or *Lucinoma borealis* at beach No. 6 which is steeper, small, well-washed and sandy, perhaps being too exposed, or the wrong texture.

The Strand, No. 2, is estuarine in character with fairly coarse yellow sandy mud. I found only *Scrobularia plana* there and at the similar Port na Beiste, No. 14. *Hydrobia ulvae* was in large numbers only at No. 2 and at associated Traig nam Barc, Nos. 3 and 4. *Potamopyrgus antipodarum* was found only at four beaches crossed by large running streams – Nos. 4, 8, 9, and 10. Beach No. 16 is a mix of sand and shell coarser than elsewhere, but the shells found included one specimen of *Aporrhais pespelicani* (only otherwise found at muddy Port na Beiste) with the only specimen of *Abra nitida*. It also held the highest number of *Parvicardium scabrum* and of *Timoclea ovata*. These seem generally to have a muddy gravelly habitat so perhaps offshore the seabed character changes to that of Queen's Bay. *Angulus squalidus* is only found at sites in the S.E.; at muddy No. 10, and at 13, 15, and 16, which possibly have mud offshore.

Queen's Bay is silver-sand above with grey mud and gravel lower down, and lots of weed in suspension. The only *Jujubinus montagui* (liking stony gravel) is recorded there; as is *Lacuna vincta* in very large numbers, which likes soft bottoms and much weed. *Thyasira flexuosa* likes sandy muds and is only present in large numbers at Queen's Bay. The only *Azorinus chamasolen*, liking mud, muddy sand, muddy gravel, is there and it is the only site of *Mysia undata* which burrows in muddy shell gravel. The highest count of *Hinia incrassata* is there, found under rocks and stones in silt, and of *Turritella communis* which likes burying itself in mud with much vegetable matter. These are just some of the examples of mixed populations which seem true to the site in which the dead shells were found.

Size and weight are other factors that influence where shells are deposited along a beach. This is, I suppose, due to the current

and strength of tide determining how far the weight may be brought. Larger, heavier shells are normally able to travel farther being more robust, unless like canoe shells they can float on the tide. Heavier shells are also more likely to be battered about by the tide for longer so are often found in a more worn state. Those frail shells that get to the beach have perhaps not travelled very far – although we all know of exceptions to that rule. Most of those in good condition probably have not been washed around from very far away especially if juveniles are plentiful.

Finally, there may be a human influence such as the farming of oysters on the Strand leading to escapes and breeding. There is also the chance of shell dumping by visitors (such as an exotic shell I found by the quay on Herm). Shells may also be dumped by fishermen – who are not much in evidence on Colonsay except indirectly by the presence of lobster pots. One may also find a few shells, usually damaged, discarded by feeding birds, but these are generally on surrounding dunes or rocks, their favourite resting points.

I have made a descriptive list of beaches with numbers to assist the reader in locating them and in judging their character. The beaches are listed in the order in which they come clockwise as they circle the island, starting at Oronsay, the island off the southern tip. Generally speaking, the beaches to the south and west are exposed and well scoured while those to the east are more sheltered and covered by vegetable matter and bleached bivalves. I also include a rather crude map showing sandy beaches as striped, and rock formations in black. The rocks shown include most which, by their position, might affect shells washed in. For a fuller picture one should refer to O/S map Pathfinder 375-NR 38/39/49 or sheet 61 of the 1:50,000 Landranger.

Dr Shelagh Smith spent six days on Colonsay in September 1993 and reports finding nearly 100 live and 100 dead species while she was there, but was disappointed by the lack of interesting shells and at that time. In comparing Dr Smith's figures with my own, I found 98 species and 3 varieties of gastropod and 80 species and one variety of bivalve. Eighty-three of those on my list of 182 species, Dr Smith found alive. I looked at species I found on only one, two or a few beaches, to see if Dr Smith found those live on Colonsay. Of the 57 I looked at, she did not find 28, 15 were found as shells and 14 were found live. Then I looked at the species

found on the most densely populated sites (noted in the charts by 'C', 100–1,000 specimens). I chose 14 of the more closely grouped of these and again made a comparison with Dr Smith's listings. Of the 14 chosen, only one did not occur in Dr Smith's records, the other 13 were found alive on either that beach or the next adjoining site.

Acknowledgements

I would like to thank Dr Smith for her great help with many of my puzzles that I was unable to identify. I have marked on my list those that she has identified or confirmed, in case of doubt. I would be most interested to hear from anyone having views or comments about the value – or otherwise – of the study of the distribution of dead shells. My thanks are also due to Jan Light for her considerable help and encouragement.

Bibliography

- Graham, A.**, 1988. Molluscs: Prosobranch and pyramidellid gastropods. *Synopses of the British Fauna (NS)* No. 2 (second edition). E.J. Brill, Leiden.
- Jones, A.M. & Baxter, J.**, 1987. Molluscs: Caudofoveata, Solenogastres, Polyplacophora and Scaphopoda. *Synopses of the British Fauna (NS)* No. 37. E.J. Brill, Leiden.
- Smith, S.M. and Heppell, D.**, 1991. *Checklist of the British Marine Mollusca*. Information Series No. 11, Royal Museum of Scotland.
- Tebble, N.**, 1966. *British Bivalve Seashells*. British Museum (Natural History), London.
- Thompson, T.E.**, 1988. Molluscs: Benthic Opisthobranchs. *Synopses of the British Fauna (NS)* No. 8 (second edition). E.J. Brill, Leiden.

Data Tables

I have made a list of shell distribution on Colonsay and I think it shows very clearly how specific are shells to particular sites. To compare beaches on my chart I coloured 'F' returns (10–100 specimens) in yellow and 'C' returns (100–1000 specimens) in orange. This gives quite a pattern of distribution suggesting areas of concentration of species. My list following is in the order of the *Checklist of British Marine Mollusca* by Smith and Heppell and uses that nomenclature. It gives the details of species I found at each of 17 sites. One or two specimens have been mislaid and are marked as 'Lost'.

There is provision for four items of information for each entry but if no information is available on any one, this is shown by an oblique line. The columns are as follows:

1. The first upper case letter – A, C, F, O or R – shows the relative number of adults and juveniles:
A = 1000+, C = 10–1000, F = 10–100, O = 2–10, R = 1 only.
(My principal emphasis was on finding good examples of dead shells and looking for shellsand.)
2. The second upper case letter – an A, B or C – shows the relative condition of adults:
A = alive, or dead with body intact, B denotes an unworn shell, C is a worn shell.
3. The third letter is in lower case a, b, or c similarly showing the relative condition of juveniles when present.
4. The fourth column has been used to pick up several varied items:
 - a) An asterisk * indicates species identified or verified by Dr S. Smith.
 - b) D = damaged specimen.
 - c) L = large specimen.
 - d) W = white
 - e) + = the beach with the species in the best condition.

Sites visited

1. **South Oronsay** – West-facing broad sandy beach with well-washed golden sand backed by dunes. Rock ledges are each side and offshore.
Found: 30 molluscs including 16 bivalves. Very fine shellsand here.
2. **The Strand** – A large flat area of draining sandy mud between Colonsay and Oronsay with three sea inlets (two west, one east) and many rocks to the west.
Found: 61 molluscs including 29 bivalves. A little fine shellsand here.
3. **Traig nam Barc** – (S.E.) A large south-west-facing, well-washed golden sandy beach, edged with rocks and dunes. A stream flows across. It had shellsand and tide-line.
Found: 89 molluscs including 58 bivalves.
4. **Traig nam Barc** – (N.W.) North across the stream with much washed up vegetable matter making shells look dirty. Dunes to the north.
Found: 39 molluscs including 25 bivalves.
5. **Coite Creige** – West-facing sandy beach backed by rocks and many offshore rocks and pools. Shellsand here.
Found: 79 molluscs including 56 bivalves.
6. **Port Lobh** – A west-facing sandy beach with rocks to north and south and grass at the back. Very few shells left on well-washed sand.
Found: 12 molluscs including 8 bivalves.
7. **Traig an Tobair Fhuair** – A large west-facing golden sandy beach with rock each side and offshore. Clean sand with good tide-line and shellsand.

Found: 48 molluscs including 25 bivalves.

8. **Kiloran Bay** – About half a mile of broad north-west-facing sandy bay with rocks at each end and caves to the north-east, crossed by a freshwater stream and lagoon. Hardly any large shells. Most of the light ones were picked up off the edge of a very soft tide as it came in to the rocks at the south. The rocks to the south-west probably house Chitons. The rocks are huge, 6 in. thick or more, like paving slabs thrown on top of each other.

Found: 106 molluscs including 62 bivalves.

9. **Balnahard-Traig Ban** – North-east-facing sandy bay with rocks and pools to north. Half a mile of fine golden sand. Shellsand to the north among rocks. Southern part clear of shells.

Found: 93 molluscs including 55 bivalves.

10. **Staosnaig-Queen's Bay** – Greyish silver sand. East-facing with many washed up old shells. More like grey mud lower down. Rocks offshore and an east-flowing stream through its centre. Shellsand.

Found: 115 molluscs including 62 bivalves.

11. **Baleromindubh** – Rocky east coast with small patches of sand and shell washed into pockets between rocks.

Found: 26 molluscs including 12 bivalves.

12. **Rubha Eilean Mhartain** – as No. 11. above.

Found: 61 molluscs including 35 bivalves.

13. **Rubha Dubh Bay** – North-east facing. A sheltered bay with greyish silver sand with lots of vegetable matter and very many dead shells. Rocks project each side and offshore. Shellsand.

Found: 75 molluscs including 32 bivalves.

14. **Port na Beiste** – A muddy little backwater eaten away from sandy soil by a stream. Dunes behind, rocks in front hemming it in.

Found: 32 molluscs including 17 bivalves.

15. **Traig an Eacail** – South-facing steeply raked bay with rocks each side and dunes behind. Lots of broken shell matter. Shellsand.

Found: 85 molluscs including 40 bivalves.

16. **Port a Chapuill** – East-facing. Shells of a different nature from those to north. The sand is more golden and coarser grained, reinforced by much fine broken shell matter.

Found: 87 molluscs including 51 bivalves.

17. **Strutha poll Gorm** – South facing. Sand with scattered rocks.

Found: 76 molluscs including 34 bivalves.

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Species	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17
<i>Leptochiton asellus</i>								%B/*		%C/*							
<i>Callochiton septemvalvis</i>			%B//		%B//		%B//	%B/*	%B//								
<i>Lepidochitona cinereus</i>		OA//	%C//		%B//			%B/*	%B//	%B//		%C//			%C//		
<i>Tonicella marmorea</i>					%B//			Pos?		%C//					%C//		
<i>Tonicella rubra</i>					%B//			%B/*									
<i>Acanthochitona crinitus</i>			%C//					%B/*	%C//	%C//		%C//			%B//	%C//	
<i>Emarginula fissura</i>					RC//			O/b/	R/b/	OB//					R/c/	O/c/	
<i>Diodora graeca</i>	RC//		R/c/		OC//		RC//	OCb/							RB//	RC//	RC//
<i>Tectura testudinalis</i>			OBb/		FBb/	RC//	FBb+	FBb+		OCb/		R/b/			O/b/		
<i>Tectura virginea</i>	RC//	RC//	FCc/	R/c/	FBb+		FC//	FBb+	FBb/	FCb/		OBc/	O/b/		FCb/		O/c/
<i>Patella ulysiponensis</i>			RC//		FBb+		OB//	FBb/	OB//	OB//	RB//		RB//		RC//	RC//	RB//
<i>Patella vulgata</i>	OB//	RC//	O/b/		FBb/	RA//	OA//	FBb/	FBb/	FAb/	OB//	OB//	RC//	RB//	FBb/	OBb/	OB//
<i>Helcion pellucidum</i>	R/c/	R/c/	F/b/	O/b/	FBb/	RB//	OCc/	FBb/	FBb/	FBb/	RB//	OBb/	OBb/		FBb/	OBb/	RC//
<i>Iothia fulva</i>								O/b*									
<i>Margarites helacinus</i>	O/b/	OC//	FBb/	FBb/	FBb/			FBb+	FBb/	FBb/		OBb/	R/c/		RC//	FCb/	RC//
<i>Jujubinus montagui</i>										R/c/							
<i>Gibbula magus</i>			OCb/							OC//	OC//		RC//			R/c/	OC//
<i>Gibbula tumida</i>								OBb/	FBb/	R/b/		R/b/				O/c/	
<i>Gibbula cineraria</i>	OB//	OC//	FBb/	R/b/	FBb/	RC//	OB//	FBb/	FBb/	FBb+	OB//	FBb/	OB//	OC//	OCc/	F/b/	OC//
<i>Gibbula umbilicalis</i>		OC//	OCc/		OB//												RC//
<i>Calliostoma zizyphinum</i>					R/b/		OBc/	O/b/	FCb/	OB//	OC//	OC//	OB//		R/c/	R/c/	RC//
<i>Tricolia pullus</i>	O/c/	OCc/	FBb/	FB//	FBb+			FBb+	FBb/	FBb/		FCc/	OCc/	R/c/	FBb/	FBb/	FCb/
<i>Bitium reticulatum</i>		OC//	FBc/	RC//	OC//			OB/+	OC//	OC//					OC//		
<i>Turritella communis</i>										FC//	OC//		OC//	OC//			OB//
<i>Lacuna pallidula</i>			FBb/	FCb/	FCb/		OC//	FBb/	FCb/	FBb/		RC//	OBc/		O/c/	OCb/	R/b/
<i>Lacuna parva</i>			OCb/	OB//	O/b/			FBb+	FBb/	OBb/						OCc/	
<i>Lacuna vineta</i>	R/b/	RC//	FCb/	FBb/	FBb/		OC//	FBb+	FBb/	CBb/		OCc/	FBb/		FBb/	FBb/	OCb/

Species	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17
<i>Littorina littorea</i>		FAb/	OC//		FCb/	RC//	OA//	O/b/	OCb/	FAb/	OCb/	OCb/	OCb/	OB//	OBb/	R/b/	OBb/
<i>Littorina neglecta</i>	RB//		FB//		FB//			CB/+	CB/+	FB//		RC//	OC//		FB//	FBb/	OC//
<i>Littorina nigrolineata</i>								O/b/									
<i>Littorina obtusata</i>		OB//	CBb/	FCb/	CBb+	RA//	FB//	F/b/	FBb/	CAb/	OB//	OBb/	OCb/	OB//	O/b/	FBb/	OCb/
<i>Littorina saxatilis</i>		FAb/	CBb/	FBb/	FBb/	RA//	FA//	CBb+	FCb/	CAb/	OB//	OBc/	OBb/	OB//	FBb/	F/b/	FCb/
<i>Melarhaphe neritoides</i>	RA//		FBc/		FB//			FB/+	FBb/	OAc/					FB//	OBb/	
<i>Skeneopsis planorbis</i>	OB//	FB//	CC//	OB//	OB//			FB/+	FBb+	OB//		OC//	OB//	RC//	OB//	CB//	FB//
<i>Var. trochiformis</i>		OB*+	OC//	OC//													
<i>Eatonina fulgida</i>	RB//	RB/*	FB/+	OB//								RC//				OB//	
<i>Rissoa lilacina</i>			RB/+							OB/+					RC//	OC//	
<i>Rissoa membranacea</i>			OC//	RB//						O%/					RC//	RC//	
<i>Rissoa parva</i>		OC//	FBb/	FBb/	FB/+		OC//	FBb+	FBb/	FBb/		FCc/	OB//		FBb/	FBb/	FCb/
<i>Var. interrupta</i>		OC/*	CBb/	CBb/	FB/+		OC//	FBb+	FBb/	CBb*		FCc/	FB//	R/c/	FBb/	FBb/	FBb/
<i>Alvania beanii</i>			O/b/		OB//			FBb+		OC//					RC//	OCb/	
<i>Alvania cancellata</i>			R/b/									R/c*					
<i>Alvania punctura</i>			RC//		OC//			FB//	FBb+	OB//		RBb/			RB//	FBc/	
<i>Alvania semistriata</i>			FC//	OB//	FB//			FB/+	FBb/	OBb/		RC//			OC//	FB//	
<i>Cingula trifasciata</i>			CCc/		FB/+			FB//	RB//	FCc/			RC//		OB//	OC//	OBb/
<i>Manzonina crassa</i>			FB//		FB/+			FB/+	OB//	OC//					OC//	FB//	RC//
<i>Obtusella alderi</i>									OB/*								
<i>Onoba aculeus</i>																RB/*	
<i>Onoba semicostata</i>	FBb/	FBb/	CBb/	FBb/	CB//		OC//	CB/+	FBb/	FB//		FBb/	OB//		FB//	CBb/	FBb/
<i>Psillina inconspicua</i>					RC/*				RC//	FBb+					RC//	FC//	
<i>Hydrobia ulvae</i>	RC//	CAb+	CAb+	CBb+			OA//		RC//	RC/*		Lest	OB//	FB//			R/b/
<i>Potamopyrgus antipodarum</i>				OBb/				FBb/	OBb/	FBb/							
<i>Caecum glabrum</i>			OB//		RB//			OB/+	OB/+			RC//				OC//	
<i>Aporthais pespelecani</i>														OC/+			RC//

Species	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17
<i>Capulus ungaricus</i>										R/b+			RC//				
<i>Trivia arctica</i>					OB//		Lost		FB//								
<i>Trivia monacha</i>					OB/+		OB//	OCb/	OB//	FC//			RC//	RC//			OC//
<i>Trivia species?</i>												OC//			R%///	R%///	
<i>Lamellaria latens</i>								F/b/	R/b/								
<i>Velutina velutina</i>					R/c*				R/c/	OCc/							
<i>Cerithiopsis tubercularis</i>					OC//			OB/+	RB/+	OC//			R%///			R%///	
<i>Epitonium clathratulum</i>					RB//												
<i>Janthina janthina</i>					RA//												
<i>Cuma minima</i>					R/c*				RB/*								
<i>Graphis albida</i>			RC//													RC//	
<i>Ocenebra erinacea</i>		RC//			OCb/		OC//	O/b/	OCb/	OCb/			OC//			R/c/	
<i>Nucella lapillus</i>	RB//		FBb/	RB//	FBb/	OB//	OA//	FBb/	FBb/	FAb/	OB//	RB//	OB//	OB//	O/b/	FBb/	OB//
<i>Buccinum undatum</i>		RC//	OCb/	RB//	OCb/		RC//	O/b/	R%/c/	OBbL		RB//	RC/L	RC//		R/c/	RC//
<i>Colus gracilis</i>										RC//						R%///	
<i>Neptunea antiqua</i>										RB//			OC/L	RC//			
<i>Hinia reticulata</i>	RC//	OC//	OC//		OCc/		OC//	R/b/	OC//	OBc+		OCc/	Lost	OC//		R/c/	
<i>Hinia incrassata</i>					RC//			O/c/	OBb/	FBb+			R%///	RB//	R/c/	O/c/	
<i>Mangelia coarctata</i>										RC//							
<i>Oenopota rufa</i>		R/c/	FCc/		FBbW		RC//	FBbW	R/c/	OC//							
<i>Raphitoma linearis</i>					RC//			O%///									
<i>Rissoella diaphana</i>			OB/*	OB//					OB//								
<i>Omalogyra atomus</i>		OC//	OB/+		RB//			RB//	OB//							OB//	
<i>Ammonicerina rota</i>			OB/+		RC//											OB//	
<i>Odostomia plicata</i>		RC/*															
<i>Odostomia turrita</i>			FB*+					RC/*		OC/*						OC/*	
<i>Odostomia unidentata</i>		RC/*	RC/*														

Species	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17
<i>Brachystomia carrozzai</i>			OC/*					RB/*		RC/*					RC//	RC//	
<i>Brachystomia eulimoides</i>								OB*+								OB//	
<i>Brachystomia scalaris</i>			OC/*					OB*+				OCc/					
<i>Chrysallida indistincta</i>												RC/*					
<i>Chrysallida obtusa</i>			OC/*					RC//		RC//		RC//					
<i>Jordaniella nivosa</i>			OB/*														
<i>Ondina diaphana</i>			OC/*														
<i>Ondina warreni</i>								OB/*	OBc/								
<i>Partulida spiralis</i>																OC//	RC//
<i>Turbonilla lactea</i>			OC//		OC//			OC//									
<i>Ebala nitidissima</i>		OB//	FB*+	OC//				RB//	OB//			RC//			RC//	FB//	OC//
<i>Scaphander lignarius</i>													O%//				R%//
<i>Philine punctata</i>								OB/*	OC//								
<i>Diaphana minuta</i>								R/b*	R/b*								
<i>Retusa obtusa</i>		FBc/	CB/+	OB//	OB//		OC//		R/b/	FBc/					FB//	OBb/	OCc/
<i>Retusa truncatula</i>			OBb/		OBb/			FBb/		R%//		RC//			OC//	OBb/	
<i>Var. mamulata</i>			RC//														
<i>Aphysia punctata</i>					RC//			OB/*	RC//	OC//							
<i>Limacina retroversa</i>								RB//	OB//								
<i>Leucophytia bidentata</i>					RC//					OB//							
<i>Antalis entalis</i>										OC//	RC//		Lost				
<i>Nucula sp. ?nucleus</i>					RC//			OCc/		R/a*		OC//	OC//				
<i>Jupiteria minuta</i>								O/c*									
<i>Glycymeris glycymeris</i>	R/c/	RC//	RC//										OC/+		R/c/	RC//	RC//
<i>Mytilus edulis</i>	OB//	OA/	FCb/	F/b/	OBb/	RC//	OC//	F/b+	F/b/	FAB/	OCc/	OCb/	OCb/	OC//	FBb/	FCb/	RC//
<i>Modiolus adriaticus</i>						RC/*											
<i>Modiolus modiolus</i>		OC//		RC//	RC//		OC//	FCb+	FCb/	OB/+	RC//	RC//	OC//		R%//		

Species	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17
<i>Crenella decussata</i>	R/c/	FCb/	OCc/					R/c/		FBb/	OCc/				FB//	OBb+	O/c/
<i>Modiolarca tumida</i>			R/c*					F/c*	O/c/	O/c+			R/c/			R/c/	
<i>Musculus costulatus</i>			O/c*														
<i>Musculus discors</i>	R/c/	R/c/	Fb*+	F/b/	F/c/			CBb/	FCb/	O/c/					R/c/		R/b/
<i>Limatula subauriculata</i>			R/c/	O/c/	R/c/										O/c/		R/c/
<i>Ostrea edulis</i>		OC//											RC//	RC//			RC//
<i>Chlamys distorta</i>			O/c/		FCc/			FCc/	FCc/	FCc+	RC//	FC//	OCc/	OC//	OCc/	O/c/	OC//
<i>Chlamys varia</i>								F/c/	OCc/	FCc+			O/c/		O/c/		
<i>Pecten maximus</i>		RC//						O/c*	OCc/	OCc+		RC//	RC//		R%/	O/c/	R%/
<i>Aequipecten opercularis</i>		RC//			R/c/			O/c/	FCc/	FCc/	R/c/	R/c/	OC/+		O/c/	RC//	OCc/
<i>Palliolium tigerinum</i>			O%/					F/c*	O/c/	OCc*							
<i>Similipecten similis</i>								RC/*									
<i>Heteranomia squamula</i>			O/c/	O/c/	FCc/		OC//	CCc/	FCc/	FCc/	OC//	FCc/	OC//		FCc/	OCc/	O/c/
<i>Pododesmus patelliformis</i>									OC/+	OC//		RC//	OC//			OC//	
<i>Lucinoma borealis</i>	OC//	OCc/	F/c/	O/c/	OCb/		FBb+	FCc/	OCc/	OBb/	OC//	OBb/	OCc/	OCc/	FCc/	OCc/	OCc/
<i>Thyasira flexuosa</i>										FC//			RC/+			RC//	
<i>Kellia suborbicularis</i>	OC//		OC//		OC//			FC/+	OCc/						RC//		
<i>Lasaea adansonii</i>	OB//	OB//	CBb/	FBb/	FBb/		R/b/	CBb+	FBb/	FAb/		OCc/	OC//	RC//	FB//	FBb/	OCc/
<i>Semierycina nitida</i>			RC//		OC//			FC//	OCc+	RC//					RC//		
<i>Tellima ferruginosa</i>										OCc+					O/c/	OCc/	
<i>Mysella bidentata</i>			OC//		RC//			FB/+	FB//	OBb/					OC//	OCb/	
<i>Neolepton sulcatulum</i>			RC/*														
<i>Epilepton clarkiae</i>								RC//									
<i>Goodallia triangularis</i>		OC//	RC//		FB/+			OC//		RC//			OC//		FB//	OC//	OCc/
<i>Acanthocardia echinata</i>										OC//	OC//		OC//			RC//	OC//
<i>Parvicardium exiguum</i>		O/c/	F/c/	R/c/	O/c/		RC//								O/c/	O/c/	OC//
<i>Parvicardium minimum</i>								R/c/									

Species	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17
<i>Parvicardium ovale</i>				O/c/	F/c/			F/c+	O/c/	O/c/					O/c/		
<i>Parvicardium scabrum</i>		O/c*		O/b+				R/c/							F/c/		
<i>Laevicardium crassum</i>		RC//								RC//		RC//	OC//			RC//	OC//
<i>Cerastoderma edule</i>		OAb+	FBb+	OBb+	OC//	RC//	OBc/	RB//		OC//	R/c/	OB//	OC//	OB//		OCb/	OCc/
<i>Macra stultorum</i>										R%///							R%///
<i>Spisula elliptica</i>			OCc/				RC//	FCc/	O/c/						R/c/		
<i>Spisula solida</i>		OC//					OCc/	FCb/					RC//		RC//	OC//	OC//
<i>Spisula subtruncata</i>		OC//							RC//	OCc/	RC//		OC//		OCc/		OC//
<i>Lutraria angustior</i>													RC/D				
<i>Lutraria lutraria</i>			RC//							OC//		RC//	OC//			OC//	R%///
<i>Ensis arcuatus</i>		OB/+	RC//				OC//			OB//	RC//		RC//		RC//	RC//	RC//
<i>Ensis siliqua</i>			RC//				RC//		R%///	OB//			RB//		RB//	RC//	R%///
<i>Phaxus pellucidus</i>																	R/c/
<i>Angulus squalidus</i>										OC//			OC//		OC//	OC/+	
<i>Angulus tenuis</i>			RC//		RB//		OC//		OCc/	OBc/			FB/+	OC//	OCc/	RC//	RC//
<i>Arcopagia crassa</i>		OB/+										RC//	RC//				
<i>Fabulina fabula</i>							OC//		F/b+	O/b/			OB//		OC//		
<i>Moerella donacina</i>																	RC//
<i>Moerella pygmaea</i>								RC//							RC//		
<i>Macoma bathica</i>	RC//	OA//				OB//	OC/+					RC//		OB//			RC//
<i>Donax vittatus</i>							RC//	RC//									RC//
<i>Gari depressa</i>									RC//	R%///					RC//		
<i>Gari tellinella</i>								OC//									
<i>Gari fervensis</i>							OC//		R%///	OC//		RC//	OC//		OC//	OC//	OC//
<i>Azorinus chamasolen</i>										RC//							
<i>Abra alba</i>		R%///	R%///					FCc/	O/c/	OCb*							
<i>Abra nitida</i>															RC//		

Species	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17
<i>Abra prismatica</i>							RC//	R/c/	RC//								R/c/
<i>Scrobicularia plana</i>		OB/+												OB//			
<i>Artica islandica</i>		OCc/							O/c/	OC/+		RC//	OC//			OC//	RC//
<i>Circomphalus casina</i>		OC//		OC//					O/c/	OC//		RC//	RC//	RC//			OC//
<i>Gouldia minima</i>								RC//		R/b/					O/c/		
<i>Chamelea gallina</i>		OA//	OB//				OA/+	OC//	OC//	OAb/	OC//	RB//	OC//	RC//	O/c/	OC//	OC//
<i>Clausinella fasciata</i>										OC//		OC//				RC//	OC//
<i>Timoclea ovata</i>		R/c/			R/c/			O/c/		O/c/		O/c/			F/c/	OCc/	O/c/
<i>Tapes rhomboides</i>		OC//						O/c*	OCc/	OB/+	RC//		RC//				
<i>Irus irus</i>								RC/*									
<i>Venerupis senegalensis</i>	OBc/	OA/+			OB//		OA/+	OCb/	OCb/	OAb/		OBc/	OCc/	RB//	R/b/		RC//
<i>V. saxatilis</i>			R%/					OB/+	OC//				OC//				
<i>Dosinia lupinus</i>	RC//						OC//		OC//	OC//			OCc/		OCc/	RC//	OC//
<i>Dosinia exoleta</i>		OB//								OBc+	RC//	OB//	OCc/	RC//			RC//
<i>Turtonia minuta</i>	FC//	FBb/	CBb/	CB/+	CB//		OC//	CB//	FBc/	FBb/		FBb/	FC//	OC//	FB//	FB//	FBc/
<i>Mysia undata</i>										O%/							
<i>Mya truncata</i>	RC//	OC//	O/b/	RCb*				R/b*	O/c/	OC//		OC//	OC//		RC//	OC//	RB/+
<i>Mya arenaria</i>	OC//	RB/+						OC//									OC//
<i>Sphenia binghami</i>					R/c/					R/c/					O/c/	R/c/	
<i>Corbula gibba</i>									RC/*	O/c/					RC//		
<i>Hiatella arctica</i>	R/c/		O/c/		F/c/			CBb/	FCb/	FBb+		O/c/	O/c/		FCc/	O/b/	R/b/
<i>Thracia villosiuscula</i>							OC//	R/c/	RC//				OC/+		OCc/		
<i>Cochlodesma praetenuae</i>							OC//			R%/	O%/		OC/+	RC//	OC//		
<i>Pandora pinna</i>			O/c*														

Collectors in East Africa

No. 23: K.L. Pfeiffer (1874–1952)

B. Verdcourt

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Karl Ludwig Pfeiffer had malacology in his blood since he was the great grandson of Carl Jonas Pfeiffer (1779–1836) author of *Naturgeschichte Deutscher Land- und Süßwasser-Mollusken* published in Weimar (1821–1828) and a nephew of Karl Georg Louis Pfeiffer (1804–1877) one of the most prolific writers on malacology last century, very well known for his eight-volume work *Monographia Heliceorum viventium* and much else besides. Karl Ludwig was born in Kassel in 1874 into a family of bankers. His great grandfather Carl together with a brother founded a bank in Hanau in 1809 which later transferred to Kassel. His grandfather and father carried on the banking tradition but the latter always thought that his son might have a better life doing other things.

During Karl Ludwig's younger days his father encouraged him to have an interest in the world about him and was pleased when he started to collect butterflies. Karl Ludwig was not sure what led him into malacology but he later assumed it must be atavism! He thought his interest might have begun during a longish stay for health reasons on the island of Norderney, one of the Frisian Islands, when he was 13; there he collected sea shells on the beach. He well remembered his surprise later after returning to Kassel seeing his first clausiliid which had been found by some other children in the forest nearby and was encouraged to collect land shells. His father bought him Clessin's *Deutsche Excursions-Mollusken-Fauna*, also works by Darwin and Haeckel and, moreover, for the first time he explained to his son that two members of the family had made a name for themselves in the study of molluscs and showed him their works. The boy knew then it was clear he should devote his life to the natural sciences. Louis Pfeiffer had died in 1877 when the boy was only three and he could scarcely remember him but the influence must have been strong.

Unfortunately a life devoted to science was denied to him since his father died after a long illness five months before his final school examination and his grandfather followed in the same year. From March 1893 only an uncle, his father's brother, was left to continue the banking business and he made it known he would only direct the firm on the condition that Karl Ludwig entered it as soon as possible, which he did on 15 March 1893 before he was 20. Naturally his interest in molluscs remained and after a trip into the Alps and Italian lakes he wrote a short paper about the species he had found on the journey which was published in 1894. Much later he heard from his friend O. Boettger (1844–1910) that the great W. Kobelt (1840–1916) only consented to publish the paper because Karl Ludwig was a beginner but it would have been better left unpublished since some drawings he had prepared for it were omitted. It was 37 years later when he published his next paper on *Murella* from Sicily.

In April 1894 he had to spend some time in Frankfurt as a 'Volontär' (? unsalaried clerk) in the Deutschen Bank and there came under the influence of O. Boettger and W. Kobelt and managed to devote some time to molluscs. In 1895, however, he became severely ill and later his attention was drawn elsewhere. He studied economics and law in Berlin and in Paris (1895–1897) and had to give up his interest in molluscs entirely during his training in banking. He spent time in London and New York and travelled all over North America. In 1899 he became the owner of the family banking house. His life now became devoted to the cultural and political life of his city, sitting on the Kasseler Kunstvereins and becoming a member and later president of the Chamber of Commerce. Because of the effects of an operation he had undergone in 1895 he was not actively involved in the First World War. The many journeys he had to make always brought him back to the Mollusca if only temporarily; he visited Egypt, Algiers, Tunis, Spain, Italy, the Balkans, Canary Islands and Madeira all of which countries have a richer fauna than Germany.

About 1924 he returned to the love of his youth and studied molluscs in his spare time. His own collection was later greatly

augmented by the purchase of the collections of Th. Krüper (1928), R. Jetschin (1928) and C.R. Boettger (1943) which meant he now had material of land and freshwater molluscs from all over the world. This inspired him after 1933 to make collecting trips and engage in research. His published results were based exclusively on material he had collected himself. When Hitler came to power in 1933 Karl Ludwig was driven out of all his positions in the Chamber of Commerce and the world of the arts and also lost his post as Director of the Deutschen Bank. Presumably the family were Jewish. So he devoted more time to molluscs and visited East Africa in 1937 and Java in 1939, but he always regretted that he lacked the scientific training which every successful researcher should have in order to avoid drawing incorrect conclusions. His contributions to the Arts were recognised during the 800th anniversary celebrations of the University of Marburg when an honorary D.Phil was conferred upon him. His scientific work was recognised when he gained an Iron Senckenberg Medal.

When I left for East Africa in late 1949 he loaned me his copy of von Martens's *Beschalte Weichethiere Deutsch-Ost-Afrikas* and I sent him the first fruits of my collecting trips. I do not recall now how I first contacted him but it must have been via Hugh Watson who was in correspondence with him (all my letters of this period are now in the Conchological Society Archives at Leeds). After suffering a stroke in 1951 he gave his collections and library to the Senckenberg Museum and after a long severe illness died on 14 June 1952 in the city of his birth. His paper describing new species of snails from Tanzania (Tanganyika, Deutsch Ost-Afrika) appeared posthumously in December 1952. I did not know this and had sent off a paper to the Proceedings of the Malacological Society with descriptions of species I had collected in the Usambaras where Pfeiffer had also worked. Hugh Watson sent me a copy of Pfeiffer's paper whilst mine was at proof stage. I was expecting to find that most of my supposed new species (minute *Gulellae*) would already have been described by Pfeiffer but fortunately only one was involved. I hastily wrote to the editor H.E. Quick who exchanged the name of my proposed *Gulella mkusiensis* for Pfeiffer's *G. translucida* but he forgot to remove

the type citation and compounded matters in his editor's note that the type of *translucida* was at MCZ, Harvard when of course it was the type of my proposed new species which was there. I sent off a correction but the whole thing was unfortunate (see Verdcourt, 1953, 1953a). Apart from Craven, Knipper and myself, K.L. Pfeiffer appears to be the only person to have described his own East African collections.

List of molluscs described from material collected by Karl Ludwig Pfeiffer in Tanzania and Kenya

- Bloyetia simulans meruensis* K.L. Pfeiffer, 1952. Tanzania, Mt. Meru, between the Sägewerk and Momella, south-east slope of mountain, 1500–1700m on road from Arusha to the farm (Momella) (SMF 96728, holotype). *Trochonanina (Montanobloyetia) simulans meruensis* (K.L. Pfeiffer).
- Edentulina (Marconia) cylindrica* K.L. Pfeiffer, 1952. Tanzania, Ngorongoro, crater edge near restcamp, 2200m (SMF 96734, holotype). *Gonaxis cylindrica* (K.L. Pfeiffer).
- Euonyma connollyana* K.L. Pfeiffer, 1952. Tanzania, W. Usambaras, Hermannsplatte, on the west precipice of the mountains, 2700m (SMF 96726, holotype). *Hypolysia connollyana* (K.L. Pfeiffer).
- Gulella (Gulella) conicodentata* K.L. Pfeiffer, 1952. Tanzania, between Moshi and Arusha (SMF 83711, holotype). Same.
- Gulella globulosa* K.L. Pfeiffer, 1952. Tanzania, E. Usambaras, on main road to Amani, 700m (SMF 83719, holotype). *Gulella gouldi globulosa* K.L. Pfeiffer.
- Gulella (Molarella ?) gwendolinae porrecta* K.L. Pfeiffer, 1952. Kenya, Mombasa, Fort Jesus, sea level (SMF 96865, holotype). Same.
- Gulella (Paucidentina) micans* K.L. Pfeiffer, 1952. Tanzania, Kilimanjaro, near Bismarck Hut, 2300–2500m (SMF 83714, holotype). Same.
- Gulella (Paucidentina) percivali kilimae* K.L. Pfeiffer, 1952. Tanzania, Kilimanjaro, Marangu, 1500m (SMF 83664, holotype). Same.
- Gulella (Gulella) translucida* K.L. Pfeiffer, 1952. Tanzania, W. Usambaras, Lushoto, 1500m (SMF 83693, holotype). Same.
- Gulella (Paucidentina) unidentata* K.L. Pfeiffer, 1952. Tanzania, W. Usambaras, Lushoto (SMF 83668, holotype). Same.
- Gulella (Paucidentina) usambarica* K.L. Pfeiffer, 1952 (non Craven). Tanzania W. Usambaras, Lushoto, near The Lawns, 1600m (SMF 83666, holotype). *Gulella ludwigi* Verdcourt and Venmans.
- Homorus usambaricus* K.L. Pfeiffer, 1952. Tanzania, W. Usambaras, Lushoto, Jägersal, 1600m (SMF 96720, holotype). *Subulona usambarica* (K.L. Pfeiffer).

- Homorus usagaricus monticulus* K.L. Pfeiffer, 1952. Tanzania, Kilimanjaro, between Marangu and Bismarck Hut, 2000m (SMF 96723, holotype). *Subulona usagarica monticula* (K.L. Pfeiffer).
- Maizania pyramidalis* K.L. Pfeiffer, 1952. Tanzania, E. Usambaras, near Derema, 900m (SMF 96716, holotype). *Maizania volkensi* (von Mts.).
- Pseudoglessula (Kempioconcha) monticula* K.L. Pfeiffer, 1952. Tanzania, Oldeani, Farm Bundies, 2000m (SMF 96725, holotype). Same.
- Pupisoma renschi* K.L. Pfeiffer, 1952. Tanzania, east side of Mt Meru, Momella, 1700m (SMF 96717, holotype). Same.
- Tayloria angustestriata* K.L. Pfeiffer, 1952. Tanzania, W. Usambaras, Lushoto, path from Forest House 'zur Bachschlucht', 1500m (SMF 96730, holotype). Same.
- Trachycystis lamellosa* K.L. Pfeiffer, 1952. Tanzania, Mt Meru, Momella, 1700m (SMF 96718, holotype). Same.

Note: Only holotypes have been listed above; paratypes were cited for many, for which the original paper must be consulted.

References

- Pfeiffer, K.L., 1952. Neue Landschnecken aus Ostafrika. *Arch. Molluskenk.* **81**: 89–102, t. 1,2.
- Verdcourt, B., 1953. Notes on the snails of North-East Tanganyika Territory. Five new species and varieties of *Gulella* from the Usambaras. *Proc. malac. Soc.* **30**: 36–39.
- Verdcourt, B., 1953. Notes on the snails of North-East Tanganyika Territory. *Proc. malac. Soc.* **30**: 153.
- Zilch, A., 1952. Karl Ludwig Pfeiffer (*5.9.1874, †14.6.1952). *Arch. Molluskenk.* **81**: 175–178.
- Zilch, A., 1972. Zur Geschichte der deutschen Malakozoologie, IX. Zur Konchylien-Sammlung von K.L. Pfeiffer. *Mitt. dtsch. malak. Ges.* **2/22**: 324–326.

Acknowledgement

My sincere thanks are due to my friend and colleague Dr Edmund Launert (also coincidentally a friend of Dr Zilch) for reading the two accounts by A. Zilch cited above slowly in English so that I could note down the basic information used in the article. □

Additions and corrections to 'Recording Mollusca in Ireland: Achill Island, Co. Mayo'

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It is nearly always a fatal act of hubris to make absolutist statements like 'no other fieldwork for the area has been published'! Far too late to amend my article in the last issue of the *Newsletter* before publication (Nunn, 1995), I came across a number of additional records and references for mollusca found in the Achill Island area. As will be seen from the list below, the additions to the species list are *Alvania carinata* (dead), *A. punctura* (dead), *Manzonina crassa* (dead), *Aporrhais pes-pelecani* (dead), *Erato voluta* (dead), *Janthina janthina*, *Epitonium clathrus* (dead), *Polygyreulima polita* (dead), *Mangelia coarctata* (dead), *Rissoella diaphana* (?dead), *Chrysallida obtusa* (dead), *Limacina retroversa*, *Clione limacina*, *Pododesmus patelliformis* (?dead), *Laevicardium crassum* (dead), *Angulus squalidus* (dead), *Moerella pygmaea* (dead), *Venus verrucosa* (dead), *Dosinia lupinus* (dead), *Teredo norvegica* (? dead), *Loligo forbesii*.

The following species are records for Sea Area 35 (Seaward, 1990):

Pre-1951: *Rissoa lilacina* (dead), *Polygyreulima polita* (dead) (both Tatlow & Praeger, 1898), *Limacina retroversa* (living), *Clione limacina* (living) (both Massy, 1909b) (*C. limacina* is not listed in Seaward (1990) as occurring anywhere around the Irish coast, dead or living, which is surprising as Massy records it from many sites all round the west and south-western coasts of Ireland), *Teredo norvegica* (dead) (Thompson in Forbes & Hanley, 1853).

Post-1950: *Janthina janthina* (living) (Jackson, 1958).

If anyone knows of any other fieldwork/references to marine mollusca in the Achill area, I would be grateful if they could let me know!

In addition to the above, I also managed to omit some of the species recorded by Tatlow & Praeger (1898), and to make two errors – in the general species list, *Abra tenuis* should be replaced by *Angulus tenuis*, and in the additional old records listed, those marked with a * are from Massy (1904).

Additional references to fieldwork in the Achill Island area:

Forbes, E. & Hanley, S., 1853. A History of British Mollusca and their shells.

Teredo norvegica, Achill Island (Thompson)

Tatlow, E.M. & Praeger, R.L., 1898. Impressions of Achill: marine mollusca. *Ir. Nat.* 7: 139–140. All shells only.

Alvania carinata, *A. punctura*, *Manzonina crassa*, *Aporrhais pes-pelecani*, *Erato voluta*, *Epitonium clathrus*, *Polygyreulima polita*, *Mangelia coarctata*, *Chrysallida obtusa*, *Pododesmus patelliformis*, *Laevicardium crassum*, *Moerella pygmaea*, *Dosinia lupinus*.

Marshall, J.T., 1899. Additions to British Conchology. *J. Conch.* 9: 129–138.

Rissoella diaphana – Achill Island.

Nichols, A.R., 1900. A list of the marine mollusca of Ireland. *Proc. Roy. Ir. Acad.* ser. 3, 5: 477–662.

Lepidochitona cinereus off Achill (Dublin Museum)

Massy, A.L., 1909a. The Cephalopod Dibranchiata of the coasts of Ireland. *Fisheries, Ireland, Sci. Invest.*, 1907, 1: 2–39.

Loligo forbesii. 4 miles off Achill head April 1899 (two)

Massy, A.L., 1909b. The Pteropoda and Heteropoda of the coasts of Ireland. *Fisheries, Ireland, Sci. Invest.*, 1907, II: 2–53.

Limacina retroversa: Helga XXV 3 miles SE by E of S point of Achillbeg, Co. Mayo, March 1903 medium silk townet at 13f (three).

Clione limacina: A XVI – 2 miles WNW of Achill Head, August 1902, medium silk townet – at surface (1), at 20f (two).

Colgan, N., 1911. Marine Mollusca. *Proc. Roy. Ir. Acad.* 31: Clare Island Survey: Part 22: 1–36.

In the general vicinity of Curraun Achill: living – *Goniodoris nodosa*; possibly living – *Macoma balthica*, *Scrobicularia plana*; dead shells – *Cerastoderma edule*, *Angulus squalidus*, *Venus verruosa*, *Venerupis senegalensis*, *Tapes decussatus*, *Mya truncata*.

Southern, R., 1915. Marine Ecology. *Proc. Roy. Ir. Acad.* 31: Clare Island Survey: Part 67: 1–110.

On the west shore of Achill Sound, near bridge, littoral: *Patella vulgata*, *Gibbula cineraria*, *Calliostoma zizyphinum*, *Littorina littorea*, *Nucella lapillus*, *Hinia incrustata*, *Trivia 'europaea'*, *Archidoris pseudoargus*, *Venerupis senegalensis*.

Southward, A.J. & Crisp, D.J., 1954. The distribution of certain

intertidal animals around the Irish coast. *Proc. Roy. Ir. Acad.* **57B**: 1–29.
Monodonta lineata was reported from Doagh (Achill Island), but absent from Achill Sound.

Gibbula umbilicalis was also reported absent from Achill Sound.

Jackson, J.S., 1958. On two occurrences of living *Janthina brittanica* Forbes & Hanley from the west coast of Ireland. *Ir. Nat. J.* **12**: 330.

Janthina janthina – ‘Capt. Boyd recorded “quite a few specimens” on Keel Strand, Achill Island during the week 1st–7th September. They were also observed floating in the water with animal and float intact, and one of the shells was sent to Museum for identification.’

O’Riordan, C.E., 1973. Notes on marine fauna recently acquired by the National Museum of Ireland. *Ir. Nat. J.* **17**: 399.

Pododesmus patelliformis – ‘specimen from Achill’ in the Museum collection [NMI].

O’Loughlin, E.F.M., 1989. Notes on the distribution of *Calliostoma zizyphinum* (L.) on the shores and shallow waters of the Irish coast. *Bull. Ir. biogeogr. Soc.* **12**: 22–30.

Calliostoma zizyphinum (1) Keel Strand, Achill Island F6304 2.8.84 littoral, 4 dead shells (2) Moyteoge Head, Achill Island F5603 10.8.86 sublittoral 24m 14 live specimens – ‘common, but were completely absent on the inshore cliffs and in less than 10m depth.’

Duggan, C.B., Minchin, D. & Gallagher, A.F., 1988. TBT: imposex of the dog-whelk from Co. Donegal to Cork to Louth. *Ir. Mar. Sci. meeting* 16–17 December 1988.

Nucella lapillus – reported at Achill Bridge, with no imposex.

Acknowledgements

In the general list of species previously published (Nunn, 1995), of those marked * as UM records only, *Buccinum undatum*, *Favorinus branchialis*, *Aeolidia papillosa*, *Musculus costulatus*, *Tapes decussatus* are the records of Helen Chesney from UM fieldwork. The remaining ‘UM species only’ are the personal records of B.E. Picton. His records are stored on a Marine Database, at the Ulster Museum and with him at Biomar, Trinity College Dublin from which further details can be obtained. Both are very gratefully acknowledged for permission to use their records.

References

Massy, A.L., 1904. marine mollusca of Achill. *Ir. Nat.* **13**: 44.

Nunn, J.D., 1995. Recording mollusca in Ireland: Achill Island, Co. Mayo. *Conch. Newsletter* **132**: 441–445.

Seaward, D.R., 1990. *Distribution of the marine molluscs of north west Europe*. Nature Conservancy Council.

Extracts from TENTACLE: The Newsletter of the IUCN/SSC Mollusc Specialist Group

Editorial

Biological control by *Euglandina* has been a recognised agricultural failure and ecological disaster, but the lesson has not been learnt. The latest trend in Pacific Island biological control is the use of the flatworm *Platydemus manokwari*. As for its predecessor *Euglandina rosea* 20 years ago, well intentioned agriculture experts are recommending its introduction to Pacific islands to 'eat out' the Giant African snail pest *Achatina fulica*. Like its predecessor *Euglandina*, *Platydemus* is not species-specific and eats all sorts of snails in sight, including the native endemic land snails of the Pacific islands.

The islands of the Pacific encapsulate the problems faced by land snails worldwide: narrow-range endemism, loss of habitat, competition with alien species. We therefore more than welcome the Partula Propagation Group, with its name now changed to Pacific Island Land Snail Group, as a member of our Mollusc Specialist Group. *Partula* species from Moorea and *Achatinella* from Hawaii are certainly the two best known examples of land snail extinctions outside malacological circles. Members of the former Partula Propagation Group are breeding species in captivity that are now extinct in the wild. Although captive breeding can hardly be considered as the key to all land snail conservation, the Group has actually saved from extinction the gene pool of two dozen species. The new name Pacific Island Land Snail Group more appropriately reflects the range of the group's work.

A toxic bait for *Euglandina rosea*

An apple snail, *Pomacea* sp., is being used to make a toxic bait for *Euglandina rosea* in Hawaii. Several *Pomacea* species have been introduced to Hawaii, where they have become major pests in commercial taro ponds. Their rate of reproduction is prodigious, and it is possible to collect hundreds from a single pond very rapidly. It is likely that we have used more than one species in preparing our *Euglandina* bait. The snails can be frozen (in their shells) for later use.

The shells are removed (apple snail shells are easily broken) and the snails are ground to a uniform soup in a blender. To this is added, by per cent weight of the apple-snail puree, 2% metaldehyde (a standard molluscicide used in garden slug and snail baits) and 5% propionic acid (a common food preservative, added to prevent putrefaction of the pellets when rewetted). The additives are mixed thoroughly with the snail puree, and the mixture is measured into small plastic tubes (diameter about 0.75 cm) in 1 ml quantities. These are then lyophilized to form dry pellets which can be easily removed from the containers and stored in a freezer.

The *Pomacea* flesh provides an attractant for predatory snails. In the laboratory, hungry *E. rosea* will eat bait pellets placed on a moist filter-paper disc and die within 24 hours. Not all trials led to death, and this probably varies with the nutritional state of the

snail as well as the condition of the pellet. Even with propionic acid, pellets begin to grow mould in 3–4 days.

In the field, bait is being applied only very locally around trees where we are attempting to establish new colonies of endangered species with snails propagated in the laboratory. These are at relatively remote forest sites. Several bait pellets are placed in a small mound on the ground and covered with small platform-covers, constructed by driving 4-inch nails through each corner of one-foot squares of quarter-inch plywood. The cover is about 1 inch above the ground, and should provide shady places attractive to *E. rosea* (they seek darkness during the day), and protect the bait from most birds and mammals other than small rodents – if rats are killed by the bait, this would be a welcome side effect in Hawaii! The effectiveness of this method is currently being tested.

1994 IUCN Red List

The following is a very rough summary of the current list; please check the Red List itself before quoting any of the figures given below. It can be obtained from IUCN Publications Services Unit, 219c Huntingdon Rd, Cambridge CB3 0DL, UK Fax (44) 223-277175, price £15 (\$30); postage and packing add 15% (UK), 20% surface mail abroad, 30% airmail Europe, 40% airmail elsewhere. Members of IUCN receive a 30% discount.

Tables 1 and 2 compare the 1990 and 1994 listings of extinct and threatened molluscs respectively. The number of listed extinct species has increased from 56 in 1990 to 284 in 1994 (a five-fold increase); and threatened species have increased from 409 in 1990 to 1319 in 1994 (a three-fold increase). Although there will have been increased threats and pressure on molluscs over this period, the main reason for these changes is that a great deal more information has become available.

Table 1: Comparison of 1990 and 1994 listings of extinct species

Region	1990	1994
French Polynesia	7	76
Hawaiian Islands	26	61
USA	21	40
Japan (Bonin Islands)		24
St Helena		22
Mascarenes		21
Cook Islands		14
Madeiran Islands		13
Europe		8
Other	2	5
Total	56	284

Table 2: Comparison of 1990 and 1994 threatened species listings

Region		1990	1994
Terrestrial			
Achatinellidae	Hawaii	24	65
Bulimulidae	Galapagos	31	29
Partulidae	Pacific	9	24
Other land snails	Australia	1	175
	Europe	26	95
	Madeiran Islands	16	63
	N. America	51	53
	FSM		52
	Japan (Bonin Is)		38
	Canary Islands	21	30
	Palau		51
	Reunion		15
	New Zealand	11	12
	Other	6	113
Sub-total		196	815
Freshwater			
Unionidae	N. America	74	100
	Europe	5	7
Hydrobiidae	N. America	44	95
	Europe	30	95
	Australia	3	93
	Mexico	12	12
	Other	3	6
Pleuroceridae	N. America	13	50
	Other	16	32
Subtotal		200	490
Marine		13	14
Total		409	1319

□

The reprint mailing list of Lt. Col. H.H. Godwin-Austen

B. Verdcourt

Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AB

Plate 32 in Peter Dance's *History of shell collecting* (1986) shows a man one would not choose to meet in anger and undoubtedly would be glad to have on one's side in a tight corner – standing there with his rifle and bayonet like an Afghan warrior. He was much more peaceable than he appears though doubtless he could look after himself when in a difficult situation. This is Henry Haversham Godwin-Austen, FRS (1834–1923) whose name was rightfully associated with a forbidding peak in the Karakoram Range of the Himalayas; formerly this second highest peak in the world was designated K2 and may be called that again since locations named after Europeans have mostly been renamed. Although his surveying was probably his most important activity (and his bread and butter of course) he stands out as by far the most important investigator of Indian Mollusca. He collected a great deal and dissected a large number of species. After his return to England for health reasons he devoted all his time to the subject.

Whilst working on the anatomy of the genus *Trochonanina* I had occasion to refer to a paper written by him (Godwin-Austen, 1895) and discovered that my copy had actually been his own working copy with a list inside the front cover of all the workers to whom he had sent reprints (reproduced here, Fig. 1). This list naturally comprises many of the well known molluscan workers of the day. Of those listed there, three, **J.W. Gregory**, **W. Doherty** (name not actually ticked in the list) and **Sir John Kirk**, have been dealt with in my series on collectors in East Africa (see index in *Conch. Newsl.* **26**, p. 223). Two copies were retained by the author, one given to his wife **Jessie** (actually his second wife, a daughter of John Harding Robinson) and another to **Arthur Godwin-Austen** (the informative article in the DNB mentions a son and this may be he).

own copy	✓	3	Li John Kirk. ✓
do			Bertram Hewett. ✓
Jessie	✓		Arthur Godwin-Austen
Dr. Anderson	✓		
5 W. T. Blanford	✓		
3 J. A. Smith	✓	35	
J. W. Gregory	✓		
S. B. Dykes	✓		
P. L. Gclater	✓		
10 J. D. D. D. D.	✓		
N. H. Woodward	✓	40	
Lin Wm Flower	✓		
B. B. Woodward	✓		
C. Hadley	✓		
15 Col. Beddome	✓		
G. Sowerby	✓	45	
Alfred Buxley	✓		
W. Collinge	✓		
W. Doherty	✓		
20 A. Everett	✓		
H. Fulton	✓	50	
Godman F.	✓		
Rupert Jones	✓		
British Soc. Bengal	✓		
25 J. Chapman M. M.	✓		
L. Theobald	✓		
B. Tomlin	✓		
Major L. Lockington Wilkes	✓		
Trustee Indian Museum	✓		

Fig. 1. Reproduction of Lt. Co. H.H. Godwin-Austen's reprint mailing list.

Working through the list – **W.T. Blanford** (1832–1905) was a well-known worker on Indian Mollusca, as was **Col. R.H. Beddome** (1831–1911), a forester and great expert on Indian ferns. **Edgar Smith** (1847–1916), one of the greatest mollusc workers of all time, employed at the British Museum (Nat. Hist.) to be compared only with Pilsbry (who did much more seminal work on scientific classification) and E. von Martens. Godwin-Austen does not appear to have been in contact with many foreign workers. **B.B. Woodward** (1953–1930) also worked in the Museum as librarian and is of course known to us as co-author of Kennard and Woodward's exhaustive synonymy of the British non-marine Mollusca and his work on *Pisidium*. **E.R. Sykes** (1867–1954), **J.H. Ponsonby** (1848–1916) and **J.R. le B. Tomlin** (1864–1954) were well known amateurs who had large collections and did a great deal of valuable work. **P.L. Sclater** (1829–1913) was secretary of the Zoological Society of London for 43 years and a famous worker on mammals and birds. **H.C. Fulton** (1861–1942) and **G.B. Sowerby III** (1843–1921) were renowned dealers in shells but much more than that; in the course of their profession they had more shells pass through their hands than many of the top professionals and frequently described species they knew or thought were new. **W.E. Collinge** (1867–1947) is well known for his work on slugs. **M.M. Schepman** (1847–1919) seems to be the only European worker on the list; he was a Dutch collector but also a scientific student of the Mollusca, one of those amateurs who is admitted to the small coterie of professionals. **W. Theobald** (1829–1908) was a well-known Indian conchologist and **Charles Hedley** (1862–1926) a noted Australian worker perhaps unfortunately best known for his pernicious comments on Hugh Cuming. **F. Godman** is doubtless F.D. Godman (1834–1919, a wealthy man and a Trustee of the Museum who had made a vast collection of birds and insects in Central America with O. Salvin and paid themselves for the publication of the results in 63 splendid volumes, the mollusc volume being produced by E. von Martens. Reprints were also sent back to India to the Asiatic Society of Bengal and to the Indian Museum. The half dozen remaining names are not known to me but doubtless something could be discovered with patience.

References

Godwin-Austen, H.H., 1895. Notes on *Trochonanina* and other genera of land Mollusca with reference to the generic position of *Martensia mozambicensis* and other species. *Proc. malac. Soc.* 1:281-287.

Conchological Society's Display Boards at Hastings and Littlehampton

The Society's touring exhibition panels will be on display this summer at the following locations and in each case will be accompanied by a separate temporary exhibition put on by the museum.

HASTINGS MUSEUM 1 June – 10 July 1995

Accompanying exhibition 'Shells at Hastings'

John's Place, Cambridge Road, Hastings, East Sussex Tel. 01424 781155

Admission free. The museum is near the Black Rock/St Leonards end of Hastings and within walking distance of the railway station.

Beach walk

There will be a beach walk in search of shells on Saturday 24 June.

Meet 2.15 at Hastings pier. Leader: June Chatfield

LITTLEHAMPTON MUSEUM 25 July – 21 October 1995

Accompanying exhibition 'Life – the first 3,900 million years'

Manor House, Church Street, Littlehampton, West Sussex.

Tel. 01903 715149.

The museum is in the centre of town within easy walking distance of the railway station.

Book Review

The Lost Ark: new and rediscovered animals of the twentieth century. By Karl Shuker, with a foreword by Gerald Durrell, 1993. London: HarperCollins. 287 pp, illustrated + 16 pp of coloured plates. Hardback. ISBN 0-00-219943-2. Price £14.99.

So often in a book of this type, aimed at the general public and intended as much for a good read as a work of reference, the word 'animals' in the title turns out to be a synonym of mammals or, at most, higher vertebrates. One would expect to find in this work, as one does, informative accounts of the discovery of the okapi, the mountain gorilla and the giant forest hog, all of which had been preceded by native reports and travellers' accounts. The reader's hopes that the author would be up to date with very recent discoveries, such as the Vu Quang ox from Vietnam, are not misplaced. And one is pleased to find here such zoological novelties, complete with illustrations, as pa beuk, the work's largest freshwater fish, the megamouth shark and, in colour, the Fijian crested iguana, undetected by science until 1979, whose eyes stare out from the jacket of this fascinating book.

As one expects from this author, the 'superlatives' are well represented: the smallest mammal (the bumblebee bat), the most primitive beaked whale (*Tasmacetus*), the smallest, living, flightless bird (the Inaccessible Island rail) and *Conraua goliath*, the frog as large as an antelope, among many others. Shuker, a well-known cryptozoologist, also takes this opportunity to include not only those animals, such as the kouprey, the wild ox of Cambodia known from temple carvings and statues 400–800 years ago yet undescribed scientifically until the 1930s, but also a number of those whose authenticity is still a matter of faith, such as the South American 'ape' *Ameranthropoides* and *Homo pongoides*, the Minnesota 'iceman'. But if you thought the o-o bird (or even the o-o-aa bird) had no existence outside the lyrics of bawdy students' songs, you can read on page 136 of their rediscovery in Hawaii after many years of presumed extinction.

The Lost Ark is not intended to be an exhaustive catalogue, but

is a compendium of well chosen and accurate information. Most books of this kind restrict their contents to vertebrates, and these do indeed occupy the bulk of this volume, but a sizeable chapter on invertebrates comprises 46 of its 287 pages. All those mentioned had eluded discovery until the twentieth century, or were found again after being written off as extinct. Vertebrates get a potted biography each, while the invertebrate entries may deal with a higher taxon, such as the phyla Pogonophora, Gnathostomulida and Loricifera (to the discoverer of which this book is dedicated), the insect orders Zoraptera and Protura ('the world's most primitive insects') or faunal assemblages such as the entirely new work of the hot vents, first discovered by the submersible 'Alvin' in 1977, where live *Riftia*, the spectacular 8.5 ft Vestimentifera and, among the Mollusca, the bivalves *Calyptogena magnifica*, with shells up to one foot long, and *Bathypecten vulcani*, a scallop with Palaeozoic affinities.

Although, inevitably, the arthropods take up the larger part of the invertebrate chapter, the Mollusca are well represented. *Neopilina*, of course, stars as 'probably the most spectacular zoological comeback of all time', while the three cephalopods included – *Lycoteuthis diadema*, *Cirrothauma murrayi* with non-functional eyes and *Vampyroteuthis infernalis* – were no doubt selected on account of their peculiarity. The last species is illustrated by a coloured photograph of one of Guy Wilkins's excellent wax models. *Conus gloriamaris* is also depicted in colour, included because no specimens were found between 1896 and 1957 and, by the same criterion, the author has chosen *Strombus taurus*, *Cypraea leucodon* and *C. fultoni*. Equally worthy candidates, however, such as *Conus milneedwardsi*, *C. bengalensis* or *Cypraea teuleri*, do not get a mention here.

Shuker has cast his net widely to bring the reader not just a mere list of zoological discoveries, but a well of interesting anecdotes into which random dips may reveal such prodigies as hairy frogs, hairy fish or hairy snails. Unlike in many books aimed at the general reader, the use of appropriate zoological terms has not been shunned, and the information provided is fully documented. The 17-page Bibliography contains not only

references to scientific journals and books in which the included species are described and discussed, but also to many articles in newspapers and popular magazines. A seven-page Appendix explains the scientific classification of animals, with a complete list of phyla and classes in systematic order. This is the stuff of travellers' tales but here, with few exceptions, Nature has yielded up her mysteries to the scientific gaze without them losing any of their wonder.

David Heppell

Mediterranean marine gastropods

The following will be of interest to anyone interested in the shells of the Mediterranean:

Preliminary check list of marine gastropods from Greece by Marianne Delamotte and Evi Vardala-Theodorou published in *Ann. Musei Goulandris* **9**: 375–427 ('1994' actually Jan. 1995).

Applications published in the *Bulletin of Zoological Nomenclature*

The following Applications were published on 30 March 1995 in Vol. 52, Part 1 of the *Bulletin of Zoological Nomenclature*. Comment or advice on these Applications is invited for publication in the *Bulletin* and should be sent to the Executive Secretary, ICZN, c/o The Natural History Museum, Cromwell Road, London SW7 5BD.

Case 2949 *Aplysia juliana* Quoy & Gaimard, 1832 (Mollusca, Gastropoda): proposed conservation of the specific name

E. Martínez & J. Ortea

*Departamento de Biología de Organismos y Sistemas,
Laboratorio de Zoología, C/ Catedrático Rodrigo Uria s/n,
33007 Oviedo, Asturias, Spain*

Abstract. The purpose of this application is to conserve the specific name of *Aplysia juliana* Quoy & Gaimard, 1832 for a sea hare (Opisthobranchia, Anaspidea) found worldwide on rocky shores in warm waters. The name is threatened by the unused senior subjective synonym *A. sorex* Rang, 1828.

Case 2922 *Octopus vulgaris* Cuvier, [1797] and *Loligo vulgaris* Lamarck, 1798 (Mollusca, Cephalopoda): proposed conservation of the specific names

Angel Guerra

*Instituto de Investigaciones Marinas (CSIC), Eduardo Cabello
6, 36208 Vigo (Pontevedra), Spain*

Miguel A. Alonso-Zarazaga

*Museo Nacional de Ciencias Naturales (CSIC), José Gutiérrez
Abascal 2, 28006 Madrid, Spain*

Abstract. The purpose of this application is to conserve the specific names of both the common octopus *Octopus vulgaris* Cuvier, [1797] and the common squid *Loligo vulgaris* Lamarck, 1798. The names of these economically important species are threatened by senior subjective synonyms unused in the past century, *Sepia octopodia* Linnaeus, 1758 and *S. octopus* Gmelin, [1791] (octopus) and *S. loligo* Linnaeus, 1758 (squid). □

Conchological Society of Great Britain and Ireland

MINUTES

1057th (Ordinary) meeting held on 16 April 1994 in the Demonstration Room of the Natural History Museum starting at 2.30 pm

In the chair: Mr D.C. Long with 29 members and friends present.

Apologies for absence: Dr B. Colville, Mr M.D. Weideli, Dr R.C. Preece, Mr P. Lee, Dr M.J. Willing, Mrs N.F. McMillan, Dr J.E. Chatfield, Mr P.E. Negus, Mrs E.B. Rands, Mr D. Rands, Mrs M. Fogan.

Minutes of the last meeting (of 19 February 1994): Read and accepted.

Matters arising: None.

Nomination and election of new members: None.

Mr Long formally thanked Mr Guntrip for his hard work as Minutes Secretary and invited any members who were attending for the first time to introduce themselves during the tea break.

Lecture of the day:

Prof. Malcolm Edmunds (University of Central Lancashire):

'Colour and Defence in Sea Slugs'.

Announcements and Correspondence:

1. Ms Reynolds announced that since attending the International Partula Workshop she is providing a home for a hybrid species, *Partula mirabilis* x *taeniata*, on behalf of the Conchological Society, and that any members wishing to see these snails should contact her directly.
2. Mr Killeen reminded members that there was to be a slug workshop held in Godalming on 30 April.
3. Mr Long reminded members that the next meeting was on 21 May and that the lecture would be 'Slugs as pests' by Dr Tony South, and that forthcoming field meetings would be in Gloucestershire on 23 April and mid-Wales on 14 and 15 May.

Any other business: None.

Meeting closed at 4.40 pm.

Chairman

Appendix: members' exhibits:

- Mr P. Dansey Genus *Ensis*: a bibliography.
- Mr K. Brown Book: N. Coleman, *What Shell Is That* plus press cuttings.
- Mr D. Guntrip Further mollusc drawings: *Helicopsis striata* x 3, *Semilimax pyrenaicus* x 2, *Paludinella litorina* x 1, *Hygromia limbata* x 4, *Ashfordia granulata* x 1, *Zenobiella subrufescens* x 4.
- Ms J. Reynolds 1. Newspaper cuttings
- 2. British woodland snails.

**1063rd (ANNUAL GENERAL) meeting held on 18 March 1995 in the
Demonstration Room of the Natural History Museum at 2.30 pm**

In the chair: Dr B. Colville with 37 members and friends present.

1. *Apologies for absence:* Mrs Light, Mrs Platts, Mrs & Miss Fogan, Mr Philp, Mr & Mrs Rands, Mrs McMillan, Dr Chatfield, Mrs Long, Dr Oliver.
2. *Appointment of two scrutineers to count postal vote:* Mrs Pain & Mr Worth were elected.
3. *Minutes of the previous SGM & AGM (of 19 March 1994):* Read and accepted.
4. *Matters arising:* None
5. *Nomination and election of new members:* One full and one student member
Full: Mr R. Robinson
[redacted] Colindale, London [redacted]
Student: Mr T. Erskine
[redacted] London [redacted]
6. *Report of the Council by the Hon. General Secretary:* Read and accepted.
7. *Report of the Hon. Treasurer:* Dr Colville announced that Mr Seccombe had not delivered his report, but it was hoped that it would be ready in time for inclusion in the *Journal*.
8. *Report of the Hon. Membership Secretary:* Read and accepted.
9. *Report of the Hon. Non-Marine Recorder:* Read and accepted.
10. *Report of the Hon. Marine Recorder:* Read by Mr Killeen and accepted.
11. *Report of the Hon. Programme Secretary:* Read and accepted.
12. *Report of the Hon. Conservation Officer:* Read and accepted.
13. & 14. *Members' exhibits and tea break.*
15. *Presidential address:*
Dr B. Colville: 'The ecology of *Vertigo* species in Britain and how to find them.'
16. *Announcements and correspondence:* None
17. *Election of Auditors:* Mr N. Light and Mr D. Worth were elected.
18. *Results of the postal ballot:* The following were elected:

Officers:

President	Dr R.C. Preece
Hon. General Secretary	Ms J.E. Reynolds
Hon. Membership Secretary/Treasurer	Mr M.D. Weideli
Hon. Editor (<i>Journal</i>)	Dr P.G. Oliver
Hon. Newsletter Editor	Miss R.E. Hill
Hon. Marine Recorder	Mrs J.M. Light
Hon. Non-Marine Recorder	Dr M.P. Kerney
Hon. Programme Secretary	Mr I.J. Killeen
Hon. Conservation Officer	Dr M.J. Willing

Ordinary Council members (to serve a 3-year term):

Mr F.J. Pinn	Mrs C.M. Street
Mr R. Boyce	

19. *Any other business:* None

Meeting closed at 5.38 pm.

Chairman

Appendix: Members' exhibits

- Mr D.C. Long
Non-marine molluscs from Madeira (names provided by Mr Killeen)
- Mr P. Dansey
East Lothian raised beach fossils
- Ms J.E. Reynolds
 1. Institutional Members' publications
 2. Article and stamps by Andy Goldsworthy
- Miss R. Holt
Methods of display
- Mr I.J. Killeen
Live specimens of *Perforatella rubiginosa* (Schmidt) from Corporation Island, River Thames, London
- Mr K. Brown
 1. Book: T. Cossignani, *Bursidae of the World*
 2. Specimens of *Bursa* (S.L.) for comparison
 3. Press cutting: Royal Mail measures against snails in postboxes
- Mr D. Worth
Harpa goodwini Rehder, 1993. New species from the Leeward Islands of Hawaii
- Dr B. Colville
The 15 species of British Vertiginidae
- Dr M.J. Willing
 1. Biodiversity Challenge information
 2. Species Action Plans
 3. Chalk grassland snail report.



Juniper Hall Snail Course

13–15 October (Friday-Sunday)

This course is a short introduction to snails and slugs in the area around Box Hill which, on the chalk, has an exceptionally good range of species.

Tutor: June Chatfield. Fee £94 Residential.

Details and bookings:

*Juniper Hall Field Centre,
Mickleham, Dorking, Surrey RH5 6DA.
Tel. (01306) 883849.*

Diary of Meetings

The diary is presented in date order and includes both meetings of the Conchological Society of Great Britain and Ireland and meetings of molluscan interest run by other organisations. Fuller details of Conch. Soc. field meetings are given on page 513.

Saturday, 24 June, Sawbridgeworth Marsh, Herts. Conch. Soc. field meeting led by Pryce Buckle ().

Saturday 24 June, Hastings. Hastings Museum Society beach walk led by June Chatfield. Meet 2.15 pm at Hastings Pier.

Wednesday 12 to Sunday 16 July, Cornwall. Conch. Soc. marine recording meeting led by Jan Light () and Stella Turk ().

Friday 4 to Sunday 6 August, Yorkshire Dales. Joint meeting to mark the centenary of the Yorkshire Conchological Society. Led by David Lindley (0113 269 7047).

Saturday 2 September, Malham. Yorks. Conch. Soc. field meeting. Meet at Tam House SD894673 at 11 am.

Saturday 23 September, Cirencester area, Glos. Conch. Soc. field meeting led by Helen Weideli ().

Saturday 7 October, Stamford Bridge. Yorks. Conch. Soc. field meeting. Meet at car park SE713556 at 11 am.

Friday 13 to Sunday 15 October, Juniper Hall. Snails and slugs around Box Hill. Tutor: June Chatfield. Further details from Juniper Hall Field Centre, Mickleham, Dorking, Surrey RH5 6DA.

Saturday 14 October, Leicestershire. Conch. Soc. field meeting led by Jon Daws.

Saturday 21 October, London. Conch. Soc. indoor meeting. 'The ammonites of the Bradford Abbas Fossil Bed of Dorset' by Robert Chandler. The Natural History Museum at 2.30.

Friday 27 to Sunday 29 October, Flatford Mill. Life on the Seashore. Tutor: Ian Killeen. Full details from Flatford Mill Field Centre, East Bergholt, Colchester CO7 6UL (01206 298283).

Saturday 18 November, London. Conch. Soc. indoor meeting. 'Patterns of non-marine molluscan diversity in East Africa' by Dr Peter Tattersfield. The Natural History Museum at 2.30.

Saturday 25 November, Woking. Conch. Soc. Molluscan Workshop.

Saturday 16 December, London. Conch. Soc. indoor meeting. 'The glass menagerie – the work of Leopold & Rudolph Blaschka' by Chris Meeham. The Natural History Museum at 2.30. □

Field Meetings 1995

Hon. Programme Secretary:

Ian Killeen

Felixstowe, Suffolk,

Tel.

Important

Please remember to inform the leader if you are attending a field meeting.

Saturday 24 June

SAWBRIDGEWORTH, HERTS.

Leader: Pryce Buckle ()

Sawbridgeworth Marsh SSSI is located on the Essex-Hertfordshire border and is currently jointly owned and managed by the Essex and the Herts. & Middlesex Wildlife Trusts. The site includes a peaty bank which is fed by calcareous springs, as well as reed beds, ditches and ponds. *Oxyloma sarsi* has been recorded from here in the past. There is also access to the River Stort, and it is hoped to obtain permission to visit an adjacent wet woodland.

Meet at 10.30 at Bishop Stortford B.R. car park (Map Ref TL492209).

Wednesday 12 to Sunday 16 July

CORNWALL

Leaders: Jan Light () and Stella Turk ()

The shores of southern Cornwall are particularly rich and many have a long history of study. This extended meeting is designed to up-date records and to provide new information for the proposed Atlas of the Channel Mollusca. It is hoped that the itinerary will include Marazion, the Fal and Helford River Marine Reserves. It may be possible to arrange a dredging trip out of Falmouth.

The facilities of the Cornish Biological Records Unit will be made available to us. It is up to individual Members to make their own accommodation arrangements but Redruth, Helston or Falmouth are recommended as convenient centres. Main Tourist Office at Kerrier District Council, Council Offices, Camborne TR14 8RY (Tel. 01209 712941).

Friday 4 to Sunday 6 August

YORKSHIRE DALES

Leader: David Lindley ()

Members wishing to attend this meeting should contact the leader who will then forward the full itinerary. Those wishing to attend should make their own accommodation arrangements. The Skipton Tourist Information Office on 01756 792809 or the National Park Centre at Grassington on 01756 752774 can offer help and advice. Self catering accommodation tends to be Saturday to Saturday in August but there are many B&Bs in the area. The

programme will be as follows:

- Friday 4th: Upper Wharfedale. Hanging woods and scars around Kettlewell, Buckden and Littondale.
Saturday 5th: Wensleydale. Woodlands, limestone grassland and a disused limestone quarry.
Sunday 6th: Lower Wharfedale woodland.

**Saturday 23 September
CIRENCESTER AREA, GLOUCESTERSHIRE**

Leader: Helen Weideli (REDACTED)

A day in a remote Cotswold location recording land and freshwater species from a variety of habitats on a private estate. Although two SSSIs are designated, little is known of the mollusc fauna. Meet at 10.30 at Edgeworth Village Hall (known as The Reading Room), Map Ref SO945063, Sheet 163 Cheltenham and Cirencester. The nearest railway station is Kemble on the Great Western Line. It is therefore **ESSENTIAL** that anyone proposing to travel by train should contact the leader, giving at least one week's notice, in order that arrangements to meet them can be made.

**Saturday, 14 October (Provisional)
LEICESTERSHIRE**

Leader: Jon Daws. Venue and itinerary to be decided.

OTHER EVENTS

FLATFORD MILL FIELD COURSE

Tutor: Ian Killeen

27–29 October. Life on the seashore. A short course on the rich variety of animal and plant life that lives on the rocks, sands and muddy shores around Harwich and the Stour Estuary. An introduction to location and basic identification of the different marine phyla found in the area.

Full details from Edward Jackson (Director), Flatford Mill Field Centre, East Bergholt, Colchester CO7 6UL. Tel. 01206 298283.

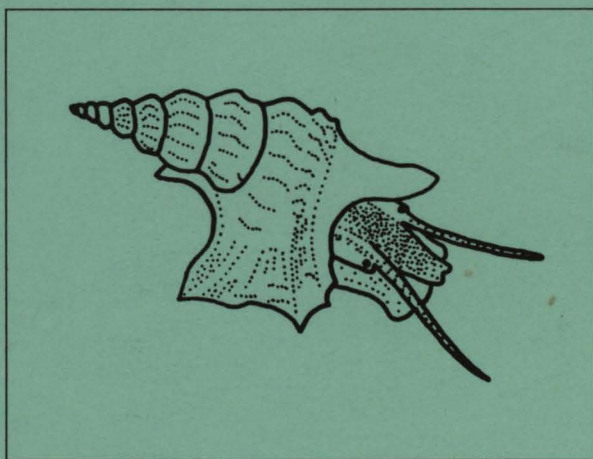
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Snail trails in the Dordogne

Amanda J. Millar

Hassocks,

West Sussex

While on holiday for a week in the Dordogne region in south-west France this spring, I was keen to see how French snail assemblages compared with English ones, and to broaden my experience of different species.

I found more species than I had dared to hope for – a total of 53 species with 36 at one rich site – over a range of habitat types. I did seem to have picked one of the richer areas in France though. Table 1 shows species at the sites visited with a simple habitat breakdown. All specimens found were fresh or alive except for some at Site 4 (see figure 2). The first six sites listed were sampled very thoroughly and where possible a soil/litter sample was taken and sieved for examination under the microscope back in England. The other sites were only briefly examined and so the species and numbers are not necessarily representative of the site, but are included for interest. It soon became clear to me that this richness and the differences between these assemblages and the ones I have found in Sussex could be accounted for by a number of factors.

The most obvious differences is the species themselves. Nine species which I found in France are not found in England. This may be because either they did not manage to colonise England before the link with the Continent was severed after the Ice Age, or they may simply prefer a more southerly Mediterranean climate (e.g. *Chondrula tridens*, *Granopupa granum*). Five others are very rare or extinct in Britain either because they are on the northern limits of their range (*Monacha cartusiana*, *Helicodonta obvoluta*) and/or they are vulnerable to habitat destruction, pollution, climate change, etc.

The next obvious reason for differences is the climate. While I was there (end March, early April) we had frosts at night, and pleasant days but only once or twice was it warm enough for

shirtsleeves, not dissimilar to a fine spring day in southern England. However, I believe the extremes are greater; in summer it is much hotter and drier, but in winter it can be quite cold, and the temperature ranges on any particular day may be greater. The air is very clean and little pollution is suggested by the abundance of lichens which festoon the trees. Our snails may be suffering more from the effects of pollution.

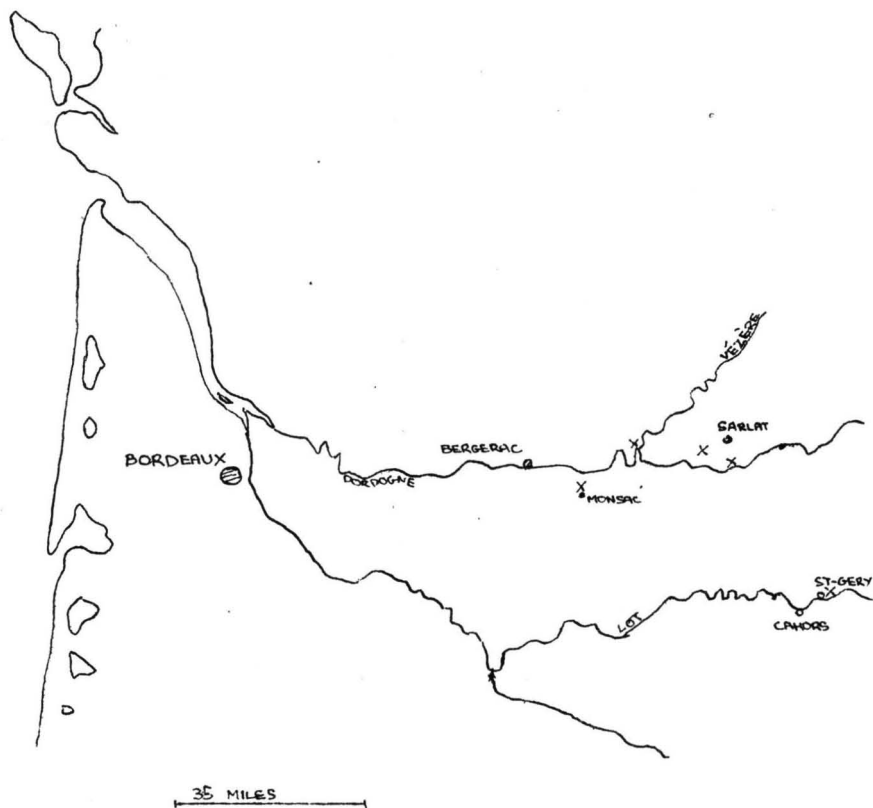


Fig. 1. Map of collecting area in south-west France

Scale 1 inch = 35 miles

X = sites visited

The Dordogne region is largely on calcareous rock so a rich fauna might be expected. Although in the Upper Cretaceous, the limestone is not the same as our familiar chalk, but is a warm honey coloured massive rock with cavities left by fossils and more granular, much used for building houses and walls. Although I have not investigated it, the soils formed over such a rock may well have different properties to those over chalk. In the Lot Valley (Sites 1, 2, 12 and 13) the rock is completely different. Here there is a very fine calcareous mudstone, of Jurassic age, grey in colour and showing more fracturing along bedding to produce small fissile scree when frost shattered. Even within this small area of France comparisons may be difficult, because around the Dordogne the slopes are gentle and well vegetated (woods, meadows or cultivated), whereas in the Lot valley the hills are higher, steeper, not cultivated and barely vegetated with stunted oak and a great deal of box scrub and undershrub, with much bare rock and scree visible, whereas in the Dordogne woods, moss, butcher's broom, juniper and prickly bedstraw with thick soil and leaf litter seem to predominate.

The habitat types are not directly comparable with English ones. As mentioned above, the hills have lots of bare rock and stunted trees, and even in the Dordogne woods, many blocks of limestone protrude through the soil, covered by moss and make walking extremely hazardous. (The only location in England that I know of with similar habitat structure is Wistman's Wood on Dartmoor, where stunted, lichen-encrusted oaks live among the granite boulders but, of course, the geology is completely different.) Most of the local houses are made of limestone and all seem to have stone walls, many of them ancient. The French do not seem to be as 'tidy minded' as the English and are happy to let things be, but they also have the advantage of a lower population density. Although most of the houses in Monsac, where we stayed, have been renovated in the last few years (this includes bringing the toilet indoors, rather than a bucket at the bottom of the garden!) we still saw big bats and barn owls drifting over the garden at dusk, lizards scuttling round the back door and emerald green frogs chorusing from the stone walls. There are many more cliffs

and rock faces available for snails, many are natural, caused by river downcutting, or man-made road cuttings which are left natural. In England I have found, in the course of surveying geological sites in Sussex, with a view to preserving some as Regionally Important Geological Sites, that old quarries and road cuttings are all too often 'landscaped' or 'infilled' or just dumped in and allowed to grow over (our wetter climate may encourage this more). This denies potential sites to rock-loving snails.

The shells of certain species showed great variability, even when collected from the same site and presumably the same population. *Clausilia bidentata* in particular in some cases had up to four extra palatal folds and I was probably experiencing the varied and unclear forms of *rugosa* which are mentioned in Kerney (1979). Another one which confused me was *Candidula unifasciata* which Dr Michael Kerney kindly identified as the variety *rugosiuscula* with very coarse ribbing. The *Trichia* also proved to be problematical. Michael Kerney confirmed, as far as possible with only empty shells, the ones marked *T. plebeia* but some were unidentifiable.

At this stage, I begin to wonder if I can make any useful comparisons with Sussex, or whether this is work for several Ph.Ds. After all I was supposed to be having a holiday! So how similar are these assemblages?

I found 35 species (66%) in common to the Dordogne/Lot and to Sussex but with interesting variations. *Lauria cylindracea* seemed to be extremely abundant – 37% of the sieve results at site 4 – but I have not found it nearly so abundant in Sussex, probably reflecting its liking for rocks and walls. I was surprised to find so few *Pupilla muscorum*, and *Monacha cartusiana* seem to occupy the same 'weed' niche that *Helix aspersa* and *Monacha cantiana* do here. Numbers of individuals extracted from the sieving suggests a higher population density in France than in England. The samples of the French Sites 4, 2 and 3 were of approximately similar volumes and yielded 1761, 240 and 63 individuals respectively (mean 688). Seven samples from Sussex (on the chalk) have yielded a mean of 82 individuals (full data not given). Even if I discount the Site 4 data as anomalous the

snails seem to be more abundant in France than in England. The number of species found at Sites 1 to 6 (the ones thoroughly investigated) varied between 15 and 36 with a mean of 22. Fifteen sieved sites on the chalk in Sussex of one habitat type (i.e. grass or scrub etc.) yielded between 7 and 28 species with a mean of 15 (full data not given). Cameron (1973) has mean figures of between 8.2 and 18.6 (overall mean 15.8) for woodland on chalk. On 71 chalk grassland sites Willing (1993) found on average 15 species. Unfortunately I do not have enough data from sample sites for France to draw any serious conclusions.

One last thing I decided to do was to examine the figures from Site 4 'The Allee' This track/public footpath had so many snail shells in such a small area of fine soil and grit banked up against a stone wall against a garden, that I thought it would make an interesting comparison between the efficacy of different sized sieves compared with collecting by hand. I felt that this site was somewhat of an anomaly, because of the high density of snails. It did not look as though it would be a desirable place for live snails to be but rather a graveyard of shells fallen from the wall, garden or bushes. However, as Table 2 shows, the high proportion of fresh shells (a few live) suggests that they are derived from nearby living populations and not a centuries-old collection of extinct shells. A total of 31 species were found, 6.5% only by hands-and-knees visual collection, 16.1% turned up only in the sieves (interestingly the largest snail, the smallest and a slug) and the rest (77.5%) were common to both hand and sieve collecting.

Analysis of the sieved species (29) revealed that one species (3.5%) was found only in the 7 mm sieve. Four species (13.8%) were found only in the 2 mm sieve (reflecting a size range of 7-2 mm). Nine species (31%) were found only in the 0.6 mm sieve (size range 2-0.6 mm) and these were the small *Truncatellinas* and *Vertigos* as might be expected. Of the total of 1761 snails in the sieves, 61% were fresh (i.e. with periostracum). If the proportion of fresh to old shells is a rough indication of the health of the population (ignoring shell robustness, seasonal effects etc.) then only *Candidula intersecta* and *Truncatellina callicratis* have rather a low proportion. Of the total snail species (2131

individuals) only three old *Helicella itala* and two old *Cochlicopa* sp. were found, suggesting they do not, and did not, like living there. These were also the two found only by hand and which escaped the sieving. This exercise gave me confidence in my hand collecting ability, but demonstrates the necessity of the sieves to get those odd few species. Because this soil had relatively little organic matter it was easy to spot the small snails by eye on the ground. A woodland soil or grassland would be an entirely different matter and probably a larger proportion of species present would be detected in sieves only.

I have become very interested in land snails only in the last two or three years, and am trying to learn more about them. Any comments on this simple survey, or recommendations for further reading, would be very welcome. I have been unable to find many papers or information on assemblages in relationship to the habitat, geology, aspect and simple flora they live in. I have surveyed a few grassland and woodland sites on chalk and woodlands on sandstone but would be grateful for any further references or unpublished lists on different types of habitat.

References

- Cameron, R.A.D., 1973. Some woodland mollusc faunas from southern England. *Malacologia* 14: 355–376.
- Kerney, M.P., Cameron, R.A.D., 1979. *Land Snails of Britain and North-West Europe* Collins, London.
- Willing, M., 1993. *Report on the molluscs of the West Sussex chalk downs 1993*. West Sussex County Council.

Notes on the more important sites

Sites 1 and 2. On the D10 just west of Masseries (between St Gery and St Cirq-Lapopie in the Lot valley). Road cutting into limestone, thin red soil, on limestone scree with *in situ* rock, open and light, stunted oak, box shrub, tormentil, *Sedum*, grape hyacinth, *Helleborus foetidus*, evergreen oak(?), violet, rock rose. ESE-facing, 31 March 1995. Site 2 was about 1 km further up the road (and hill) east-facing, rich black soil and leaf litter collected and sieved.

Site 3. Woodland between Monsac and Bayac, on D27, Dordogne. Oak coppice, thin lichen-covered trunks, undershrub juniper and

butcher's broom and much moss, some grass and prickly bedstraw (possibly *Rubia tinctorum*). Moss-covered limestone blocks protruding through soil. Litter sample sieved.

Site 4. A track along the bottom of the Garden (Site 6). Reputed to have had a queen of France ride along it! Fine earth bank consisting of dry soil and finely divided mortar and grit banked up against a stone wall. Overhung by privet and elderberry. Partly shaded, but south-facing. Soil sample sieved.

Site 5. The Church wall, Monsac. Limestone, varying between 1 and 5m high, west-facing, adjacent to the Garden (Site 6). Old mortar crumbling, some moss, ivy-leaved toadflax, 0.5m from metalled road (little used). Snails collected from wall and on ground immediately at its base. Sieving not practicable.

Site 6. The Garden, Monsac, near Beaumont, Dordogne. 0.25-acre, ex-maize field now garden with shrubs, vegetables and new limestone walls. Gentle south-facing slope.

Site 7. The Lavoir, Monsac. At the bottom of a south-facing hill, a spring emerges into a concrete construction used in the past for washing, then flows into ditch. Nothing seen in the concrete area but collected *Succinea* on vegetation in the stream/ditch. Other species found dead at the edge or floating shells.

Site 8. On top of hill near Monsac. *H. itala*, *M. cartusiana* from open grassland, rest from fallen-down wall under oak tree.

Site 9. On D703, near La Roque-Gageac, 4 km south of Sarlat. Roadside picnic spot next to river Dordogne. Soil banked up against limestone cliff. Shaded at midday by trees and overhung in spite of SE aspect. Nettles, comfrey.

Site 10. Woodland on D25 between St Cyprien and St Andre d'Allas (west of Sarlat) with *Asphodelus alba*.

Site 11. Limeuil, at junction of River Dordogne and River Vezere, on house limestone walls.

TABLE 1: French Snail Survey

Key: Site type

SS - Stony scrub W - Woodland
 SW - Stone wall R - Rocks
 S - Scree G - Grassland

Site	Site number	Site type																				
Masseries, low site.	1	SS	1	1																		
D10	2	SS	1	1																		
Masseries, high site.	3	W	1	1																		
D10	4	SW	1	1	1																	
Monnac to Bayac.	5	SW	1	1																		
D27	6		1																			
The Allée.	7				1																	
Monnac	8	G	1																			
Church wall.	9	W R	1	1	1																	
Monnac	10	W																				
The Garden.	11	SW																				
Monnac	12	R																				
The Lavoit.	13	R																				
Monnac	14	S																				
Hill walk.	15																					
Monnac	16																					
Vitrac.	17																					
D703	18																					
St Cyprien.	19																					
D25	20																					
Limeuil.	21																					
Dordogne	22																					
Bouziès.	23																					
D10	24																					
St Cirq-Lapopie	25																					
D40	26																					
Le Bugue	27																					
D703	28																					
TOTAL	29																					

Continued. .

TABLE 1 (continued)

Site	Site number	Site type	<i>Vitrea subrimata</i>	<i>Vitrea contracta</i>	<i>Aegopinella nitidula</i>	<i>Oxychilus draparnaudi</i>	<i>Oxychilus cellarius</i>	<i>Euconulus fulvus</i>	<i>Ceciloides acicula</i>	<i>Cochlodina laminata</i>	<i>Macrogastra rolphi</i>	<i>Clausilia parvula</i>	<i>Clausilia bidentata</i>	<i>Testacella haliotidea</i>	<i>Candidula unifasciata</i>	<i>Candidula intersecta</i>	<i>Candidula gigaxii</i>	<i>Cernuella aginnica</i>	<i>Helicella itala</i>	<i>Monacha cartusiana</i>	<i>Hygromia limbata</i>	<i>Trichia plebeia</i>	<i>Trichia hiepie group</i>	<i>Helicodonta obvolvata</i>	<i>Helicigona lapicida</i>	<i>Chilostoma squamatum</i>	<i>Cepaea nemoralis</i>	<i>Cepaea hortensis</i>	<i>Helix aspersa</i>	Total species
Masseries, low site, D10	1	SS	1																											15
Masseries, high site, D10	2	SS																												36
Monac to Bayac, D27	3	W																												17
The Allee, Monac	4	SW																												32
Church wall, Monac	5	SW																												19
The Garden, Monac	6																													15
The Lavoir, Monac	7																													7
Hill walk, Monac	8	G																												13
Vitrac, D703	9	W R																												15
St Cyprien, D25	10	W																												3
Limeuil, Dordogne	11	SW																												7
Bouzaies, D10	12	R																												4
St Cirg-Lapopie, D40	13	R																												1
Le Bugue, D703	14	S																												8
TOTAL			2	3	3	8	3	1	3	2	1	9	7	3	3	6	1	3	6	7	4	2	10	2	2	7	5	3	4	

TABLE 2: Analysis of Site 4

	Old	Fresh	Subtotal	% of total sieved	Old	Fresh	Subtotal	% of total sieved	Old	Fresh	Subtotal	% of total sieved	Total old sieved	% old of total sieved	Total fresh sieved	% fresh of total sieved	GRAND TOTAL SIEVED	% of Grand Total	Old	Fresh	Total	Only in hand	Only in sieve	Found in both
	7.0	mm	sieve		2.0	mm	sieve		0.6	mm	sieve								Hand collection					
<i>Cochlostoma septemspirale</i>					2	2	4	57	3		3	42	5	71	2	29	7	0.4		3	3			x
<i>Pomatias elegans</i>	21	10	31	30	41	17	58	56	9	5	14	14	71	69	32	31	103	5.8	1	2	3			x
<i>Carychium tridentatum</i>									3	2	5	100	3	60	2	40	5	0.2	1		1			x
<i>Cochlicopa</i> sp.																			2		2	x		
<i>Truncatellina cylindrica</i>									62	53	115	100	62	54	53	46	115	6.5	2		2			x
<i>Truncatellina callicratis</i>									1	11	12	100	1	8	11	10	12	0.7	2		2			x
<i>Truncatellina claustralis</i>									61	72	133	100	61	46	72	54	133	7.5		1	1			x
<i>Vertigo pusilla</i>										20	20	100			20	100	20	1.1		2	2			x
<i>Vertigo pygmaea</i>									10	23	33	100	10	30	23	70	33	0.2	1		1			x
<i>Orcula doliolum</i>					2	18	20	51	7	12	19	49	9	23	30	77	39	2.2	9	20	29			x
<i>Pupilla muscorum</i>									1	1	2	100	1	50	1	50	2	0.1					x	
<i>Lauria cylindracea</i>	2		2	0.3	43	69	112	17	172	360	532	82	217	33	429	66	646	37	39	98	137			x
<i>Vallonia costata</i>					1	2	3	1	54	180	234	99	55	23	182	77	237	13.5	15	17	32			x
<i>Chondrula tridens</i>						1	1	100							1	100	1	0.05	2	4	6			x
<i>Ene obscura</i>		1	1	4	8	14	22	81	1	3	4	15	9	33	18	67	27	1.5	5	27	32			x
<i>Punctum pygmaeum</i>										7	7	100			7	100	7	0.4					x	
<i>Discus rotundatus</i>		1	1	1	23	19	42	51	16	23	39	48	39	48	43	52	82	4.7	3	13	16			x
<i>Vitrinid</i> sp.					7	2	9	36	6	10	16	64	13	52	12	48	25	1.4	1	1	2			x

TABLE 2 (Continued)

	Old	Fresh	Subtotal	% of total sieved	Old	Fresh	Subtotal	% of total sieved	Old	Fresh	Subtotal	% of total sieved	Total old sieved	% old of total sieved	Total fresh sieved	% fresh of total sieved	GRAND TOTAL SIEVED	% of Grand Total	Old	Fresh	Total	Only in hand	Only in sieve	Found in both
	7.0 mm	sieve			2.0 mm	sieve			0.6 mm	sieve									Hand collection					
<i>Vitrea contracta</i>									2	2	100				2	100	2	0.1					x	
<i>Oxychilus</i> sp	1	1	4		4	5	9	33	6	11	17	63	10	37	17	63	27	1.5		13	13			x
<i>Cecilioides acicula</i>						1	1	7	9	4	13	93	9	64	5	36	14	0.8	1	1	2			x
<i>Clausilia bidentata</i>					19	26	45												8	14	22			x
<i>Clausilia parvula</i>	1	1			20	9	29													3	3			x
<i>Clausilia</i> sp.							49		25	52	77	51	64	42	88	58	152	8.6						
<i>Testacella haliotidea</i>					1		1	33	1	1	2	66	2	66	1	33	3	0.2					x	
<i>Candidula intersepta</i>					15	1	16	88		2	2	11	15	83	3	17	18	1	5	2	7			x
<i>Cernuella aginnica</i>	2	1	3	100									2	66	1	33	3	0.2	1	1	2			x
<i>Helicella itala</i>																			3		3	x		
<i>Monacha certusiana</i>						1	1	100							1	100	1	0.05	1	1	2			x
<i>Trichia</i> sp		4	4	13	18	9	27	87					18	58	13	42	31	1.8	9	20	29			x
<i>Chilostoma squamatinum</i>					2	2	4	100					2	50	2	50	4	0.2	5	11	16			x
<i>Helix aspersa</i>		3	3	25	7	2	9	75					7	58	5	42	12	0.7					x	
Juv. or unknown							5				171	0.1					176	0.1						
TOTALS	25	22	47	2.7	213	200	413	23	447	854	1301	74	685	39	1076	61	1761	99	116	254	370	2	5	24

The Money Cowrie of the Maldive Islands – A miracle of reproduction (?)

Fred Pinn

London

Some of the earliest references to cowrie shells used as money in the Maldives come from the Arab writers who visited the islands long before the arrival of the Portuguese. Thus a Persian trader, Suleiman, recorded about 850 AD that 'the wealth of the people (of the Maldives) is constituted by cowries; their queen amasses large quantities of these cowries in the royal depots ... The cowries are got by them from the surface of the sea. The head of this mollusc encloses something living. To fish them up they take a branch of the coconut tree and put it in the sea, and the cowries attach themselves to it. The islanders give the cowries the name kabtaj.'

About two hundred years later (c. 1030) Alberuni recounts that 'these islands are, according to their products, divided into two classes, the Diva-kudha, i.e. the Diva (islands) of the cowrie shells, because there they gather cowrie shells from the branches of the coconut palms which they plant in the sea, and Diva-kanbar, i.e. Diva of the cords (coir ropes) twisted from coconut fibres and used for fastening together the planks of the ships.'

According to Ibn Batuta (1344 AD) the cowrie trade from the Maldives to the Indian mainland was flourishing and he himself engaged in sending large quantities to Bengal. On his departure from the islands he was given a present of twelve million shells.

Ma Huan (1433 AD) a Chinese author, writing about the Maldives, explained: 'As to their cowries, the people there collect them and pile them into heaps like mountains; they catch them in nets and let the flesh rot; then they transport them for sale in Thailand, Bengal and other such countries where they are used as currency.' It is thought that the cowries used in China long before the Christian era had been brought there by Chinese traders from the Maldives via Thailand.

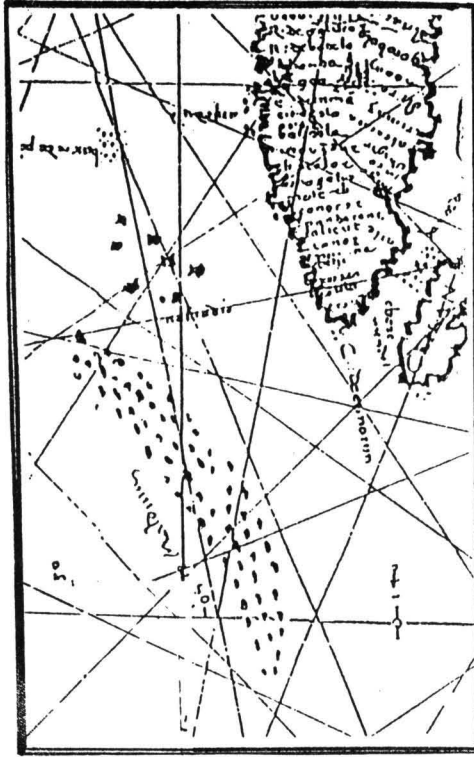


Fig. 1. The Maldivian Islands on the Map of the World by Diego Ribero, 1529

Duarte Barbosa, a Portuguese resident in Goa in 1515 described how the Malabar merchants bought up 'very bad black rice ... to sell it to the lower sort of people who buy it readily as it is good cheap, and by it they make more than by the good rice. They also take much thereof to the Maldivian Islands ... as the inhabitants are poor Moors who by reason of its lower price would rather have the black than the white ... They give it to them in exchange for cairo (coir ropes) ... There is in these islands great store of dried fish, and they carry hence as well certain small shells (buzios) which are much sought after in the kingdom of Cambaia and in Bengal where they pass current as small change for they hold it to be cleaner and better than copper ...'

For decades the Portuguese carried on their trade between the Maldivian Islands and Bengal taking shiploads of cowries to

Bengal and exchanging them at a high profit for rice which in turn was taken to the Maldives for more cowries. One French reference will suffice to hint at the quantities of shells carried away: 'At first when our people came there, a Portuguese ship of 400 tons was at anchor in the roads, having come from Cochin with a full cargo of rice to take away bolis, or shells, to Bengal where they are in great demand.'



Fig. 2. The Maldivé Islands, Map of 1653

Much information on the importance of cowries in the life of the Maldivians is found in Pyrard de Laval's account of his shipwreck in 1602 and stay as a prisoner in the islands. Describing the commercial activities he wrote: 'You see merchants from all quarters' of the Indian Ocean from Arabia to Sumatra, all coming chiefly for 'cordage', that is the much valued coir ropes. But 'there is another kind of wealth, viz. certain little shells containing a little animal, large as the tip of the little finger, quite white, polished and bright: they are fished twice a month, three days before and three days after the new moon, as well as at the full, and none would be got at any other season. The women gather them on the sands and in the shallows of the sea standing in the water up to their waists. They call them Boly and export to all ports an infinite quantity in such wise that in one year I have seen 30 or 40 ships loaded with them without other cargo. All go to Bengal, for there only is there a demand for a large quantity at high prices ... All the merchants from other places in India take a large quantity to carry to Bengal ... All these Bolys are put in parcels of 12,000, in little baskets of coco leaves of open work, lined inside with cloth of the same coco tree, to prevent the shells falling. These parcels of baskets of 12,000 are negotiated there as bags of silver are here (France) which between merchants are taken as counted, but not by others; for they are so clever at counting that in less than no time they will take tally of a whole parcel. Also in Cambaye and elsewhere in India they set the prettiest of these shells in articles of furniture as if they were marbles and precious stones.'

During the 17th century the Portuguese were gradually displaced by the Dutch and English East Indian Companies. The Dutch were particularly powerful and ruthless and tried to monopolise the Maldivian cowrie export. Time and again they attempted to persuade the Sultan to make a treaty by which they would become the sole buyers of shells. The Sultan evaded the issue by sending polite messages but refusing to sign a contract. Nevertheless, for a long time the Dutch were the major exporters of cowries either by their own ships or by Maldivian vessels bringing the shells to Ceylon attracted by preferential treatment

and concessions from the Dutch Company. If, however, they did not deliver sufficient shells, a Dutch vessel would be sent to the islands to collect what was required.

Records of the transactions in cowries are not easy to come by so it is difficult to calculate the exploitation of this commercial commodity, but the figures that are at our disposal indicate why nowadays *Cypraea moneta* has almost become a rarity on the Maldives.

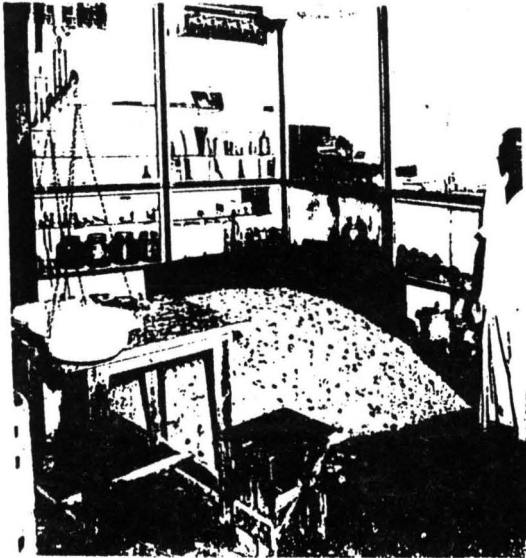
As has been mentioned all trade in cowries was done by baskets or three-cornered bundles of coconut leaves containing 12,000 cowries each. Such a bundle was called a KOTTA or KOTTE. At times buying was done by weight, each kotta weighing between 25 lb and 28 lb. About the middle of the eighteenth century the Dutch fixed the weight at 25 lb. Weighing, of course, speeded up the process of buying and loading the shells. The following are some mind-boggling figures which allow us to speculate on the astronomical numbers of shells collected by the islanders and carried away by the Dutch traders alone:

- 1669: The Dutch ship *Cocatoe* brought back 1149 kottas = 13,788,000 cowries
- 1721: This year the Netherlands annual demand was 20,000 kottas = 240,000,000 cowries
- 1723: The Dutch vessels *Adam* and *Africa* brought back 8,000–10,000 kottas = approx. 108,000,000 cowries.
- 1727, 1728, 1732, 1734: Dutch vessels are known to have been despatched to the Maldives and returned each time with an average of 9,000 kottas = 108,000,000 cowries which makes a total for these four years of 432,000,000 cowries.
- 1740: The annual demand from home (Netherlands) was 400,000 lb = 16,000 kottas = 192,000,000 cowries.
- 1752: Each return vessel to the Netherlands was expected to take 500,000 lb = 20,000 kottas = 2,400,000,000 cowries.
- 1753–1763: Vessels carried 2,400,000,000 cowries.
- 1764–1766: Average home demand was 9,000 kottas = 108,000,000 cowries.

This gives a total of 4 billions 709 millions 788 thousand cowries!!!

To the above figures must be added the unrecorded number of shells taken by French, English and Indian traders who paid a higher price than the Dutch and were therefore the preferable customers, so that in 1777 the Sultan apologized to the Dutch authorities in Ceylon for his inability to supply cowries 'as usual.'

There exists a table of imports from the Maldiv Islands to British India between 1853 and 1881, the data of a survey of the Maldives by H.C.P. Bell. Unfortunately for our purposes 'Cowries and Shells' were lumped together and only the total value is given in pounds sterling. But there can be no doubt that the number of cowries fished ran into billions. In 1921 when the same author made another survey of the islands, cowries were still collected partly for the payment of local taxes and partly for export.



The above illustration was not so long ago described as 'the last cowrie shop in Male.' A visitor to the Islands in 1993 reported, however, that this shop could not be traced. In fact, money cowries were hard to find even by an experienced diver. So it does look now as if the miracle of reproduction has been exhausted after at least a thousand years of exploitation. □

Tree slugs *Limax marginatus* (Müller 1774) in Treswell Wood

*Francine Pilcher and Chris du Feu,
Queen Elizabeth's High School, Gainsborough, Lincs.*

Although the tree slug *Limax marginatus* (Müller 1774) is widespread in Britain and Europe, it is rarely found in the East Midlands. Presumably this is because of both low rainfall and the lack of suitable woodland. In wetter areas it can occur in more open places than woodland but in this area where conditions are generally unfavourable it requires high quality habitat in order to survive. Treswell Wood (53°18'N 00°51'W) comprises 47ha of ancient woodland, managed with a coppice and standards regime by Nottinghamshire Wildlife Trust since 1972. Most of the mature trees are ash, with a few others including birch, crab and oak. The woody understory is composed largely of hazel, hawthorn and maple. The wood stands on heavy clay soil and is isolated from other woodlands by arable farmland – the nearest large woodland being 2 km to the west.

Tree slugs are common in the wood, and have been noticed for the last 15 years when they use bird nestboxes in the northern two thirds of the wood, but until Autumn 1993 they were not the object of any particular scrutiny. This study was a result of A level Statistics project work which aimed to answer the question, 'Do tree slugs have tree preferences?'. It soon became apparent this was difficult to answer in a wood with 95% ash trees. However preliminary observations showed that perhaps slugs were more common in particular parts of the wood than others. (It is salutary to note that Chris du Feu had not noticed this pattern in 15 years of inspecting nestboxes, but it was obvious from an afternoon's well directed observation.) Figure 1 shows a map of the wood with a 63m grid superimposed. The shaded squares are those where boxes were inspected; boxes with slugs inside are also indicated. To assess the slug distribution we carried out a transect survey from west to east across the wood counting both numbers of ash trees alongside the path with and without slugs on the trunk, and

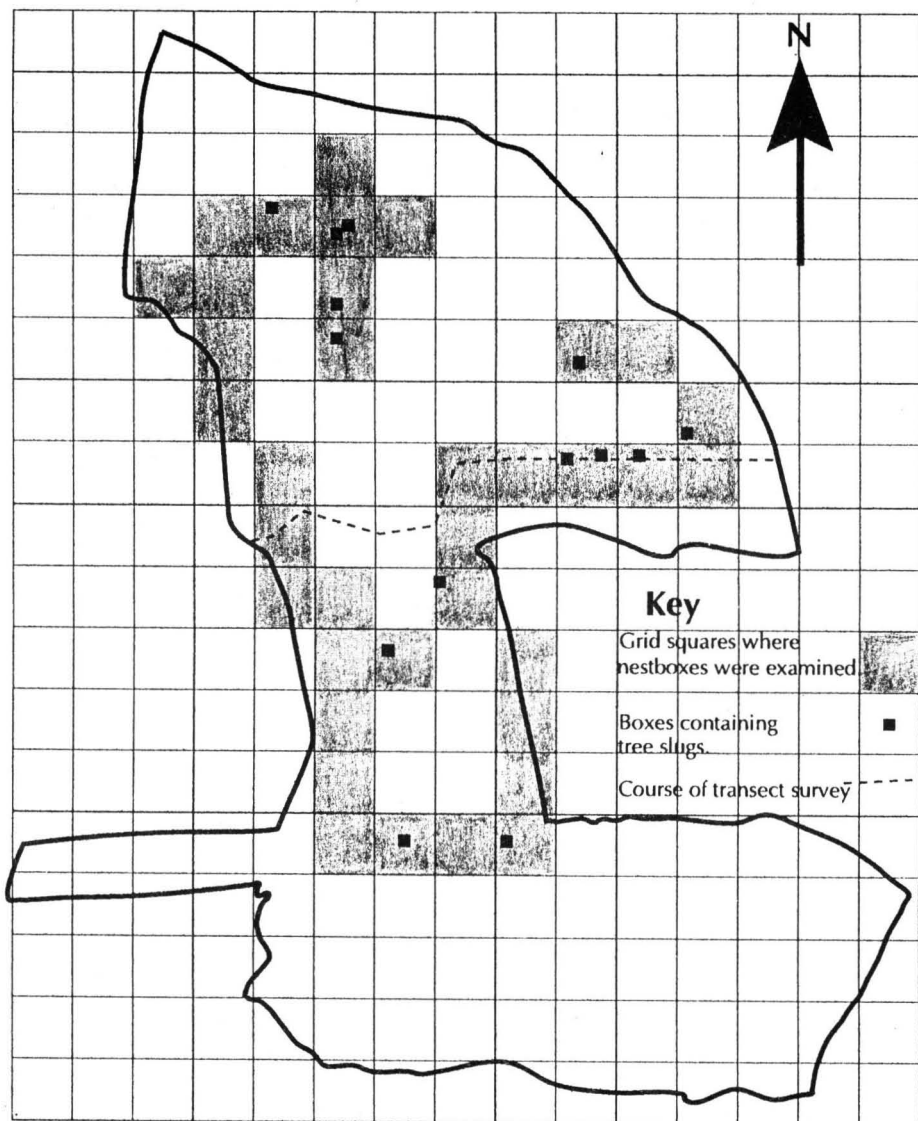


Figure 1. Treswell Wood, Nottinghamshire. 63m grid.

the numbers of slugs seen on the trunks. Figures 2 and 3 show the proportions of trees occupied by tree slugs and the mean number of slugs per occupied tree along this transect. There are more slugs in the centre with almost none at the edges. Both measures showed linear correlation with distance from nearest edge of the wood (Figures 4 and 5).

Treswell Wood, at first sight, seems to be a good habitat for tree slugs, yet the closer look we have taken shows that the edges of the wood are far less suitable than the interior. Treswell Wood is, in effect, an island of woodland in a sea of arable farmland. It is exposed to wind from all directions, there being little shelter in the form of hills or anything else. The most obvious conclusion is that the edges of the wood are too exposed for the slugs to survive easily. Whether the cause is dryness, exposure to wind or cold is not clear. It is, of course, possible that the slugs were present in the wood edges but not active. Even so, the lack of slugs found in bird nestboxes down the west edge of the wood and the lack of slug trails on the trees indicated that even if they are present at the edges, they are much less abundant there than in the centre.

Further evidence for the edge effect comes from a hunt for tree slugs in a nearby copse, 500m to the west, which used to be part of the wood before the post-war clearance for arable farming. The copse is about 50m by 20m and has several plant species which indicate it is a remnant of the ancient woodland. All things being equal we would expect that tree slugs would have remained in the copse after clearance of the trees between it and Treswell Wood. At the time when tree slugs were easily found in the wood, we found no slugs or slug trails in the copse. On the other hand, tree slugs are abundant in another large nearby wood (Eaton & Gamston 4 km to the south-west).

How big is the edge effect? The edge 63m grid squares are almost devoid of tree slugs. For a study of the effects of woodland management on the bird populations, we were advised (R.J. Fuller, pers. comms.) to consider the outer 50m of the wood separately from the interior. It is interesting that these two independent suggestions of wood edge effect are so close in size. The nearby copse is clearly all edge and so too small to support a tree slug population in this area.

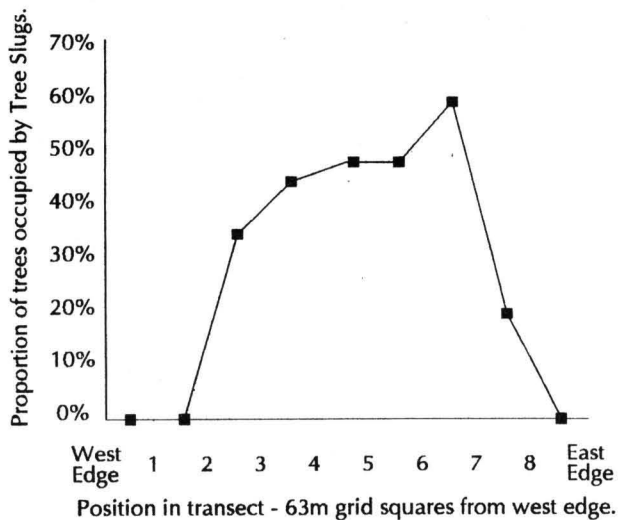


Figure 2. Occurrence of tree slugs on a west/east transect in Treswell Wood

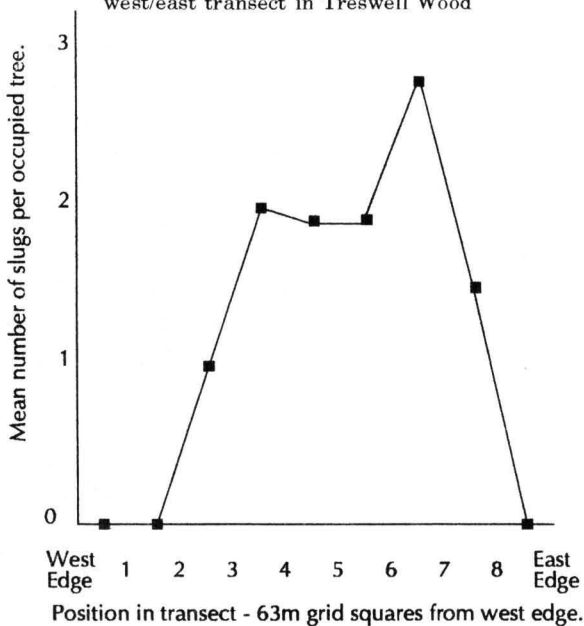


Figure 3. Numbers of tree slugs found on trees on a west/east transect in Treswell Wood

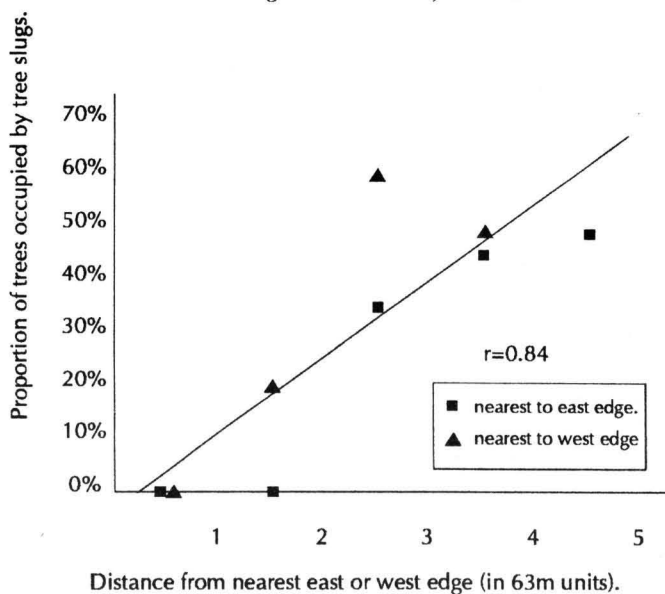


Figure 4. Occurrence of tree slugs found on trees against distance from nearest edge of wood

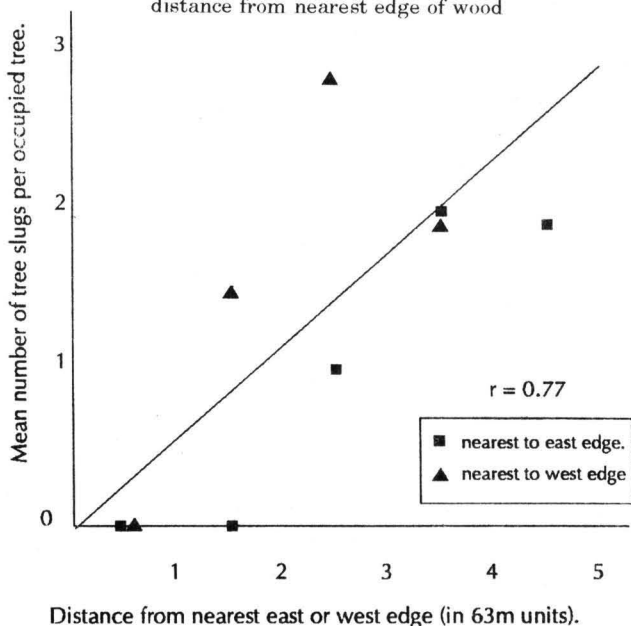


Figure 5. Numbers of tree slugs found on trees against distance from nearest edge of wood

How big must a woodland be for the tree slugs to reach maximum density? Figures 4 and 5 show increasing abundance of tree slugs with distance from the edge. Clearly there must be some point at which abundance no longer increases. There is possibly a suggestion in Figures 2 and 3 that the slug density is levelling off before it reaches the centre of the wood but it would require a somewhat larger area of woodland to be certain of this – and Treswell Wood is amongst the largest woods in the area. This study highlights the importance, not just of conserving habitats, but of preserving large areas of habitats – ancient woodland in this case.

Footnote for tree slug hunters

Tree slugs spend a good deal of the daytime resting in holes. The best place to find them are ones that are easy to look into! For this reason, bird nestboxes (and other similar artifacts) are good hunting places. Natural sites generally do not have convenient opening lids and so it can be hard to find slugs even when they are present. In coppiced woodland, old coppiced stools with their many cavities must be ideal resting sites. The idea of nestboxes for birds is well known – Michael Chinery has suggested nesting sites for bees in his book *The Family Naturalist* – but I am not aware of any previous suggestions for slug boxes. A simple design for a tree slug 'box' would be simply a piece of wood tied to a tree. The fact that it is tied makes it removable and therefore inspectable. Tree slugs may often be found resting behind tree name plates. One of us (Chris du Feu) has even seen some resting behind a name plate on a redwood conifer tree in an arboretum in Jersey – a far cry from our native hardwoods but a thought-provoking return to our starting point of tree preferences!

Acknowledgements

- Nottinghamshire Wildlife Trust for access to Treswell Wood.
- Brian Eversham for help and suggestions.
- J & E Howard for permission to search on their land. □

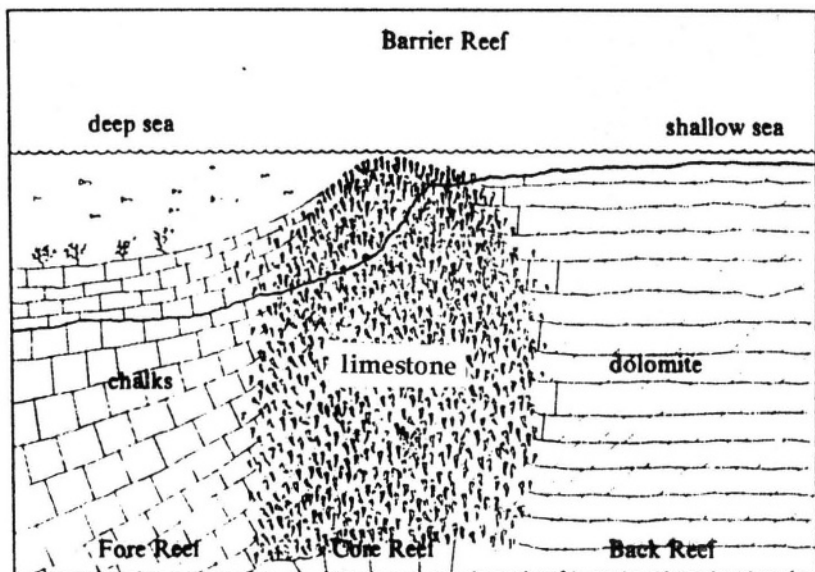
Rudists and *Dentalium* on Mount Carmel

Fred Pinn

, London

A recent trip to Israel enabled me to pay a visit to some famous caves on Mount Carmel near Atlit which now have been turned into the Nahal Me'arot Nature Reserve. A little pamphlet states that 'the reserve is characterised by the flora and fauna of the Mediterranean forest, and also has some special features: (a) the loveliest and most completely exposed fossilized rudist reef in the country; and (b) caves formed in a natural karstic process of the limestone which bear witness to the continuum of settlements of early man in a world representing 200,000 years in the life of prehistoric man.'

The Nahal Me'arot reef was formed about a hundred million years ago (Albian - Lower Cenomanian), with its centre composed of rudists - conical bivalves about 30-40 cms high. These bivalves grow densely packed together, thus overcoming the shattering waves.



Geomorphological structure of a Coral Reef

But what exactly are these RUDISTS? R.C. Moore in his *Historical Geology* explains:

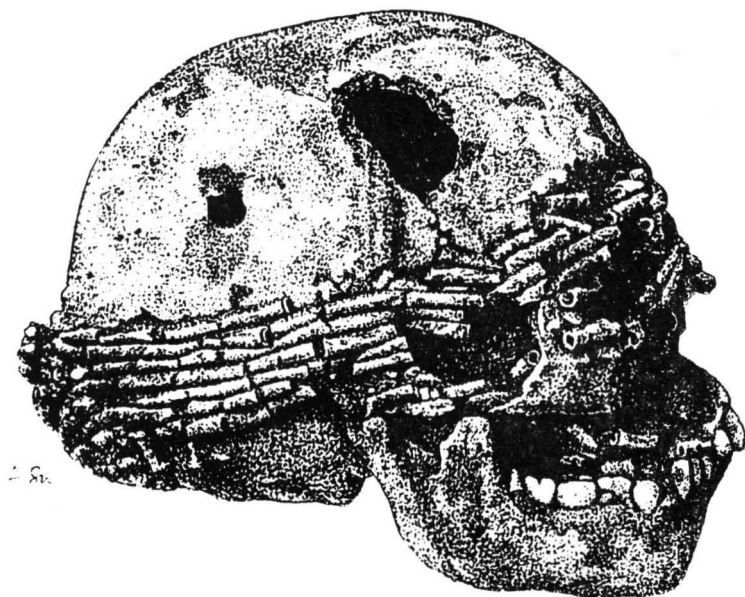
'In the middle and especially the late part of Mesozoic time, peculiarly specialized pelecypods, known as RUDISTIDS, developed a shell having the form of a horn coral, covered at the top by a nearly flat lid. The shell walls may be excessively thick, and the height of the coral-like lower valve more than three feet. The abnormal features of these pelecypods are evidently the result of a sedentary, fixed mode of growth on the sea bottom, where they generally lived in closely crowded colonies the remains of which may form thick beds of limestone. These pelecypods abound in the warmer-water deposits of cretaceous [Cretaceous] time.'

The rudists belong to the super-family Chamacea of which the Jurassic and Cretaceous representatives are extremely numerous, known chiefly from the large conical Rudistae, such as *Hippurites*. There is only one surviving genus, *Chama*, an oyster-like bivalve with the foot greatly reduced and a flat opercular valve.

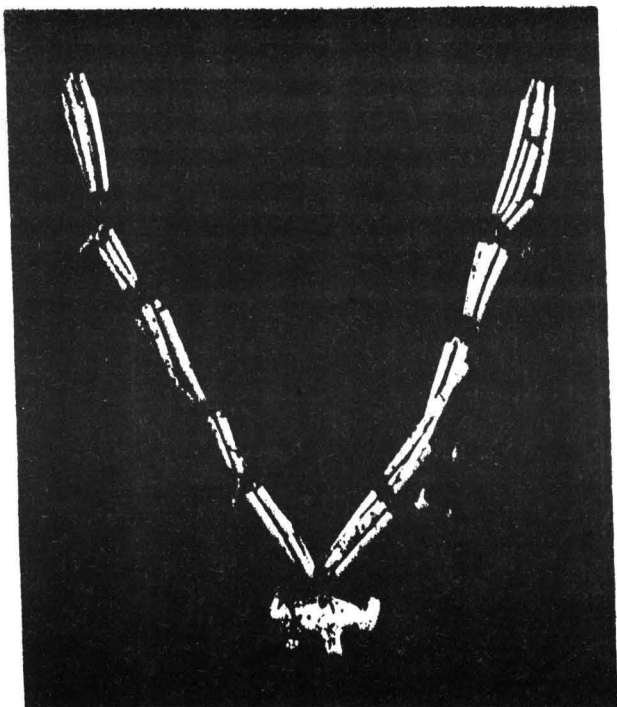


So-called rudistid clams, distinguished by strongly inequivalved coral-like form and growth commonly in colonies especially adapted to a warm-water habitat, are illustrated by *Hippurites*, from Upper Cretaceous beds in France (B, side view; C, summit, with lid-like small valve in place; D, interior of large valve).

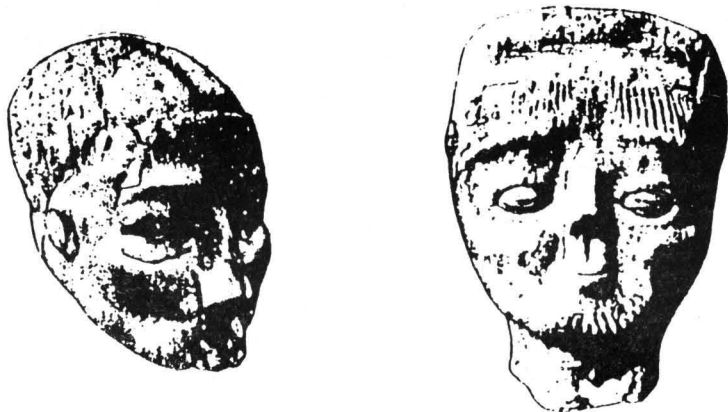
The caves have been excavated to rock bottom and produced a rich and illuminating collection of skeletons and artifacts illustrating man's progress through 200,000 years. Among the many finds is one of particular conchological interest: a female skeleton buried in front of one of the caves dated to the Upper palaeolithic Natufian period (12,000–9,000 BC) the skull of which is adorned with a wreath of seven rows of tusk shells. The existence and use of this kind of ornament is of course open to many interpretations one being that 'man has begun to look at himself. He adorns himself, he is pleased with his appearance and would like to please others.'



It is interesting to speculate on which *Dentalium* was used in the making of the wreath. There are four species of *Dentalium* recorded for the eastern Mediterranean (see *Mediterranean Seashells, Cyprus* by George Tornaritis) the closest of which to the shells in the drawing being *Dentalium rubescens* Deshayes, being truncated rather than delicately pointed like the others and very similar to the shells in the necklace from Cyprus of the Chalcolithic period c. 3000 BC:



Mentioning the artistic use of shells, another ancient example in the Rockefeller Museum, Jerusalem, comes to mind: the life-size terracotta portraits with shell inlays for eyes from Jericho dated ca. 7000 BC:



Field meeting in Godalming, Surrey: 3 June 1995

Jan Light

Godalming, Surrey

It is rather surprising that the non-marine molluscs of Surrey are not as well recorded as might be expected. There are lists and short accounts dating from the 1900s but no county fauna has been produced. There are many lists over the years for the well-studied sites such as Box Hill, but much of the county, particularly parts of the north and south are poorly recorded. The data for the national Atlas were obtained in the 1960s and 70s and much of this was only on a 10 km basis.

Taking the examples of Preece (1980) and Killeen (1992), I am undertaking a mapping project of the molluscs of my home county. Following on from a few preliminary site visits that I have made, an inaugural meeting of the Surrey survey took place on a wet Saturday in June. Eleven members of the Society took part and the meeting generated a large number of records with impressive lists for three tetrads within the Godalming area.

Milton Wood is privately owned and is situated at the end of Peperharow Road. It is not extensive but forms a strip at the south-facing foot of a hill which runs down to the north bank of the River Wey. The wood contains oak and holly, and a number of plants indicative of old woodland and wet flushes. During the morning we worked this small area of wood down to the river banks, sampling both the woodland and river margin habitats. A list of 60 species was obtained amongst which the more notable species are *Macrogastra rolpheii*, *Ashfordia granulata*, and *Vertigo moulinsiana*. This latter species is confirmation of an old record (c. 1910) from Eashing Marsh which is about 1.5 km to the south-west of the new site. Killeen (1992) has described its current known distribution and habitat preferences. The Godalming specimens were first observed by Ian Killeen, crawling on the stems of *Glyceria maxima* and *Iris Pseudacorus* which grows abundantly along this stretch of the River Wey. The underlying

geology of this area is Lower Greensand whereas *V. moulinsiana* is observed to favour calcareous fens and marshes. A number of other calciphiles were recorded during the day and the Chalk pebbles taken in scoop nets during the day indicate the influence of the North Downs on the River Wey.

Working eastwards the ancient woodland habitat gives way to carr and fen where alder and willow replace the woodland trees. The ground was covered with tall, lush-growing herbs and it was difficult to investigate the ground fauna. The river yielded a range of snail species as well as *Anodonta anatina* and six *Pisidium* species. Retreating to base we dried off a little, ate our lunch and prepared for the afternoon site.

As it runs through Godalming, the River Wey turns north-east towards Guildford and becomes the River Wey Navigation. Parking near Broadwater Lake we were able to access the west bank of the waterway and walked a short stretch northwards along the towpath. Despite the presence of *Glyceria* we did not find *Vertigo moulinsiana* living. Apart from the fact that autumn is a better time to find the animal in some numbers, during the afternoon our sampling was disrupted by the approach of a horse-drawn barge which prompted a second theory. As the vessel and its equine guide came nearer we observed the towrope sweeping through the riverside vegetation and it was suggested that the flattening and rebound of the plants would cause the snails to 'ping' from their foothold! The river fauna was rich and diverse with a number of elements typical of canals or large, slow-flowing rivers. The more interesting finds included the mussels *Unio pictorum* and *Unio tumidus*, *Theodoxus fluviatilis*, and *Pisidium supinum*.

By 5 pm the heavy drizzle which had persisted all day fell in torrents and a second retreat to the dry enabled further drying of wet people and the consumption of hot buttered buns and tea.

A Surrey mollusc atlas is very much in its infancy. Although smaller than many counties, with 556 tetrads, to obtain an adequate and uniform coverage, a time span of 10 years is realistic. Whilst in many respects such a project is essentially a personal undertaking, there are ways in which Society members

and county naturalists can contribute in addition to joining field meetings. Many species, particularly slugs, are most frequently associated with man, living in gardens and urban environments of which much of Surrey is composed. Getting access to such habitats is not always easy and therefore I would be delighted if members would survey their gardens, especially if they have an 'untidy' area! I would also appreciate lists from your local woods and water bodies. The Mollusca of any area is not static and for areas with such pressures as road-building and urbanisation, change may occur over a relatively short time span. I hope that the carrying out of a systematic survey and comparison with historical data will enable future change to be monitored.

Many thanks to all who joined the meeting and helped to make it an enjoyable and successful event.

References

- Killeen, I.J.**, 1992. *The land and freshwater molluscs of Suffolk*. Suffolk Naturalists' Society, Ipswich. 171pp.
- Preece, R.C.**, 1980. *An Atlas of the non-marine Mollusca of the Isle of Wight*. Isle of Wight County Museum Services publication no. 1, Newport, Isle of Wight.



Annual General Meeting March 1996

Members are reminded that they can nominate candidates for election to the Council.

Rule No. 12. Candidates for nomination to the Council shall be paid-up members of the Society and shall be nominated by two members. Nominations, other than those made by the Council itself, shall be sent in writing to the Hon. Secretary at least six weeks before the AGM, and shall be accompanied by a signed declaration of the candidate's willingness to serve.

Note: Nominations must be received by the Hon. Secretary NOT LATER THAN 31 December 1995.

Computer Workshop: 8 April 1995

Colin Gillard

Taunton, Somerset

Fourteen of us met at the Granary Exhibition Room in Newbury town centre and set up our computers or prepared to use those set up by Michael Weideli assisted by a colleague, John, who helped to calm those of us who pale at that dread work 'DOS'. After all that hard work it was time for a coffee break very ably organised by Helen – it was a 10.30 for 11.15 start, wasn't it, Michael?

For our first session, an introduction to DMAP, we typed in grid references, mollusc species and reference numbers, tapped a key and lo and behold there was a map showing the distribution of a particular species on an outline map of the Isle of Wight. 'Wait a moment though, this will interest our Marine Recorder, there is a healthy colony of *Helix aspersa* one hundred metres off Ryde pier ... now who fed me those grid references?'

After a rather slow start when perhaps Michael was wondering whether this course was *such* a good idea – 'In 15 minutes you'll have a map' ... half an hour later, '15 minutes starting when, Mike?' – we were beginning to forge ahead and clearly our tutor was agreeably surprised. We were shown further features of the DMAP program and were feeling confident enough to experiment by changing various parameters. Then it was lunchtime and a chance to sit away from the hardware and allow our faces to lose their glazed expressions.

In the afternoon we continued with DMAP and shared our experiences of using the RECORDIT program, spending some time looking at the trial Windows version which appears to have many powerful features yet be 'user-friendly'. As Michael advises: 'Decide what you want to do with the software and tailor it to your own needs.' This was interspersed with further and more frequent visits to Helen and the tea counter.

At 4.30 pm we packed up and went our separate ways ... 'been there ... done that ... got the Conch. Soc. mug.'

Thanks to Michael, Helen and John. □

Conchological Society of Great Britain and Ireland

MINUTES

1058th (Ordinary) meeting held on 21 May 1994 in the Demonstration Room of the Natural History Museum starting at 2.30 pm

Announcements of deaths: The death of Mr J.M. Douglas, member since 1987, was announced.

In the chair: Dr B. Colville with 35 members and friends present.

Apologies for absence: Mr Lee, Mrs Light, Dr Willing, Miss Sawyer, Mr Philp, Dr Chatfield, Mr Pinn, Mr & Mrs Rands.

Minutes of the last meeting of 16 April 1994: Read and accepted.

Matters arising: None.

Nomination and election of new members: Three full members:

- Mr Trevor Coote [REDACTED], London [REDACTED]
- Mr C. Dufeu [REDACTED] Beckingham, Notts [REDACTED]
- Mr D. Boyce [REDACTED] Exmoor National Park, Dulverton, Somerset.

Announcements and Correspondence:

1. Dr Chatfield has produced a British seashells wall-chart for *BBC Wildlife* magazine, which will appear in the July edition.
2. The Society will shortly be requiring both a new Treasurer and a new Editor for the *Newsletter*, and volunteers or suggestions for these roles were requested.
3. Members were reminded that Deed of Covenant forms were available, and that for each full member the Society receives an extra £6.

Lecture of the day: Dr Tony South (formerly Dept of Biological Sciences, City of London Polytechnic): 'Slugs as Pests'.

Any other business:

Members were reminded that the next indoor meeting is to be a joint meeting with the Malacological Society of London and the Society for the History of Natural History and is to be held at the Linnean Society, Burlington House, Piccadilly, London, on 22 October; also that there was as usual a full programme of field meetings throughout the summer.

Meeting closed at 5.14 pm.

Chairman.

Appendix: Members' exhibits

- Dr T. South The three major British pest slug species:
Deroceras reticulatum, *Arion hortensis* agg. and
Tandonia budapestensis.
- Mr I.J. Killeen *Phenacolimax major* and *Azeca goodalli* from Hay-on-Wye field meeting 14-15 May 1994.
- Mr S.G. Appleyard Letters: 1. from L.E. Adams, 1891
2. from Norman Haddon to W. Harrison Halton, 1915.
- Mr D.C. Long Fossils from Blockley and Highcliffe.
Zonitoides arboreus from Cheltenham.

- Mr C.P. Palmer Fossils from Blockley.
- Mr D. Guntrip Slug diagrams.
- Mrs C. Street Rare shells from Angle, Pembrokeshire: *Cerithiopsis pulchella* + ?*Aclis minor* also *Jordaniella nivos*.
- Mr K. Brown Book, *Catalogue of the Superfamily Cancellarioidea* + assorted species of *Cancellaria* + press cuttings.
- Ms J. Reynolds Newspaper articles.
- Mrs E. Platts Photographs of slug workshop held in Godalming on 30 April.

— ♦ —

1060th (Ordinary) meeting held on 19 November 1994 in the Demonstration Room of the Natural History Museum starting at 2.30

In the chair: Mr D. Long with 36 members and friends present.

Apologies for absence: Dr Colville, Mrs McMillan, Mr & Mrs Rands.

Minutes of the last meeting of 21 May 1994: Read and accepted.

Matters arising: Miss R. Hill would be standing for the post of Hon. Newsletter Editor, but nominations for the post of Hon. Treasurer are still sought.

Nomination and election of new members: Seven Full members and one Student member:

- Lieutenant Commander [redacted] Bruton, Somerset
N.W. Rockingham [redacted]
- Dr G.B. Corbet [redacted] Leven, Fife [redacted]
- Miss J. Pedley [redacted] Wheaton Aston, Staffordshire
[redacted]
- Miss S. Dawe [redacted] Glasgow [redacted]
- Mr C.N.J. Mulrenan [redacted] Kings Lynn,
Norfolk [redacted]
- Mr C. Peters [redacted] Falmouth, Cornwall [redacted]
- Mr D. Stratmann [redacted] 41352 Korschenbroich, Germany.
- Mr J.R. Montero-Moreno [redacted] San Jose, Costa Rica (student).

Announcements and correspondence:

1. Ms Reynolds announced that on Monday, 21 November the television programme *Horizon* would be on the subject of *Partula* snails. It would be on BBC2 and would be repeated the following Saturday. Ms Reynolds had brought some publicity notices, etc. for members to look at.
2. Ms Reynolds reminded members that she had Deed of Covenant forms available.
3. Mr Long reminded members that nominations for election of officers were due at the December meeting. Three Ordinary Members were required to replace the outgoing Council Members. Nominations should be made with the support of the Nominee at the meeting.

Lecture of the day:

Speakers: Conchological Society members

Title of talk: National and regional marine and non-marine mapping schemes:

- | | |
|-------------------|---------------------------------|
| • Mrs J.M. Light | Marine Recording |
| • Dr J.D. Nunn | West Scotland and North Ireland |
| • Mr I.J. Killeen | The English Channel |
| • Dr M.P. Kerney | Non-Marine Recording |
| • Mr T. Smith | Somerset Atlas Project |
| • Mr M.D. Weideli | Computer Mapping |

Any other business:

1. Members were reminded that the next indoor meeting would be on 10 December (*not* the third Saturday) and that it would be an open meeting. Members are asked to bring an exhibit or slides (maximum 10); and to please notify Mr Killeen if they were doing so. There would also be a molluscan quiz and prize draw.
2. A Molluscan workshop would be held on Saturday, 26 November in Woking.

Meeting closed at 5.04 pm.

Chairman

Appendix: Members' exhibits

- | | |
|--------------------|--|
| • Mr D.C. Long | Survey related publications, and a book on fossils of the Dolomites. |
| • Dr M.J. Willing | Copy of 2nd <i>Biodiversity Challenge</i> document. |
| • Dr M.P. Kerney | Tetrad mapping recording coverage in the British Isles. |
| • Mr K. Brown | 1. Genus <i>Buccinanops</i>
2. <i>Ficus eosvilla</i>
3. Press cuttings
4. Book <i>Shell Shock: Conchological Curiosities</i> by P. Mauries. |
| • Mrs J.M. Light | Publications relating to Marine Mollusc Mapping. |
| • Dr J.D. Nunn | Examples of maps from the <i>Checklist and Atlas of the Marine Mollusca of West Scotland and North Ireland</i> . |
| • Miss J.T. Sawyer | 1. Fossils from Canada
2. Articles on Kenyan Marine Reserves and Urchins.
3. RSPB Marine Life campaign literature. |
| • Mr C.P. Palmer | <i>Petricola lithophaga</i> in Sandwich Bay, Kent. |
| • Ms J.E. Reynolds | 1. Institutional Member publications
2. BTCV publications
3. Publicity for <i>Horizon</i> TV programme. |

— ♦ —

**1061st (Ordinary) meeting held on 10 December 1994, in the
Demonstration Room of the Natural History Museum at 2.30 pm**

In the chair: Dr B. Colville with 27 members and friends present.

Apologies for absence: Mrs McMillan, Mr & Mrs Rands, Mr Crowley, Dr Chatfield, Mrs Platts, Mrs & Miss Fogan, Mr Seccombe, Dr Preece, Dr Willing. Miss Sawyer's apologies for lateness.

Minutes of the last meeting (of 19 November 1994): Read and accepted.

Matters arising: None.

Nomination and election of new members: One Institutional member:

Invertebrate Conservation Centre
Zoological Society of London, London Zoo,
Regents Park, London NW1 4RY.

Announcements and Correspondence:

- Dr Colville reminded members that there would be no meeting in January, and that proposals were still sought for all Council posts. The closing date is 31 December.
- Dr Colville also announced that Mr Weideli had produced a provisional Membership list and that it was on display for comments and corrections.

Lecture of the day: Quiz and members' slides.

Papers to be read: None.

Any other business: A magazine, *Of Sea & Shore*, was mislaid at the last meeting.

Mr Barry Auckland from New Zealand wishes to swap the NZ Conchological Society magazine *Poieria* with the *Journal*. Dr Colville can supply details to any member who is interested.

Meeting closed at 5.20 pm.

Chairman.

Appendix: Members' exhibits:

- | | |
|---------------------|---|
| • Miss S.M. Davies | <i>Arion fasciatus</i> 3 stages in life of a slug. |
| • Dr R.C. Honnor | Pattelliform mollusca from Maja California, Mexico |
| • Mr K. Brown | 1. Book – Barry Wilson, <i>Australian Marine Shells</i> Vols. 1 & 2.
2. Press cuttings.
3. <i>Peristernia</i> & <i>Engina</i> inc. <i>Peristernia zelandica</i> . |
| • Mr F. Pinn | Sundry (<i>Umbaculum</i> ; earrings; land snails from Israel). |
| • Dr B.F. Coles | Some Madeiran Land Snails. |
| • Miss J. Pedley | Snail ornaments for sale. |
| • Dr N.W. Nicholson | A slightly scaliform specimen of <i>Trichia striolata</i> .
'Swiss Gourmets Race to Sample Snail Liver Dish' from back page of the <i>Guardian</i> . |
| • Mr C.P. Palmer | Growth series of British Marine Mollusca |
| • Mr D.C. Long | Italian (Tuscan) land snails |
| • Mr T. Pain | Two many-whorled land pulmonates from Brazil, showing extreme variation in direction of coiling. |
| • Miss R.S. Holt | <i>Cardita trapezia</i> (L.) found Broad Haven, Pembs. 1978. |
| • Ms J.E. Reynolds | Miscellaneous mollusca: scrap book
postcards
<i>Bugs</i> magazine |
| | Books: <i>Mythopœikon</i> – Patrick Woodroffe
<i>The Ultimate Alphabet</i> – Mike Wilks |

**1062nd (Ordinary) meeting held on 18 February 1995 in the
Demonstration Room of the Natural History Museum at 2.30 pm**

Announcements of deaths: The death of Dr Joan Llewellyn-Jones, life member since 1958, was announced.

In the chair: Dr B. Colville with 50 members and friends present.

Apologies for absence: Mrs McMillan, Mr & Mrs Rands, Dr Kerney, Mr Philp, Dr Willing, Dr Honnor, Mr Negus.

Minutes of the last meeting of 10 December 1994: Read and accepted.

Matters arising: None.

Nomination and election of new members: Three Full members.

- Dr P. Graham Oliver [REDACTED] Cardiff [REDACTED]
- Mr S.C. Terry [REDACTED] Bexley, Kent [REDACTED]
- Mr D.A. Briarley [REDACTED] Oldham, Lancs [REDACTED]

Announcements and Correspondence

Mr Steve Clark of the British Phasmid Group would like to buy, scrounge or swap (for Phasids or Platoidea) the following snails: *Archachatina marginata*, *Achatina achatina* and/or *Euglandina rosea*. These are for members of the Group to keep for their own personal interest and not for commercial use. Any interested parties should contact the General Secretary for details.

Mr Killeen reminded members to book in advance for the visit to the British Antarctic Survey, Cambridge, on 27 June, as places were limited.

Lecture of the day:

Speaker: Mr Dave Clarke (Head Keeper, Invertebrate Conservation Centre, ZSL; Joint International Co-ordinator, Pacific Islands Land Snail Group). Title of talk: 'The *Partula* breeding project – the re-introduction of snails to Moorea'.

Papers to be read: None.

Any other business There was an auction of three books.

Meeting closed at 5.06 p.m.

Chairman.

Appendix: Members' exhibits

- | | |
|---------------------|--|
| • Mr F. Pinn | Zoological Survey of India publications |
| • Mr E.O. Bishop | A population of <i>Cerion</i> (and some other land snails) from Cuba |
| • Miss J.T. Sawyer | Photos from Buchard Gardens, Victoria, Vancouver Island, of snail fountain and Sawyer Glacier, Tracy Arm Inlet, Alaska. |
| • Mrs H. Weideli | British Airways <i>High Life</i> Magazine and Royal Doulton magazine featuring shells. |
| • Mr K. Brown | 1. Article re overfishing of <i>Haliotis tuberculata</i> in the Channel Islands
2. <i>The Abalone Book</i> by P.C. Howorth
3. Specimens of <i>Haliotis</i> . |
| • Mr P.T. Wimbleton | Marine Mollusca from crab pots, North Sea, near Grimsby. |

Diary of Meetings

The diary is presented in date order and includes both meetings of the Conchological Society of Great Britain and Ireland and meetings of molluscan interest run by other organisations. Fuller details of Conch. Soc. field meetings are given on page 553.

Saturday 23 September, Cirencester area, Glos. Conch. Soc. field meeting led by Helen Weideli [REDACTED].

Saturday 7 October, Stamford Bridge. Yorks. Conch. Soc. field meeting. Meet at car park SE713556 at 11 am.

Friday 13 to Sunday 15 October, Juniper Hall. Snails and slugs around Box Hill. Tutor: June Chatfield. Further details from Juniper Hall Field Centre, Mickleham, Dorking, Surrey RH5 6DA.

Saturday 14 October, East Leicestershire. Conch. Soc. field meeting led by Jon Daws. No phone so ring Ian Killeen on [REDACTED].

Saturday 21 October, London. Conch. Soc. indoor meeting. 'The ammonites of the Bradford Abbas Fossil Bed of Dorset' by Robert Chandler. The Natural History Museum at 2.30.

Friday 27 to Sunday 29 October, Flatford Mill. Life on the Seashore. Tutor: Ian Killeen. Full details from Flatford Mill Field Centre, East Bergholt, Colchester CO7 6UL (01206 298283).

Saturday 18 November, London. Conch. Soc. indoor meeting. 'Patterns of non-marine molluscan diversity in East Africa' by Dr Peter Tattersfield. The Natural History Museum at 2.30.

Saturday 25 November, Woking. Conch. Soc. Molluscan Workshop.

Saturday 16 December, London. Conch. Soc. indoor meeting. 'The glass menagerie – the work of Leopold & Rudolph Blaschka' by Chris Meecham. The Natural History Museum at 2.30. □

Biodiversity Challenge: an agenda for conservation in the UK

RSPB Publications, ISBN 09031 38808, £20

The 2nd edition of this work contains Summary Species Action Plans for *Myxas glutinosa*, *Vertigo genesii*, *V. geyeri*, *V. angustior*, *Margaritifera margaritifera*, *M. auricularia*, *Pseudanodonta complanata* and *Catinella arenaria*.

Field Meetings 1995

Hon. Programme Secretary:

Ian Killeen

Felixstowe, Suffolk

Tel.

Important

Please remember to inform the leader if you are attending a field meeting.

Saturday 23 September

CIRENCESTER AREA, GLOUCESTERSHIRE

Leader: Helen Weideli

A day in a remote Cotswold location recording land and freshwater species from a variety of habitats on a private estate. Although two SSSIs are designated, little is known of the mollusc fauna. Meet at 10.30 at Edgeworth Village Hall (known as The Reading Room), Map Ref SO945063, Sheet 163 Cheltenham and Cirencester. The nearest railway station is Kemble on the Great Western Line. It is therefore **ESSENTIAL** that anyone proposing to travel by train should contact the leader, giving at least one week's notice, in order that arrangements to meet them can be made.

Saturday, 14 October

EAST LEICESTERSHIRE

Leader: Jon Daws (no phone, so please ring Ian Killeen if you are attending)

It is hoped to visit 2-3 sites. Skeffington Wood is a privately owned ancient woodland on Jurassic limestone with a diversity of habitats including oak/ash wood, wet areas with sedges etc. *Macrogastera rolphii* was found here recently. Tilton Cutting is a Leicester Trust NR and comprises a cutting through limestone on the course of an old railway line with grassland and woodland habitats. If time permits we will also visit another ancient woodland at Loddington Reddish. Meet at Oakham Railway Station at 10.30.

Other Events

FLATFORD MILL FIELD COURSE

Tutor: Ian Killeen

27-29 October. Life on the seashore. A short course on the rich variety of animal and plant life that lives on the rocks, sands and muddy shores around Harwich and the Stour Estuary. An introduction to location and basic identification of the different marine phyla found in the area.

Full details from Edward Jackson (Director), Flatford Mill Field Centre, East Bergholt, Colchester CO7 6UL. Tel. 01206 298283.

FOR SALE

Simplex Sectional Bookcases

4 Cabinets – each consisting of:

- 1 Base
- 2 Book Storage Sections with wood sliding doors
- 2 Book Storage Sections with glass sliding doors

Height of complete Cabinet 58 ins Width 3 ft

Solid Medium Mahogany £275 each

Details:

1 Base height 2½ ins

2 Interior sections with wood sliding doors and 3 dividers

Height 13¾ ins	Depth 12¾ ins	Width 3 ft
349 mm	323 mm	

2 TOP sections with glass sliding doors

Height 10 ins	Depth 7½ ins	Width 3 ft
276 mm	191 mm	

Please apply to:

Mrs H. Kay

Palmers Green, London

Tel.

Books and Journals for Sale

A number of conchological books and journals will be available for purchase at the Indoor Meeting of the Society on **Saturday 21 October 1995**, which come from three sources. The books include part of the library of a late member of the Society being sold on behalf of his widow.

Complete bound sets of the *Journal of Conchology* and the *Conchologists' Newsletter* are available.

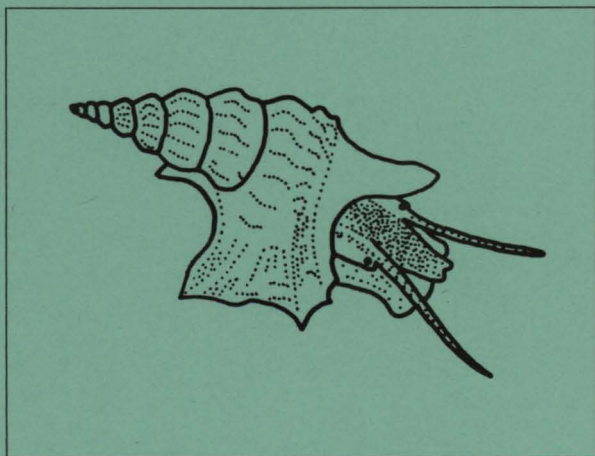
The books cover a wide range of subjects, marine and non-marine molluscs, UK and worldwide, with something for everyone.

The Conchologists' Newsletter

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No. 135

December 1995



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(Founded 1876)

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**The Conchological Society's
Partula colony**
or
**The problems of keeping rare snails in
captivity in a domestic environment**

Jane Reynolds

, London

When I attended the *Partula* Propagation Group workshop at London Zoo in 1994, it was agreed that I could house the colony of *Partula mirabilis* x *taeniata* on behalf of the Society, to be under my personal care. This was agreed to, despite the fact that the snails were to be kept in my own home, due mainly to two reasons: 1) I was already known to the Zoo staff as a snail-breeder and volunteer and 2) that this hybrid species was not considered very important and therefore the colony and keeping conditions could be regarded as experimental. It may seem harsh to suggest that any group of animals is not important, but there are clear reasons why *Partula mirabilis* x *taeniata* is less important than the other species being reared in captivity. Firstly as a hybrid it may not be a 'good' species, and as all the existing snails are reared from one wild caught individual backcrossed with one of the parent species, it is unlikely that there is a representative sample from the gene pool in these snails. At one stage they were being reared mainly as a back up for *P. taeniata*, which had dropped down to four individuals, so that some of its genes might be preserved. Interestingly, *P. taeniata* is now in numbers of over 1000 in captivity, one of the species that is doing best. There are set targets of each *Partula* species held, most are 250 but *Partula mirabilis* x *taeniata* has a target of only 100; furthermore they are kept in a single mixed generation tank, so there are no complicated transfers from tank to tank to promote direct or crossed lines. All these factors made it an ideal choice of species for an amateur to keep.

Before I could take any snails I had to provide a suitable environment in which to keep their tank. Armed with the measurements of the tank and the required temperature range, I set

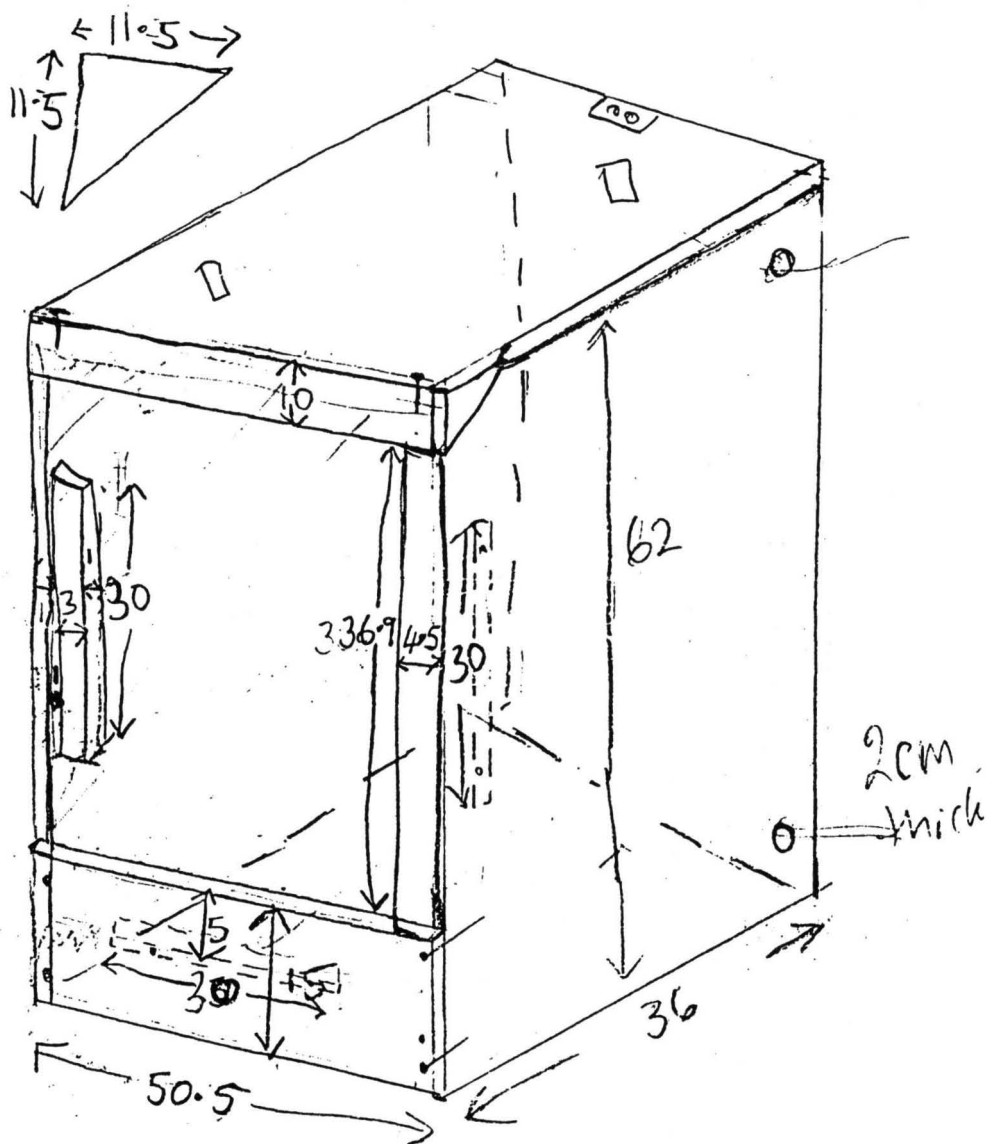
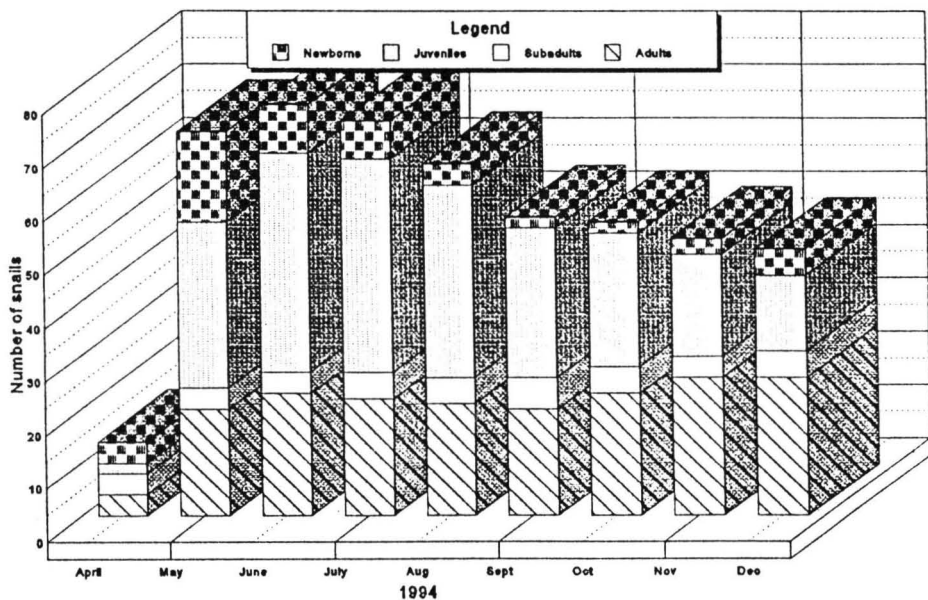


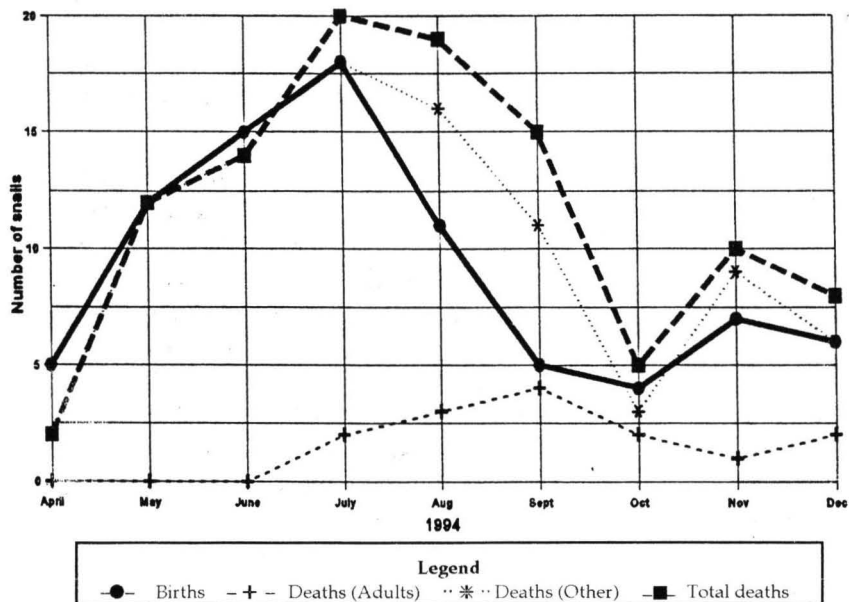
Fig. 1. The plans for the 'Environmentally Controlled Container'

about working out how to construct a box for them. The sketch illustrated (Fig. 1) is as far as I ever got in terms of a finished drawing, and the actual construction was modified very little. It is very simple, merely a box with a hinged lid and a sliding glass front. It had to be deep enough to accommodate the tank itself, a soil warming cable and thermostat, plus a suitable depth of sand and a light and fitting. The construction of the box and drilling holes for the cables was fairly simple but before I could fit the cable I had to line the base with heavy duty plastic sheeting. I then filled it 5 cm deep with horticultural sharp sand, arranged the cable inside, added another 5 cm layer of sand, with the thermostat sensor 2 cm above the cable, and then a 5 cm layer of coir. I had been going to use vermiculite but when I got the cable there was a warning that this could cause the cable to short out. The box used nearly all of a 25 kg sack of sand. The wiring of the thermostat was for me the most difficult part. Fixing the light was easy and as soon as I had a suitable piece of glass, which to my great relief fitted correctly, on 6 March I was able to switch everything on and see if it worked. After a few adjustments to the thermostat I had the temperature at a range of 21–26° and the RH at 60%, and the light timer set to go on at 10 am and off at 10 pm. On 12 March 1994 I collected from London Zoo 4 adults, 3 subadults, 3 juveniles and one newborn as an initial trial group to ensure conditions were suitable.

For those who aren't aware of the keeping system for *Partula* snails, a brief summary follows. They are kept in the kind of tank commonly known as a locust tank. The base is lined with paper kitchen towel which is moistened with distilled water. Twice daily RH and minimum and maximum temperatures are recorded, and the inside of the tank is sprayed with distilled water. It is important that it is not too wet. The snails are fed on an artificial diet prepared after an analysis of their wild food, which is the decaying leaf stalks of *Hibiscus* spp. This consists of cuttlebone/chalk, porridge oats, grass pellet, trout pellet, 'Stress' (a vitamin supplement used for cats and dogs) and Vitamin E. All ingredients are ground to a powder and mixed into a paste. This is smeared onto the sides of the tank in three diagonal lines using a spatula twice weekly, when any remaining food is removed. Once a week the snails



Graph 1. Population trends for 1994.



Graph 2. Births and deaths spit by developmental stage.

are counted by developmental stage and all information – births, deaths etc. – is recorded on a Cerci record card. When full these cards are sent to London Zoo for the information to be transferred onto the Cerci database by Ajay Burlington-Johnson.

The rest of the world population arrived on 10 May. By this stage my colony consisted of 5 adults, 3 subadults, 2 juveniles and 5 newborns, so they were reproducing very well. When the transfer was completed there were 36 newborns, 15 juveniles, 6 subadults and 15 adults. Graph 1 clearly demonstrates the massive rise in my responsibility. Initially things seemed to go fairly well, and although a lot of the babies died this is to be expected after a transfer. Graph 2 demonstrates the death rates split by development stage. Mortality of newborn *Partula* is usually around 80%. The surviving snails were still actively growing and there were still a lot of births although many didn't survive. In July (see Table 1 for figures) there were the first two adult deaths. Slower to be affected than the younger snails, they had died after a long burst of hot weather which I had found impossible to alleviate. Although the mean temperature was 26°C (Table 2) it had reached temperatures as high as 30°C during the hottest periods of some days. Eventually I was able to obtain a suitable fan to fix inside the box and this considerably resolved the problem of the excessive heat, but too late for many of the snails which were still to suffer the effects. There were fewer deaths in total as the summer came to an end, but the birth rate was still very low. Table 2 and Graph 3 show the relationship between the temperature, humidity (RH%) and births and deaths. When *Partula* are under stress they seem to have a tendency to abort the young that they are incubating (they are ovoviviparous), which explains the massive rise in births at the hottest driest period. A large number of the deaths recorded are for the same newborn snails. In October I went away for four days and my inexperienced 'snail-sitters' managed to let one adult and some young die by over-spraying, but generally the end of 1994 was more stable. There were few births but with a three-month gestation period and most babies 'dumped' during the summer, this wasn't surprising. Quite a lot of the adults at the end of the year were young and probably not fertile yet.

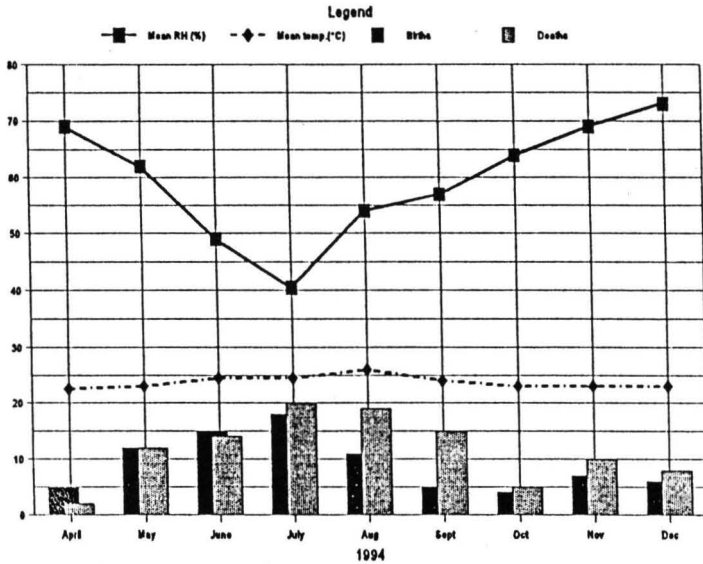
Table 1. *Partula mirabilis x taeniata* figures for 1994

	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Adults	4	20	23	22	21	20	23	26	26
Subadults	4	4	4	5	5	6	5	4	5
Juveniles	2	31	41	40	36	28	25	19	14
Newborns	4	17	9	7	4	2	2	3	5

	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Births	5	12	15	18	11	5	4	7	6
Deaths (Adults)	0	0	0	2	3	4	2	1	2
Deaths (Others)	2	12	14	18	16	11	3	9	6
Total deaths	2	12	14	20	19	15	5	10	8
Arrivals	0	57	0	0	0	0	0	0	0

Table 2. *Partula mirabilis x taeniata* births and deaths compared with relative humidity and temperature (1994 figures)

	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Mean RH(%)	69	62	49	41	54	57	64	69	73
Mean temp.(°C)	23	23	25	25	26	24	23	23	23
Births	5	12	15	18	11	5	4	7	6
Total deaths	2	12	14	20	19	15	5	10	8



Graph 3. Births and deaths compared with RH (%) and temperature (°C)

1995 started very badly. I intend to produce graphs and a short update at the end of the year, but in summary for some unknown reason there seemed to be an epidemic amongst the snails. The conditions were perfect, but the population dropped by nearly half, through all stages but chiefly the oldest of the adults. The adult bodies have been sent for pathological tests and hopefully they will be able to find a cause. Three babies were born in January and all of them are now juveniles. Eventually in mid-February they stopped dying but until the end of April no babies were produced. There are 4 healthy newborns at present, and I attribute this to lowering the temperature regime to 18–24°C, which seems to suit them much better. The fan is now on for 45-minute intervals once every two hours during the daytime. The death rate has also declined and although one adult died in April this was the first since the end of January.

I can only hope that the birth rate does continue to improve and that we don't have too much of a hot summer. Dave Clarke and Paul Pearce-Kelly reassure me that my experiences are not uncommon. Friends who aren't snail enthusiasts say it sound worse than having kids, but I think I'll be sticking to *Partula*!

May 1995 □

The distribution of dead shells: a response to Christine Street

Jan Light

Godalming, Surrey

Christine Street's study of the distribution of dead shells on Colonsay beaches has prompted some thoughts.

To the shell collector, beachcombing – often a pastime commenced in youth and continued through life – is an art for which the maxim *practice makes perfect* may well apply. Eventually the initially apparent random distribution in which shells are found across a shore begins to reveal to the collector on recurrent visits to favoured sites, repeated patterns. So the likely pockets of deposition are searched first. Then one day, perhaps after a storm, the shore is littered with shells many of which may not have been collected before, but within a day or two, the sea has picked them up again and they are gone. I touched on this serendipity element to strandline collecting when writing about Camber Sands (Light, 1993) and this phenomenon needs no further elaboration here.

From her tables and site descriptions (Street, 1995) Christine has conveyed a level of information from which certain inferences can be drawn. Looking at the map the two northern beaches on Colonsay, Kiloran Bay (S8) and Balnahard-Traig Ban (S9) have scores in the region of 100 species. The only other beach to match this, Queen's Bay (S10), is further down the west coast. But there are other beaches on her map which combine the habitats of a sandy shore flanked by rock outcrops. So, in addition one must consider the geographical, topographical and biological components which these shores possess. Also since one is also dealing with sublittoral species and shell transport, it is important to consider the territory offshore because the bathymetry and the fetch of dead shells arriving on these beaches is likely to vary and thus current and tidal factors come into play. Stella Turk (1983) touched on this subject when writing about Cornish marine conchology. Quoting Norman Holme (1965) she pointed out that he found evidence for 'little or no transport along the sea bed' in depths of 8 to 95m but in shallower

water both living shelled molluscs and the shells of dead ones are carried by tides to be cast ashore. In the same work Holme calculated that sediment in the English Channel of 20 to 30 cm depth containing perhaps 10 cm depth of shells still living in the vicinity, with an accretion rate of 1 cm per 1000 years, might represent a deposit of some thousands of years in age.

The study of taphonomy concerns itself with everything that happens to an organism after death: decomposition, scattering of parts and transportation to another place. For shells, this includes their break-up rate in various conditions, and dissolution in acid conditions such as mud flats. At the time he wrote (op. cit.) Holme stated that little was known about these factors but in the past 30 years an increasing number of workers, notably palaeontologists have concerned themselves with actualistic taphonomic studies in an attempt to achieve better resolution in palaeoenvironmental interpretations.

Looking in detail at the list for site S8 it has a comprehensive list of pyramidellids and Erycinaceans and this suggests that the rocky community is likely to be well represented by the various encrusting invertebrates that colonise the undersides of rocks and acts as hosts to these interesting groups of molluscs. Rich sponge, ascidian and bryozoan growth also increase diversity of the larger mobile invertebrate groups found in rocky communities. Another interesting feature is that beaches S8 and S9 with their northern aspect are the only two on which Christine found dead shells of the fragile pteropod *Limacina retroversa*, thus reinforcing the suggestion that a strong offshore component has boosted her lists for these beaches.

To take Christine's study a step further, it would be interesting to survey the shores at her collecting localities to obtain a list of all the species that can be found living there. This will be more straightforward for the rocky community which requires searching and sampling of known microhabitats of molluscan species and assemblages. This strategy is regularly practised on Society field meetings. For infaunal species it will be less straightforward but digging and sieving with a large sieve of suitable mesh size (1 mm) at extreme low water mark is likely to yield living examples of some of the species on her list.

As Marine Recorder I have tried to promote the gathering of distributional data for live molluscs around our coasts whilst always conceding that all distributional data is useful in the clues that it offers. As an example of this, the recurrence of dead shells of the minute Acidid, *Graphis albida*, in sediments taken off the south-east coast of the Isle of Wight led me to suppose that either the shells were allochthonous, being preferentially washed into the area or that the animal must be living in the vicinity. Subsequent sampling work has revealed the sublittoral presence of the tube-building polychaete *Sabellaria alveolata* and fieldwork elsewhere (Light & Killeen 1992, Smith & Killeen, 1995) suggests that a commensal relationship between the two organisms exists and that live animals of *G. albida* are likely to turn up with continued sampling.

Returning to the main theme of Christine's article there is another aspect of dead shell distribution which invites study by 'strandliners' in the Society. It is often noticed that disarticulated valves of bivalves may be washed ashore in such a way that a predominance of right or left valves is deposited on a particular shore or zone of the shore. A number of papers have been written on this topic of which some are listed in the bibliography and it would be a useful exercise to obtain some up-to-date information as to how often this phenomenon is observed and whether any patterns can be shown for certain beaches.

During our recent field trip to Cornwall whilst eating out one evening, Christine commented to the group that the shore we had surveyed that day had a strandline showing a good representation of all the macromollusc species recorded alive except one. She had observed that *Monodonta lineata* animals were extremely common on the upper shore but were lacking from the strandline assemblage. 'What happens to all the dead *Monodonta* shells?' she asked. None of us could instantly come up with an answer!

References and bibliography

- Brenchley P.J. & Newall G.**, 1970. Flume experiments on the orientation and transport of models and shell valves. *Palaeogeography, Palaeoclimatology, Palaeoecology* 7: 185-220.
- Cadee, G.C.**, 1994. Floating shells, Dutch Wadden Sea. *J. Palaeont.* 68 (4) 903-904.

- Carter, R.W.G.**, 1974. Feeding sea birds as a factor in lamellibranch valve sorting patterns. *J Sed. Pet.* **44**: 689-692.
- Carter, R.W.G.**, 1977. Excesses of right-hand lamellibranch valves on Magilligan Strand. *Ir. Nat. J.* **19**: (3).
- Holme, N.A.**, 1965. Mollusc shells as evidence of sediment transport. *Rep. Challenger Soc.* 3, No. 17.
- Kornicker, L.S., Wise, C.D. & Wise, J.M.**, 1963. Factors affecting the distribution of opposing mollusk valves. *J. Sed. Pet.* **33**: 703-712.
- Lever, J. & Thijssen, R.**, 1968. Sorting phenomena during the transport of shell valves on sandy beaches studied with the use of artificial valves. In Fretter V. (ed.) *Studies in the Structure, Physiology and Ecology of Molluscs. Symp. Zool. Soc. Lond.* No. 22, 259-271.
- Light, J.M.**, 1993. From the Marine Recorder. *Conchologists' Newsletter* **7**: (1) No. 124.
- Light, J.M. & Killeen, I.J.**, 1992. *Noemiamea dolioliformis* (Jeffreys) and *Graphis albida* (Kanmacher) living at Criccieth, North Wales. *J. Conch., Lond.* **34**: 117-8.
- Martin-Kaye, P.**, 1951. Sorting of lamellibranch valves on beaches in Trinidad, B.W.I. *Geol. Mag.* **88**: 432-4.
- Smith, S.M. & Killeen, I.J.**, 1995. New records for Sea Area 25, found at Nethertown, West Cumbria. *Conchologists' Newsletter* **7**: (3) 132.
- Street, C.**, 1995. The distribution of dead shells on Colonsay shores. *Conchologists' Newsletter*, **8**(1): No. 133.
- Trewin, N.H. & Welsh**, Transport, breakage and sorting of the bivalve *Macra corallina* on Aberdeen Beach, Scotland. *Palaeogeography, Palaeoclimatology, Palaeoecology* **12**: 193-204.
- Trewin, N.H.**, 1973. Sorting of bivalve populations in a beach environment. *Geol. J.* **8**: 307316.
- Turk, S.M.**, 1983. Cornish Marine Conchology. *J. Conch., Lond.* **31**: 137-151.

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Papers, Journals, Books on Molluscs

A list of secondhand publications for sale is available on request together with s.a.e. from Dr Michael Morphy,

Halifax

**Extracts on shells and collecting from
*Jottings During the Cruise of HMS Curaçoa
among the South Sea Islands in 1865*
by Julius Brenchley**

June Chatfield

Alton, Hants

As Julius Brenchley's book on his cruise in the Pacific during 1865 is not easily obtainable, extracts relating to molluscs and habitats are presented. The background to Brenchley's life and his shell collection, now in the Maidstone Museum, was outlined in the *Journal of Conchology* (Chatfield, 1994). These extracts provide a first-hand account of Pacific Islands 130 years ago. It would be interesting to have accounts of the same places today – perhaps a reader may be able to contribute such as description.

Chapter 1: Niue or Savage Island, 29 June 1865

Soon afterwards a number of canoes rapidly approached the Curaçoa laden with spears, shells, fruit, models of canoes, and other objects intended for barter with the sailors. *Page 18.*

I picked up three species of small land-shells. *Page 22.*

Specimens of Helicina musiva Gould from Savage Island have been located in the Brenchley Collection at Maidstone Museum.

Lime abounds in many places, as well as a great quantity of sea shells. *Page 24.*

Chapter 3: Tutuila, Samoan Group, 1–4 July

A great number of women were busy on the shore catching shell-fish. *Page 39.*

The trawl which I had thrown overboard before going to land brought me twenty species of shells, generally small, and of little interest. *Page 44.*

On our way I picked up several land shells, one of which was very pretty. *Page 46.*

The ground was strewn with dead land-shells, while live ones

were to be seen upon the ferns and other plants. In two or three little brooks I crossed I saw several varieties of live shells, some of them of a remarkably handsome form. *Page 48.*

They offered me for sale spears, tomahawks and shells. *Page 52.*

Of some the heads were bound round with large beads of the pearl nautilus *Page 54.*

... but could they see the Samoan belles enter the circle in their full evening costume, with their coronets of nautilus shells and scarlet *Hibiscus* ... *Page 54-55.*

Chapter 5: Vavau-Tonga Group, 10-15 July 1865

The greater part of their canoes were small; I saw one double one, the ends of which were ornamented with milky cowrie shells (*Cypraea lactea*). *Page 90.*

I saw but two species of land shells, very small and like those of Apia; ... *Page 92.*

Chapter 6: Tongatabu – Tonga Group, 17-22 July 1865

Canoes with shells, and small white cowries, which are made use of to ornament their canoes and the roofs of their huts. *Page 105.*

Chapter 7: Ovalau – the Fiji Group, 26-29 July 1865

They visit Madame Graaffe and her husband who were collectors:

The collection being particularly rich in mollusks, I begged Madame Graafe to make a selection of shells for me peculiar to the Fiji Islands. She was lively and communicative; what with her chat first about herself, then her shells, and then her husband, I began to think I should never get away. When the selection was made of shells and other things, then came the packing up; and as it were a great many minute species of land-shells, they required careful packing; ... Now came another important part of the process, paying for the whole. I asked what she wanted for the lot, and she said she would leave it to me; a most objectionable way of proceeding ...

I said three pounds, then four, and paused and asked her if she were satisfied; and seeing clearly she was not I said five pounds, intending to go no further, and then asked if she were not satisfied now; she said she was ... *Pages 148-9.*

Chapter 9: Kandava – Fiji Group, 3 August 1865

We dropt anchor in Levuka Bay. This is an open bay on the northern coast of the island, and has its southern point bounded by a mountain 3,00 feet high, being a precipitous cliff on its seaward side. *Page 176.*

Chapter 10: Anatom – New Hebrides, 6–10 August 1865

Anatom is a beautiful island, well wooded and watered; its general character is mountainous; hill and valley, mountains of every shape and size, intersected by deep ravines, cultivated spots and barren tracts, covered with shrub or entirely without vegetation, diversify the scene ... *Page 193.*

It is fourteen miles long, and eight wide. *Page 195.*

The thermometer had never fallen below 58, and seldom below 62; it has never risen above 94, and seldom exceeds 89 in the shade. The island is well watered; droughts are unknown, and more or less rain falls every month throughout the year. *Page 195.*

The island is of volcanic origin, but surrounded in many places by coral reefs. *Page 198.*

But in spite of the attraction of the habitat, Brenchley did not collect there.

Chapter 11: Tanna – New Hebrides, 10–13 August 1865

Cannibalism exists to a very large extent; they eat their enemies ... occasionally they eat their own dead.

But perhaps white men were less at risk than the natives because:

They find human flesh preferable to that of pork, and the connoisseurs in this line prefer the flesh of a native to that of white man, the latter having, they say, a salt taste. *Page 209.*

There is a variety of shellfish; one, when touched ejects a fluid which is poisonous, and generally proves fatal in a short time ... *Page 214.*

Chapter 12: Vate or Sandwich Island – New Hebrides, 6–18 August 1865

For earrings they had small sticks or shells, ...

Many had a large, round, flat piece of shell suspended from their

necks, the upper side resembling mother-of-pearl ... *Page 217–8.*

Besides being tattooed, and having their noses and ears pierced to admit shell ornaments, they wore round their arms above the elbow very pretty armlets made of disks of shell ground into the shapes required, black and white disposed alternately. They were often so tight upon the arm that neither I nor the wearers could remove them. *Page 222.*

On returning to the beach we found it crowded with women just returned from fishing, and bearing baskets full of mollusks and crabs. *Page 223.*

There are also sea-crabs and land-crabs, the common pearl oyster, and other kinds of this mollusk. *Page 231.*

Chapter 13: Vanau Lava – Banks' Islands, 21–23 August 1865

The day after our arrival, early in the morning, I went, accompanied by Mr Veitch and Brazier on board the 'Southern Cross', to take up Bishop Patterson, who, with his usual kindness, had been good enough to offer to pilot us into the interior of the island ... *Page 235–236.*

We had hardly advanced a few steps before we were obliged to cross a small stream, into whose sandy bottom I sank up to my middle. I picked out of the sand a pretty little mussel of a deep green, ... then on the banks of the stream I gathered some insects, two lizards, two centipedes, some land shells, and a small species of fresh water mussel. *Page 236.*

I procured by barter bows and poisoned arrows, some rather pretty fresh-water dead shells *Page 239.*

Chapter 14: Santa Cruz Islands, 25 August 1865

From their ears were suspended from six to twelve rings, made of large shells, half an inch thick. Their arms above the elbow were decorated with armlets of black and white shells. On their necks they wore necklaces made of small black and white rings on which were attached little pieces of mother of pearl. Others had a round shell black and white cord necklace, and a great many of them the large round mother of pearl shell: ... *Page 246.*

Chapter 15: Ulakua – Solomon Group 27–29 August 1865

The ship was met by about 90 canoes.

At each extremity the canoes were ornamented with tassels, made of strips of pandanus leaf dyed red at intervals, and also with mother-of-pearl let in different patterns. *Page 249.*

Armlets of thick solid white shell were worn above the elbow, and also thick, massive, white rings one on each arm, varying from half an inch to three and a half inches in width and so very nicely polished as to imply a good deal of labour in making them. *Pages 249–250.*

Their nose ornament, as here figures ... perforating the cartilage of the nostrils, into which are inserted externally pins prettily made with bead handles ... *Page 250.*

The nose ornament figured has a species of scaphopod or tusk shell inserted on either side.

They had also bands of a good sized white shell worn round the head, just above the eyes which they shade; ... *Page 250.*

I could never get them to part with one of them for any of my wares. These people seem to have more ingenuity than I have seen elsewhere in these islands. It is noteworthy what a variety of materials, what a diversity of designs exhibiting a remarkable combination of taste and skill, characterise the workmanship of their personal and other ornaments. Shells of various descriptions, cowrie shells, clam shells, mitre shells, a kind of land shell, the *Helix tricolor*, the *Bulimus*, mother of pearl shells, seeds, bamboo and woods of different kinds, ...

All these materials, ingeniously wrought into different patterns, either more or less into their necklaces, armlets, ear and nose ornaments, knee ornaments, waist belts, bracelets etc.

... others of beautifully made rings of black and white shell work, occasionally of black rings made of a kind of seed mixed with red and white shell work, or shell work of different colours ... and others of small mitre shells attached to a cocoa-nut fibre braid ... *Page 251–252, illustrations of these on Page 252.*

Occasionally they have an especial value; such for instance, as those made of black, red and white shell rings, ten yards of which will in Florida Island purchase a wife; ...

Great attention is paid to the composition of their head ornaments, which exhibit great variety of patterns, forms and

materials. Some of them are made of a piece of thin rounded clam shell, faced with a very thin circle of tortoise-shell beautifully carved, in which form they are worn at the side of the head and cover the ear. *Pages 252–3.*

Their nose ornaments are made sometimes of mother of pearl and take the forms of those represented in the woodcut. *Page 254, including illustration.*

Chapter 16: Uji – Solomon Group, 29–30 August 1865

I found some fine land shells, looking beautifully green, but when the animal was taken from them it was evident that it was this which imparted its colour to the shell. One other small shell I found had a curious animal in it ... the shell was covered with a fine membrane, except on the top; the animal was red, and when touched or pulled about on paper deposited a red stain on it, throwing its tail about which was very long, and resembled an eel's. The shell did not go near the ground, and was very delicate. *Page 260.*

Chapter 17: San Christoval – Solomon Group, 30 August–4 September 1865

On September 1, at daybreak, the boat again took us ashore, Mr Millman, the paymaster, and myself, also Brazier, the shell collector, whom the sailors jocularly nick-named Jack Shells ...

We went up the banks of a river, through woods for a mile and a half. After crossing and recrossing the river several times, I stopped at what seemed a suitable spot, and went to work with good will in search of fresh-water shells ...

The water, at first clear, was soon made muddy by my movements, so I was obliged to trust entirely to my touch, and grope about with head and arm, a great part of the time under water. I obtained several kinds of shells – small and average-sized cones, a large bivalve, almost round, of a yellowish red, and with a large and prominent hinge muscle. I also picked up a sort of fresh-water periwinkle and other shells, one of which had sharp points or spikelets on a part of its circumference. The water, which was pleasant at first, began after a couple of hours to feel rather cold, and so I was not sorry to warm myself by going to my provision bag and finding wherewith to breakfast.

In a part of the bed of the river which was dried up I found a handsome dead shell, an *Auricula*. From all I saw of this river I am inclined to think that it must during great floods discharge into the sea a very considerable quantity of water in spite of its little width.

About eleven o'clock I returned on board the Curaçoa with my basket half filled with shells. *Page 268–270.*

Chapter 18: Guadalcanar – Solomon Group, 4–5 September 1865

Of land-shells I saw but two species. *Page 275*

I found some large flat round fresh-water mother-of-pearl shells, and some sea shells, red inside, both of which were lying in a heap under a tree in the water, and looked as if they had not been long taken. *Page 276.*

Chapter 19: Florida – Solomon Group, 5–7 September 1865

They [*the men*] had large round white shell ornaments, some of them six inches across, quite flat, and about an eighth of an inch thick, over which was a very thin circle of open carved tortoise-shell, resembling Chinese work ... it was worn by the men at the side of the head. Very few had rings in their ears, as at Marau Sound and other places; ... *Page 280.*

Not venturing to land, I took advantage of low tide to examine the Madreporite Reef at a little distance from the ships, in the company of Messrs. Veitch and Brazier. This reef seems to be a sort of coral beach, made of broken-up coral sprigs, to some depth; the water runs through as well as over it. I sank in up to my hips in this soft coral. I got on this reef a few seaweeds and shells; one of the latter, three or four inches long, was like a much-twisted mussel shell ... and found a tridacna about one foot across. This large shell was imbedded in the broken coral, with the lips about six or eight inches apart, filled with a leathery sort of membrane covered with an endless number of very bright green spots in straight lines – these spots were holes or valves of some kind, I have no doubt; in the centre of the open space, and about the middle of the two lips, taking them lengthwise, there was a somewhat raised aperture, from which, when I touched the membrane, issued a rather loud sound, like the escape of high-pressure steam. It then closed up, and the lips of the shell were

within an inch of each other. I think it is able to close itself quite up when it pleased; it would, therefore, be an unpleasant thing to tread upon, for it might catch hold of you and if it did it would be hard matter to extricate your foot. I found another tridacna about six inches across, and also alive. *Pages 283–284.*

Chapter 20: Ysabel – Solomon Group, 7–10 September 1865

A two P.M. we anchored under Cockatoo or Eastern Islet, in St George's Bay; this island did not appear to have any grass land nor open ground, but it was certainly covered, as far as I could see, with a dense forest, ... Round St George's Bay there are no mountains that as I could judge, exceeded 2,000 feet. Cockatoo Island is very small, not half a mile long, flat and very little above the sea. The vegetation is luxuriant, and there are large trees ...

As soon as we anchored, the canoes came as usual, ...

They brought shells, ... and some ornaments made of shell-beads.

We went ashore several times during our stay ... *Pages 286–288.*

The first part of the way was swampy with mangroves close to the sea. *Page 289.*

Barter had been carried on largely every day by our men on board the 'Curaçoa' – I go for my share many things, among them a large quantity of good land and sea shells. *Page 293.*

Chapter 21: Eramanga – New Hebrides, 25–26 September 1865

During this passage from Ysabel to Eramanga, which was prolonged much beyond what we wished or calculated, there was nothing to vary our daily monotony, unless, on my part, I am to reckon as exceptions the trouble and worry I had in taking care of my collections, of which I nearly lost a considerable portion by the ship's keeling and rolling in rough weather, which embarrassed me while busy drying my plants, and also for my dog's mania for lying down on my ferns after scratching and tearing the paper in which they were placed to make himself a comfortable bed. *Page 296.*

On September 25 a magnificent sunrise lit up for us the mountains of Eramanga. *Page 297.*

At Eramanga a shell called Nunpuri, the *Cypraea moneta*, passes

as money, as also in New Caledonia.

I landed for a few hours in the afternoon

I picked up also fresh-water shells of several kinds, and a yellow shell found under dead wood near the sea, of which there were two kinds. *Pages 298–300.*

The island of Eramanga measures thirty-five miles in its greatest length, sixteen miles in its greatest width and is about one hundred miles in circumference. *Page 318.*

Nunpuri shells, principally bought by traders, and boar's tusks, are used for similar purposes in barter. *Page 322.*

Chapter 22: New Caledonia – Loyalty Islands

We passed some mangrove swamps. *Page 338.*

Reference

Chatfield, J.E., 1994. Shell collections in the Maidstone Museum:

1. The collections of Julius Brenchley. *J. Conch., Lond.* **35**: 91–101.

Pacific Island Land Snail Annual Meeting, Jersey Wildlife Preservation Trust, 29 and 30 April 1995

Jane Reynolds

London

I was invited to attend this meeting as Conchological Society of Great Britain & Ireland representative and as curator of a collection of *Partula* snails (see previous articles in the Newsletter). In order to better reflect its wider aims, the group has now changed its name from the *Partula* Propagation Group. The other participants included Paul Pearce-Kelly and Dave Clarke (from the Invertebrate Conservation Centre, Zoological Society of London); Georgina Mace and Trevor Coote (Institute of Zoology, ZSL); Ajay Burlington-Johnson (Cerci Office, ZSL); Andrew Cunningham (Pathology Dept., ZSL); Quentin Bloxam and Richard Gibson from Jersey Wildlife Preservation Trust; Prof. Bryan Clarke and Viv Frame from Nottingham University; Prof. Jim Murray from the University of Virginia; Warren Spencer and Dr Sue Dow from Bristol Zoo; Edwin Blake from Edinburgh Zoo; Dr Peter Daszak from Kingston University; Keith Brown and Jonathan Cracknell from Chester Zoo; Nadia Roberts from Tierpark Dählholzi, Bern, Switzerland; and Dr Cathy Jones and Dr Les Noble, now at Aberdeen University.

The meeting began promptly at 9 am on a wet Saturday. Quentin Bloxam, as Chair, began the meeting by welcoming us to 'the South Sea Island of the UK'. We were seated around tables in the Jersey Wildlife Preservation Trust library so that everyone could participate freely in discussion. There was a lecture theatre next door so we were able to relocate when necessary, and tea facilities were nearby. As usual I took copious notes throughout; due to the nature of the meeting I have attempted to organise this report into a logical sequence, rather than report everything strictly chronologically.

Jim Murray began by giving an update on the status of the reserve that was set up on Moorea during 1994, and extensively covered on BBC TV's *Horizon* programme and by Dave Clarke at the February

1995 meeting of the Conchological Society. Jim outlined the set-up, the *Partula* species used, defences against *Euglandina*, etc. Monitoring was to be carried out by the University of California (who also funded the project) for six months, after which the French *Centre de l'Environnement* was to take over. The transition in March had gone less than smoothly; furthermore the biweekly reports had not been received since December. A summary sheet of findings from December to April had been sent – this indicated a 50% loss of marked (released) adults, but there was evidence that reproduction had occurred in all four sectors of the enclosure. This was only 'soft' data as all monitoring had been conducted from outside the site, but is consistent with normal mark-release-recapture experiments. *Euglandina* had not breached the defences, but there was certainly evidence that it had tried to do so. With funding set to end in August, a return visit to the reserve before the end of the summer was considered essential. This would provide valuable data for continuing monitoring and protocols for new reserves, dependent upon the success of the first. Prof. Clarke said that future reserves need not take the same format and cited the case of several *P. taeniata* being found in an isolated private garden on Moorea since the reserve was set up. The garden was bounded by the sea and a road; *Achatina fulica* was there but *Euglandina* was not. Other natural reserves might exist and could be exploited.

Paul Pearce-Kelly reported on the status of wild snails, including the findings of the 1994 expedition. Only six *Partula otaheitana* had been found on Tahiti but nine *P. arguta* and 246 adult, 27 subadult and 25 juvenile *P. varia* had been collected from Huahine. These probably represented the last snails from French Society Islands apart from those on the reserve. Jenny Bowen, from the Vanuatu Protected Areas Initiative, had sent back *Partula* shells, reporting that both *Achatina* and *Euglandina* were present even in protected areas of the Island. This was useful, if depressing, data. Barry Smith had sent an E-mail report from Guam. The second severe drought in three years was having an effect on *Partula* populations, although births were still high in *P. gibba* populations. Three new colonies of this snail have been found after Barry and Dr Stephen Miller, of the US Fish and Wildlife Service, surveyed nearby Rota Island. The

captive breeding project consists of greenhouses at high altitudes. Initially there had been a high mortality rate in juvenile snails. This was attributed to limescale build-up on plant leaves inhibiting feeding, and this had been solved by the installation of a water softening system. There were also some problems due to overshadowing, but the snails, and the plants, are now developing normally. Barry is also initiating a project to use artificial canopies to restore snails to cyclone damaged forest and trying to get Mariana Island endemic snails protected species status through US legislation. Mike Hadfield had also sent a report on his work on Hawaiian endemic *Partula* and *Achatinella*, including *A. apexfulva*, which he had previously believed extinct. He has also developed a toxic bait for *Euglandina* and had been granted an 'Experimental Use Permit' for it. It was reported that Alison Kaye, of the American Malacologists' Union, had gone to the Marquesas only a few days before this meeting was taking place. Attempts to get in touch with her had failed, and it was not clear what the purpose of her visit was (it was considered unlikely that she would *not* look for snails!). Any findings would have a bearing on the proposed expedition for 1995, which was scheduled to visit the Marquesas.

There was much general discussion on the expedition, the participants, the cost, funding for this and the reserve. A subgroup consisting of the expedition party would form on the second day of the meeting to discuss the plans.

After this we relocated to the lecture theatre for the pathology update. Peter Daszak delivered a 'multimedia presentation using slides, videos and body movements'. This was one of the most amusing yet informative presentations I have seen. Peter had been investigating, with Andrew Cunningham, the incidences of flagellates in captive *Partula* populations to find a possible cause for the sometimes high mortality rates. Flagellates had been found in faecal samples but it was then necessary to establish whether they were pathogenic. It was also necessary to identify the prevalence of pathogenic flagellates (if found) according to age, species and husbandry. Over 700 faecal smears were examined using DAPI and/or GIESMA stains, also scanning electron microscopy and transission electron microscopy. A population of snails was also culled to provide

additional material. Samples came from three species kept in two different regimes (tanks or boxes). Five different types of flagellates were isolated, but none had been positively identified at this stage. Twenty per cent of samples had contained one type, 10% two types, but very few contained three or more. Type 2, the most commonly found type, was the only one that was thought to be pathogenic, and the videos of it ingesting 2µm fluorescent beads seemed to confirm this hypothesis. There was also a possibility that some of the other types were beneficial, like those found living symbiotically with termites which help in cellulose digestion. As *Partula* ingest faecal matter organisms could readily be transferred this way.

Several implications of the findings were apparent. 1. Flagellates were more likely to live longer in boxes than tanks due to the higher humidity (neonate mortality rates are also higher). 2. 'Death epidemics', which could not be attributed to other factors could be due to the presence or absence of flagellates. Survival and future reproduction would also be affected. 3. Percentages of flagellates varied across the generations, which could have implications on the survival rates of released snails. 4. No other potentially pathogenic organisms had been found, and the flagellates were not found in the artificial *Partula* diet, therefore they occur naturally. Certainly these microorganisms are very rare, and Peter put forward a good case for conserving them along with the *Partula*. To establish the importance of the flagellates in mortality. Peter proposed that they be eliminated from a population of snails and then selectively reintroduced. This would require a large population of *Partula*.

The morning session ended somewhat earlier than expected so we went to the Reptile House to see Jersey's *Partula* collections. In the absence of an Invertebrate House, many *Partula* are kept in aquaria or herpetology sections. Jersey keep *P. mooreana*, *P. taeniata nucleola* and *P. gibba*. *Partula gibba* is one of the largest species in the genus and Jersey keep them in large tanks of their own design, rather than the standard type. They have voracious appetites and are fed twice daily, with the food smeared on the sides of the tank by hand, not with a spatula, and are also given whole cuttlebone. Newborn snails are removed as soon as they are seen, in case they get eaten by the adults. Some of the tanks have plastic

tubes for shelters and no tissue substrate.

We still had 40 minutes before lunch so we had the chance to look around the rest of the zoo, although it was still pouring with rain. This proved to be an unexpected benefit as the antics of the orangutangs using rags as umbrellas were extremely funny. The zoo restaurant served a delicious gourmet lunch, with a fruit salad for a starter that was *almost* too beautiful to eat.

Immediately after lunch we resumed the meeting, starting with the annual collection report and census by Dave Clarke. We were each given a printed full inventory of *Partula* in captivity as at 1 January 1994. Dave indicated which species had declined, increased or remained stable and made general comments. At this stage the Conchological Society's *Partula* had stabilised after an initial decline. *Partulatohiveana* is doing especially well with now over 1000 individual snails, not including those that were released on Moorea. *Partula langfordii* had gone extinct. The grand total of all *Partula* in captivity was 11,407, an increase on the previous year.

Georgina Mace reported on Captive Population Demographic Analysis. She had been working closely with Ajay Burlington-Johnson and Andrew Cunningham in generating data from Cerci database records. Cerci holds records of the numbers of snails at each development stage in each tank or box, as well as transfers, births and deaths. Fecundity and mortality had now been calculated for nearly all *Partula* in captivity. Ajay had produced a total of 97 graph pages (three graphs each) to represent the data. The x axis on all the graphs showed the period 1990–1994 (although in some cases there was no data for the entire period), with weekly data points and quarterly divisions for clarity. The first graph on each page represented fecundity, adult transfers, numbers and rate of change. The rate of change in the size of the adult population was calculated as the number of adults at the start of week x divided by the number of adults at the start of week $x - 1$. Fecundity was calculated as the number of births during week x divided by the number of adults at the start of week x . The second graph represented young mortality, divided into development stages (neonate, juvenile and subadult). Percentage mortality was calculated as number of deaths during the week divided by number of snails at the start of the week multiplied

by 100. The third graph was adult mortality, calculated using the same method. This method for calculating mortality can give figures of over 100% if snails that are born or transferred into the tank during the week also die. In some cases young mortality figures were as high as 150%, while adult deaths were on average 25%.

The data was produced to answer the following questions:

1. What is the status of the taxa over time?
2. How does this relate to changes in fecundity and/or mortality?
3. Is the trend due to adaptation (or failure to adapt) to captivity? or
4. Is the trend due to density and/or husbandry techniques?

It also allows comparison between the performance of direct and crossed lines, and between institutions. It was as suggested that observed effects, such as seasonal fecundity, might be shown or disproved by the charts. We were directed to look at several graphs that demonstrated the data most clearly. One observation was that both fecundity and adult mortality initially increased when a new tank was set up and later stabilised. This could be linked to adaptation to captivity. Fecundity also increased at other periods of high mortality, possibly a density effect, or a result of stress. Many curators have noticed what is known as 'dumping', i.e. *Partula* (which are normally ovo-viviparous) laying infertile eggs or giving birth to underdeveloped young which are stillborn or die. There was also some contradictory data, for example *P. tohiviana* snails that were *not* transferred had a higher mortality rate than those that were. Drops in fecundity rates were noted in several populations where there were a large number of adults, also across the generations. The approximate time from birth to maturity of some species could also be judged, for example *P. faba* does not appear to produce any young until some months after the lip of the shell is formed.

A huge amount of data had been collated and because of the number of graphs produced, reprinting only a few here would be misrepresentative. Not all the theories were demonstrated, and some data only provoked more questions. Minor differences, e.g. in assigning developmental stages, could account for some discrepancies,

but the graphs can only be as good as the data collected. Emphasis was placed on correct adherence to protocol. The lack of information on wild species is a problem that is unlikely to be solved.

The final sessions of the day were the genetic profiling reports by Les Noble, Trevor Coote and Bryan Clarke. We adjourned to the lecture room for the second time and Dr Noble spoke first. He had been using genetic profiling to look into the following issues:

1. How similar are the accession collections (between different valley and plot populations, or direct and crossed lines)?
2. The amount of genetic variation in each accession.
3. The maximum outbreeding phylogeny of *Partula*.

Les explained how preliminary RAPD (Randomly Amplified Polymorphism Analysis) tests had been carried out on two species of *Partula*, and in the past, to differentiate between superficially similar species of slugs *Arion ater*, *A. lusitanicus*, *A. flagellus* and *A. sylvaticus*. The system does not aim to provide the complete genetic make up of any species, but is a measure of homology. DNA is reduced to homogeneous fragments that are then used as primers for identification of species or groups within that species. *Partula tohiveana* and *P. taeniata* had been tested for homology, and it was found that *P. taeniata* were genetically more varied than *P. tohiveana*, which had been a 'bottleneck' population. The advantages of this method are that it is non-destructive, uses only a small amount of tissue (one eye stalk can be used for 150 tests), it is quick, simple and robust and can use samples preserved in ethanol so type specimens and other museum material can also be used for comparison.

Trevor Coote then took the floor to explain the procedure for obtaining a micro satellite DNA library. He works in the Conservation Genetics Department at the Institute of Zoology and is interested in obtaining genetic data from crashed and fragmented populations within the captive breeding programme. In order to identify genetic markers DNA extraction and preparation were more elaborate and needed more care than the RAPD system, but would provide more data eventually. Trevor outlined the procedure in great detail, but briefly it measures heterozygosity against homozygosity.

Although it is slow to initiate, the system is up and running at ZSL, and is a more established procedure than RAPD. Nonetheless, RAPD is more commonly used in the USA.

Finally Bryan Clarke spoke briefly about his work on mitochondrial DNA of *Cepaea nemoralis* at Nottingham University. So far they have identified about 20–30% of the genetic sequence. This work was hoped to provide some genetic markers for *Partula*. This method was considered superior for species where the homology was too different (i.e. many forms) to be assessed by microsatellite analysis, such as *Cepaea* or some species of *Partula*. Bryan hoped to have some sequences for *Partula* in a year's time.

At this stage the proceedings for the first day were closed. Sunday was to be spent in working groups followed by discussion. The groups were Captive breeding, Expedition, Experimental analysis and Genetics, although there was some overlap as expected. I joined the Captive breeding group, having reluctantly had to decline a place on the expedition. We remained in the groups for about two hours and then reconvened for reports from each group.

Dave Clarke reported on the Expedition group's proposal. They had discussed the possible remaining locations of *Partula* in Tahiti, based on the CAMP sheets drawn up at the last meeting. This was expected to be the last chance to collect snails from the eight or so sites. About two weeks would be needed here. The main problems were related to accessibility of the sites due to topography and ownership. The return visit to the reserve on Moorea was expected to take about one week, and would involve members from the 1994 expedition plus Jim Murray. Continued monitoring would cost about \$5,000 p.a.; split between the collections this would average about £350 each. The proposed visit to the Marquesas was subject to review according to the findings of Alison Kaye, but if there was a positive prognosis then two weeks would be needed due to the travelling distance between the islands in this group. Endemics of these islands include another genus in Partulidae, *Samoana*. In all, allowing for extra time, about six weeks were needed at a cost of £3,000+ per person. Jim Murray had to return to Virginia by mid-August, so late July/early August was considered the best time, despite the short time for fund raising. The expedition team members consisted of Dave

Clarke, Trevor Coote, Jim Murray, Warren Spencer, Jonathan Cracknell and Edwin Blake. There were also proposals regarding funding. A formal report and proposal for the reserve would be drawn up, in addition to those for the expedition, to be submitted to organisations such as the Flora and Fauna Preservation Society, the Royal Geographical Society and others. It was thought that Operation Raleigh could help with monitoring the enclosure and clearing away the invasive plant *Miconia*.

Ajay Burlington-Johnson reported on the Captive group's discussion. The validity and usefulness of the data had been covered, as well as what future data was required. Some data was confused by the different techniques used and once again the importance of more accurate recording and adherence of protocol was stressed. Relative humidity and minimum and maximum temperatures should be recorded consistently, and several institutions wanted to see a keeper code for who had maintained or counted the snails. The last report had implied that all keeping systems were identical, and the validity of the system was questionable if differences were not logged. There was a massive amount of data to comprehend in such a small amount of time, and in some collections more time was needed to see if trends had really been established. It was proposed that further work to continue on these lines at ZSL.

Peter Daszak reported that the experimental work on flagellates would take place on two groups of 50 *Partula nodosa* from the USA and 50 *P. suturalis strigosa* from Nottingham, of which there were sufficient numbers. One hundred and fifty snails is not enough for all the potential research but is sufficient for flagellates. The flagellates would all be removed and cultured selectively for reintroduction. Kingston University had a Wellcome grant for a student who could do the initial work, but there is scope for several years' work for a PhD student given the amount of variables possible. It was also proposed that every collection could prepare faecal smears for examination. Peter Daszak and Andrew Cunningham were to prepare a protocol for this.

There was a general discussion, led mainly by Bryan Clarke, about the genetic implications of merging *Partula* populations. It is becoming increasingly difficult to maintain separate populations of

some species. *Partula suturalis strigosa* was cited as an example: these snails were collected from 10 plots in four valleys, in order to maintain as much genetic diversity as possible. Keeping both direct and crossed lines of these populations separately requires much space and time. Bryan felt that it was preferable to mix generations rather than plots, as this occurred naturally in the wild, even if they were from released direct line captive bred stock. The arguments against mixing generations were that of conserving as much of the original gene pool as possible and that direct line animals would be closer to the wild state and thus better adapted for release. The feasibility of release in the future would therefore be a factor in deciding which populations to mix. Eventually it was decided that no population crosses would take place without recording of the phenotypes and nondestructive DNA samples being taken.

There were a few items of other business. There had been interest in joining the group by C.C. Appleton of Natal University. He was reported to be breeding carnivorous snails and had visited Jersey Zoo recently. There had also been an enquiry from Cricket St Thomas (UK) and ZSL had sent the *Partula* '94 report and other details. Other potential sites for release similar to Kew were Spalding and Newbury 'rainforests' (the latter suggested by Helen Weideli of the Conch. Soc.). Bern Zoo could be ready to take *Partula* in June. The group discussed introducing a trial period of one year and a non-refundable deposit for new members. This was in the light of Berlin Zoo losing all their stock of *Partula*. Ideally new participants would also be given a species of which there was surplus stock initially.

It was agreed that more emphasis should be placed on genera other than *Partula*, and that the new statement of concern should reflect this. It was hoped that the next report would contain a list of genera at risk in the Pacific.

There were some arrangements made regarding transfer of populations between institutions, and there were some suggestions about directions future research could take.

Paul Pearce-Kelly and Georgina Mace had written up the report of the Kew release and it was to be published in the *Journal of Biodiversity and Conservation*.

Quentin concluded by summarising the actions to be taken and who

was to be responsible. The next meeting is to take place in London during May 1996.

I would like to apologise for taking so long to write this report, but at least it should bring members up to date for the 1996 meeting. Since last April many of the proposals have been instigated and a lot has happened, including the expedition, and less than two weeks after the party's return, the French atomic tests in Muroroa. If any members would like an update or more details of the events of the meeting, Cerci, or other aspects of the Group's work, Dave Clarke, Paul Pearce-Kelly or myself are able to supply this. Input from CSGBI members regarding other molluscs at risk in the area would be most welcome.

I would like to thank the Council for donating some of the Society's funds towards my expenses in flying to Jersey, Dave Clarke and Paul Pearce-Kelly for inviting me and Jersey Wildlife Preservation Trust for their hospitality. □

IMPORTANT NOTICE

1996 Indoor Meetings

With the ever increasing costs of room hire at the Natural History Museum and the gradual decline in attendances, Council have decided to make changes to the 1996 Indoor Programme. For an experimental period of one year the number of indoor meetings will be reduced from 7 to 6. However, to preserve continuity the meetings will be spread out to five or six weekly intervals. The dates for these meetings are listed below please make a note of them now and remember that the third Saturday of each month will not necessarily be a Conchological Society meeting!

Saturday 10 February
Saturday 23 March
Saturday 4 May

Saturday 28 September
Saturday 9 November
Saturday 14 December

Ian Killeen

First modern record from vice county 68 (Cheviot) of *Vertigo pusilla* Müller 1774

Peter Topley

West Wickham, Kent

Alnmouth in Northumberland is a coastal village on the estuary of the river Aln, which was once the most important medieval seaport between the Tweed and the Tyne. In 1806 an exceptional sorm changed the course of the river so that it now runs into the sea on the north side of a bay flanked by sand dunes, behind which, covering an area approximate to the original course of the river, are brackish water tidal mud flats. In August this year I spent a holiday with my family in a cottage adjacent to this area, and had the opportunity to do a small amount of collecting in the dunes.

On top of the dunes, there were several hollows where moisture collects, allowing moss to grow. In one such hollow (Grid ref. NU248097), in the soil amongst moss I found two specimens of *Vertigo pusilla* (Fig. 1), together with the much more common *Vitrina pellucida* and *Cochlicopa lubrica*. According to Michael Kerney the only previous known record of *V. pusilla* from v.c. 68 was from Spindleston (NU13 – no record of habitat), found by A.M. Oliver in 1912, and verified by J.W. Taylor for the Conchological Society Census.

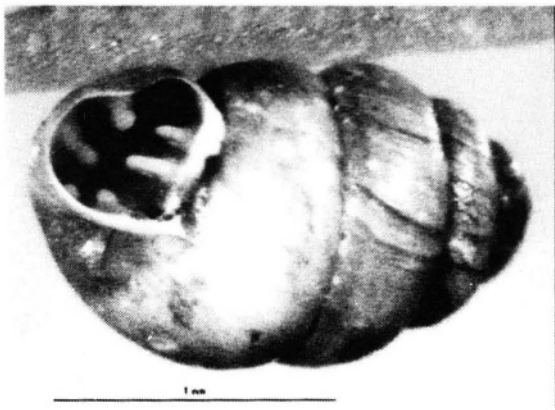


Fig. 1. *Vertigo pusilla* from vice county 68

In the surrounding, drier areas of grass were found the following species: *Cepaea hortensis*, *Helix aspersa*, *Candidula intersecta*, *Cernuella virgata*, *Cochlicopa lubrica*, *Cochlicopa lubricella*, *Pupilla muscorum* (dead), *Lauria cylindracea*, *Vallonia costata*, *Vallonia excentrica*, *Vitrina pellucida* and *Oxychilus alliarius*. Along the margins of the dunes with the area of tidal mud flats, in plant debris at HWM I found: *Ovatella myosotis*, *Potamopyrgus jenkinsi* and some dead *Lauria cylindracea* in the sand under the debris.

Since I was on a family holiday, I had little other time for collecting land snails apart from the following which may be of interest: 1) *Vertigo pygmaea*, south-facing wall of Dunstanburgh Castle, near Craster, Northumberland. Under roots of dry grass, in loose soil. NU 219256. 2) *Lauria cylindracea*, numerous, adults and juveniles. Wall of Lindisfarne Priory ruins, Holy Island NU417128. 3) *Arianta arbustorum* 1 specimen, live, unbanded form. At base of stone garden wall near grasses and nettles, Waterside Cottage, Alnmouth NU101243.

Acknowledgements

I would like to thank Dr M.P. Kerney for his help in identifying several of the species collected, and for the information on *Vertigo pusilla*.

References

- Kerney, M.P., Cameron, R.A.D. & Riley, G., 1979. A Field Guide to the *Land Snails of Britain and North-West Europe*. Collins, London.
- Ellis, A.E., 1926. *British Snails, A Guide to the Non-Marine Gastropoda of Great Britain and Ireland*. Clarendon Press, Oxford.
- Kerney, M.P. (Ed.), 1976. *European Invertebrate Survey: Atlas of the Non-Marine Mollusca of the British Isles*. Conchological Society of Great Britain and Ireland, Institute of Terrestrial Ecology, Cambridge.
- Macan, T.T., 1977. A Key to the British Fresh and Brackish Water Gastropods with notes on their ecology. *Scientific Publications No. 13*, Freshwater Biological Association. □

**The Newsletter Editor sends
Seasonal Greetings and Best wishes for
the New Year to every reader.**

EQMal

a new European malacological association

EQMal (European Quaternary Malacologists) is an organization established in association with the Subcommission on European Quaternary Stratigraphy of INQUA (SEQS). The aim of EQMal is to stimulate exchange of knowledge on European Quaternary malacology, including taxonomy, palaeoecology, stratigraphy, palaeogeography, dating, European correlations, and so on. EQMal will consider the Quaternary in the broad sense.

The *EQMal Newsletter* is issued to further these aims. Initially, the newsletter will appear yearly and contain a membership list, references published during the year, news and views of members, news on localities, and announcements of forthcoming meetings etc.

Members are recommended to participate in meetings of SEQS and of Unitas Malacologia. Membership is free for active contributors to the subject.

If you are interested to join us, please write to:

T. Meijer
Rijks Geologische Dienst
Postbus 157
2000AD Haarlem, The Netherlands
Phone: +31 (0)23 30.03.15;
Fax: +31 (0)23 35.16.14
EMail: T. Meijer@RGD.NL

Please give us your name, address, telephone, fax, and EMail numbers.

T. Meijer (Haarlem, The Netherlands)
and R.C. Preece (Cambridge, UK)

French mollusc atlas

An Atlas Preliminaire des Mollusques de Midi-Pyrenees is being published by **Alain Bertrand**
(Laboratoire Souterrain, C.N.R.S. 09200
Saint Giron, France).

Price 100.00 F + 35.00 F post and packing

Conchological Society of Great Britain and Ireland

MINUTES

**1064th (Ordinary) meeting
held on 22 April 1995 in the Demonstration Room of
the Natural History Museum starting at 2.30 pm**

In the chair: Mr D.C. Long with 26 members and friends present.

Apologies for absence: Dr Preece, Dr Colville, Dr Chatfield, Mrs McMillan, Mr and Mrs Rands, Mrs Fogan, Mr Crowley, Mr de Bartolomé, Mr Palmer, Mrs Long.

Minutes of the last meeting (of 18 February 1995): Read and accepted.

Matters arising: None.

Nomination and election of new members: None.

Announcements and Correspondence:

- Maidstone Museum and Art Gallery were holding an exhibition entitled 'Seascapes and Seashells' which included the Society's display boards. Posters for the exhibition were available for members to put up in public places.

- Malacologica Mostra Mondiale of Italy were interested in exchanging publications with members of the Society. Details were available and interested members should write directly to them.

- Volunteers to help run the Conchological Society stall in September at Vigo in Spain were sought. Any members who expected to attend and could spare a couple of hours were asked to give their name to the Hon. Gen. Secretary.

Lecture of the day:

Speaker: Mr I.J. Killeen (Conchological Society of Great Britain and Ireland). Title of talk: *The distribution and ecology of freshwater snails on Pevensey Levels.*

Papers to be read: None.

Any other business:

Members were reminded that the next meeting would be on Saturday, 20 May. The speaker would be Dr Bill Symondson on the topic of predation on slugs by ground beetles. There would be a field trip to Studland Bay, Dorset on Sunday 14 May, led by Mr Killeen.

Meeting closed at 5.00 p.m.

Chairman

Appendix: Members' exhibits

Miss J.T. Sawyer

Mr K. Brown

Sand Dollar from Florida

1. Book – *Hawaiian Marine Shells* by A.E. Kaye

- | | |
|------------------|---|
| | 2. Book: <i>Shells of Hawaii</i> by A.E. Kaye and O. Schoenburg-Dole |
| | 3. Book: <i>Field Guide to Shells of the Pacific Coast and Hawaii</i> by P. Morris |
| | 4. Endemic Hawaiian shells |
| Mr T. Wimbleton | A large specimen of <i>Neptunea antiqua</i> , from Dogger Bank, North Sea L. 1758. |
| Dr. P.G. Oliver | New book on Arabian Shells/special offers |
| Mr D.C. Long | Bartonian Fossils (mostly from 25 March 1995 Conch. Soc. meeting). |
| Ms J.E. Reynolds | 1. Newspaper cuttings. |
| | 2. Various publications. |
| | 3. Posters for 'Seascapes and Seashells Exhibition'. |
| | 4. Photos of albino <i>Archachatina marginata</i> and newly hatched <i>Euglandina rosea</i> . |
| Mr I.J. Killeen | Freshwater mollusca from Pevensay Levels |
| Mr D. Miller | Gastropods for confirmation of identity. |



**1065th (Ordinary) meeting
held on 20 May 1995 in the Demonstration Room of
the Natural History Museum starting at 2.30 pm**

In the chair: Dr Richard Preece with 27 members and friends present.

Apologies for absence: Mrs McMillan, Mr and Mrs Rands, Dr Honnor, Mr Philp, Mrs Fogan, Miss Fogan, Mr Negus, Dr Willing, Mr de Bartolomé, Dr Colville, Mrs Light, Dr Oliver, Mr Pinn, Mr Gillard, Mrs Platts.

Minutes of the last meeting (of 22 April 1995): Read and accepted.

Matters arising: None.

Nomination and election of new members: 2 full members, 1 student, 1 family.

Full:

Mr D. Miller, [REDACTED] Broxbourne, Herts. [REDACTED]

Mrs A.J. Miller, [REDACTED] Hassocks,
West Sussex [REDACTED]

Family:

Miss S. Platts, [REDACTED] Winchester [REDACTED]

Transfer of category:

Mrs E. Platts: Full to Family

Student:

Miss N. Yonow, [REDACTED] Swansea, West Glamorgan
[REDACTED]

Lecture of the day:

Speaker: Dr W.O.C. Symondson (University of Wales, Cardiff)

Title of talk: *Predation upon slugs by ground beetles.*

Any other business:

Members were reminded that the next field meetings to be held are on Saturday 3 June, Godalming area, led by Jan Light, and Saturday 24 June, Sawbridgeworth, led by Pryce Buckle.

Meeting closed at 4.40 pm.

Chairman

Appendix: Members' exhibits

Dr W.O.C. Symondson

Predation upon slugs by Carabidae – some live slugs and carabid beetles

Dr J.E. Chatfield

Various publications:

1. *A Voyage in the Sunbeam* by Lady Brascey (1890)
2. *Kent Life* (April 1995) and *Kent Today* 13.4.95 with articles on exhibition in Maidstone Museum.
3. Copies of *Vertigo*, the Journal of L'Association Française pour L'Etude des Mollusques Continentaux

Mr K. Brown

1. Book: D. & E. Bosch, *Seashells of Southern Arabia*
2. Book: D. & E. Bosch, *Seashells of Oman*
3. Book: K. Smythe, *Seashells of the Sultan Qaboos Nature Reserve at Qurm*
4. Specimens of some Arabian Endemic species.

Mr D.C. Long

The Times, 20 May re: *Partula*

Ms J.E. Reynolds

1. Photos of *Limicolaria distincta*
2. Press items
3. Society posters
4. Marzipan snails.

□

Field Meetings 1996

Hon. Programme Secretary:

Ian Killeen

[REDACTED]
Felixstowe, Suffolk,

[REDACTED]
Tel. [REDACTED]

Important

*Please remember to inform
the leader if you are attending
a field meeting.*

Note: These are *provisional* dates/venues.

20–21 April

ISLE OF WIGHT. Tertiary fossils.

25 May

SURREY. Non-marine recording.

26 June – 6 July

BRITTANY. Marine recording for
Channel Atlas Project

27 July

NORFOLK. Freshwater recording.

31 August and 1 September

SOMERSET. Non-marine recording.

19 October

LONDON. Non-marine recording

Pacific Islands Land Snail Group

PILSG needs financial help in its important work in the conservation of endangered snails in the Pacific. Funding is needed for the continued monitoring of the Moorean reserve and other projects. The Conchological Society of Great Britain and Ireland is donating £200 and members are invited to make individual contributions.

Cheques/POs made payable to the Zoological Society of London and addressed:

FAE Paul Pearce-Kelly
 International Coordinator
 The Zoological Society of London
 Regent's Park
 London NW1 4RY

Thank you for your support.

Subscriptions

Subscriptions for 1996 will become due on 1 January 1996 and members are asked to remit promptly, without further reminders, to the Membership Secretary:

Mr M.D. Weideli

Newbury

Berkshire

Cheques should be made payable to 'The Conchological Society'. Overseas members must pay in sterling. International money orders, Eurocheques, Bankers drafts or transfers to our bank account are acceptable. Our bankers are: National Westminster Bank Plc, Bolton Branch, PO Box 2, 24 Deansgate, Bolton, Lancs. BL1 1BN, Account 0652384602. We regret that we cannot take credit card payments.

Rates are unchanged from 1995 and are:

Ordinary Member	£23.00
Family Members	£25.00
Student Members	£10.00
Institutional Members (UK)	£32.00
Institutional Members (Overseas)	£35.00

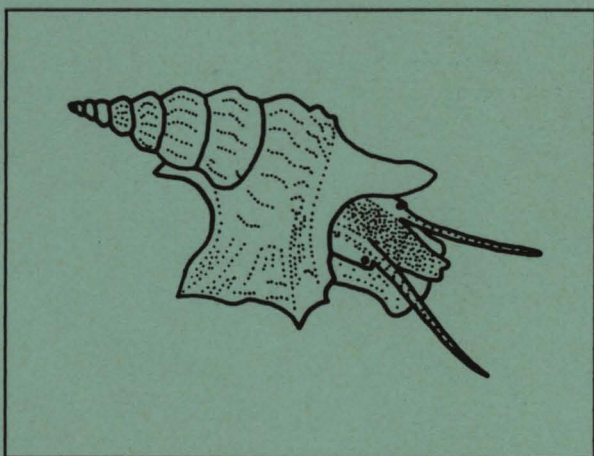
Ordinary Members, Family Members and Student Members may deduct £1.00 from the above if paid before 31 March 1996. Will all members with Standing Orders please check that the amount they are paying is correct. The £1.00 early payment discount will not apply if it is necessary for us to request additional payment.

The Conchologists' Newsletter

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First impressions of the land snails of Arkansas

Brian Coles

 *Jefferson, AR 72079, USA*

During the past eight years I have been studying the land molluscs of SE USA but it was not until this year that I had the opportunity for an extended visit, to the state of Arkansas. 'Ya-hoo' I hear you cry or perhaps 'where?'. The response isn't much different from Americans. 'How did you end up there?' is the usual question but amongst the Arkansans it's a different matter. 'Sure is a purty state; yo'all find folks mighty friendly 'round here'; yo'all have a good 'un'. And indeed 'folks is mighty friendly' and I am having a good time, and there are 'rednecks' and 'good ol' boys'. Are you getting an idea of where Arkansas is? Let me locate it on the molluscan map of North America.

In general terms there are three zoogeographical provinces in North America. The Boreal covers much of Canada with extensions into northern-most USA, while the bulk of the USA is divisible into one province east of the Rocky Mountains and another west of the Rockies. In the east, endemism is most pronounced along the Appalachian chain which, in a broad sense, runs from Newfoundland to NE Alabama, and in the west there are many pockets of endemics along the Rockies and the mountains to the west. As the mountains run north-south, there are more similarities in the molluscan faunas of NE and SE USA than, say, NE and NW USA but there are some species to be found all over the USA. Arkansas is located east of Texas with the Mississippi River as the eastern boundary and the Ozark mountains to the north and west. It lies in the humid 'Austroriparian' zone – and 'boy is it humid!' The land molluscs belong to the south-eastern fauna but in the north there are more northern elements and in the SW some forms get in from Texas. The Ozark uplift of SW Missouri, NW Arkansas and E Oklahoma form the last mountains before the Rockies and are an area of some endemism. In fact, Arkansas covers an interesting geographical position. Freshwater

Mollusca belong to forms of the Mississippi-Missouri-Ohio drainage.

In its geography, the State shows a high degree of diversity. As mentioned above, the W and NW form an area of upland, attaining some 3000 feet, with steep wooded hills, deep valleys, cliffs and so on. Limestones are exposed in the northern part of the hills. In contrast, the SE is the flat Mississippi Delta and the land is under intense agriculture – cotton and rice. However, swampy woodlands and lakes (bayous) abound and those that are developed on the rich alluvial soils by the rivers Arkansas and Mississippi appear to represent remnants of former woodland cover. Between the two regions lies a gently undulating area, the 'Gulf Coastal Plain'. Woodland is the natural climax vegetation all over the state but it is markedly different in the hills than in the lowlands. Upland woodland is rich in hickory (related to horse chestnut) and oak whereas lowland woodland is rich in sweetgum, cottonwood (poplar) and hackberry (related to elm).

So where do you look for molluscs in this unfamiliar land? Firstly, if you don't have a car, or better a pick-up truck, forget it! There is no public transport. Secondly, there is the problem of access. Most of the land is private – and remember that the Americans are a gun-happy nation – but there are areas of state or federal land in the form of 'Wildlife Management Areas', 'State Parks', 'National Forest' and 'National Parks' where access is relatively easy. This applies to the whole of the USA and Canada and includes some of the most unspoilt areas. The next problem is getting lost for most of these sites in Arkansas are dense woodland. Now we come to the real problems. 'Yo'all knows 'bout nettles and briars but down here boy we got poison ivy, mosquito, chiggers and snakes, even a 'gator or two'. Poison ivy is a real problem as it grows everywhere and even a casual brush can cause a blister that develops in a few days and persists for over a week. Fortunately it is an easy plant to recognise. Mosquitos are familiar enough to all but chiggers are the real menace. They live of the tips of grass and burrow under the skin and 'man! do they itch'. Insect repellants offer considerable protection. As for snakes, there are plenty around but they don't seem to be a problem provided that

care is taken when lifting logs and stones. Copperheads and cottonmouths are the commonest poisonous snakes in Arkansas but of these two 'moccasins', only the cottonmouth offers a serious threat to life; it is a very common snake by water. Rattlers occur and it is said that an encounter with a nine-foot rattler is a hair-raising experience. I can well believe it!

The presence of snails in the USA is determined by the same factors that affect European snails, shelter, moisture, food and lime, and the occurrence of a species depends on its requirements for these factors. Much of the woodland of Arkansas, such as that of the Gulf Coastal plain, is acid and the leaf litter dries completely during the summer so that in such woodland, snails are rare in the winter and vanish in the dry summer months. Particularly striking in these habitats is the importance of rotting wood to both the molluscan fauna and the invertebrate fauna in general. Wood rots rapidly on the humid forest floor, aided by termites, and this provides a habitat that is a host to fungi, provides direct shelter and remains moist. The molluscs don't just live under the wood but actually burrow inside provided that it is friable enough. The importance of this microhabitat is easily appreciated in late summer when the woodland floor is bone dry. Helicid snails have then matured and laid eggs under or in the rotting wood that are protected from predation and desiccation. As microhabitats improve, with more constant moisture levels or better base status, so the fauna expands into the leaf litter, vegetation and finally boulder scree and bare limestone ledges and cliffs.

Most of the larger snails of the eastern USA belong to the helicid genera of *Mesodon* and *Triodopsis* (all genera are considered in the broad sense as used by Pilsbry, see bibliography) and they are, all but a few, woodland snails. Native American helicids lack the bright colours of the European *Cepaea* (which has been introduced into the USA) all being some shade of horn-brown, and differ markedly in their anatomy, lacking the dart sacks of the typical European helicid. Many of these forms bear teeth in the aperture and in the smaller ones teeth are 'the rule'. The commonest medium-sized snail in Arkansas, *Mesodon inflectus*, has three

teeth, two on the outer lip and a long lamellar-like parietal tooth – a common pattern in many North American snails. It is found all over the state. *Mesodon zaletus* and *Triodopsis alleni* are restricted to the hilly areas where they live in leaf litter and under logs and stones. They are prominent members of the molluscan community on account of their large size. In captivity, these will eat cucumber but I have seen a related species, *M. elevatus*, eat other live snails. In the wild they are probably polyphagous. *M. clausus* and *M. thyroideus* are two similar forms that live in more distinct colonies and occur more widely. These species are widespread in SE USA but two large forms, *M. binneyanus* and *M. indianorum*, which live in boulder piles, are endemic to NW Arkansas and E Oklahoma. In general appearance these resemble the European *Chilostoma* in their low spire and habitat. Another snail that reaches about an inch in diameter is the unrelated *Anguispira alternata*. This is rather like a large *Discus* and seems to spend its whole life in and around rotting wood. I have seen eggs and juveniles with adults in such sites. The snail is widespread, in several weakly defined forms, all over the eastern USA. *Discus* itself, represented by *D. patulus*, is often found with *Anguispira* but whereas *Anguispira* is found all over Arkansas, *Discus* appears to be confined to the upland half of the State.

In general, the mountainous areas of Arkansas are richer in species than the lowland but some forms occur only in the SE. Amongst the large forms, *Triodopsis fosteri* is a low spired, toothed snail found in the Missouri-Ohio basin but in Arkansas it is found in the low woods towards the Mississippi, a natural downstream extension of its range. It is quite absent from the uplands where a superficially similar snail, *Mesodon perigraptus*, occurs. *M. perigraptus* is widespread in SE USA and is associated with shaded rock outcrops so that its habitat is lacking in SE Arkansas. Amongst *Anguispira*, the lowland delta form appears to be closer to the northern form (*alternata sensu stricto*) than the southern form, *strongylodes*, which occurs in the Arkansas uplands, and this distribution pattern again seems to be due to the Mississippi River providing a corridor for this northern race. However, other species of southern Arkansas are not northern in their origin. The river

valleys are home to a small snail of the genus *Polygyra*, *P. leporina*. *P. leporina* is typical of the genus in that it has a discoidal shell with tightly coiled whorls and prominent teeth in the aperture. Unlike other species of the genus it retains hairs on the periostracum when adult and tends to become covered in mud. The snail matures in the winter when its habitats are wet. In habit it is reminiscent of *Trichia hispida* or *Perforatella rubiginosa*. The centre for *Polygyra* in the USA is in the SE, particularly Florida, but other forms are widespread through the Carolinas to Texas. *P. dorfeuilliana* is a very widespread form found in the Arkansas uplands where three or four additional forms are found but *Leporina* never extends into the hills.

Another very distinctive genus is *Stenotrema*. These snails are characterised by a narrow slit-like mouth with a lenticular to globose shell and are restricted to eastern USA. The greatest variety of forms occurs in the southern Appalachian mountains but the Oachita mountains of W Arkansas are home to two species not found elsewhere, the small globose *S. unciferum* and the remarkable *S. pilsbryi*. In general shape, *S. pilsbryi* resembles a number of species of the genus in its lens shape, a little like the European *Helicigona lapicida* and is very close to *Stenotrema labrosum* which is widespread in the Arkansas uplands. But *pilsbryi* has several spiral rows of hooked periostracal hairs about 1 mm long so that the shell is covered in spines. The shell of a newly matured adult is quite beautiful with the hairs a pale golden yellow against the darker shell. *S. pilsbryi* has a very restricted range but within its range it is quite common in boulder talus in deep shade. The function of the spines is not clear but several species of *Stenotrema* possess hairs or spines but they do not persist long in the adult.

The deeply shaded valleys of upland Arkansas are also home to many small snails of the genera *Vertigo*, *Gastrocopta*, *Punctum*, *Striatura*, *Euconulus* and *Strobilops*. *Gastrocopta* are close to *Vertigo* in their affinities but have a waxy white shell usually covered in dirt. *G. contracta* is one of the larger species of the genus and is also one of the most widespread snails in the USA; the mouth is crammed full of teeth. Other species are more calciphile.

For example, *G. sterkiana* and *holzingeri* are confined to the limestone areas in Arkansas. The minute *Punctum minutissimum* resembles the European *P. pygmaeum* but is even smaller and bears spiral sculpture in addition to the radial riblets. *Striatura* are tiny snails belonging to the Zonitidae. Their waxy white shells have raised spiral sculpture crossed by a radial sculpture that is not parallel to the aperture and the effect is to present a very distinctive pattern. Two species occur in Arkansas, *milium* and *meridionalis*. *S. milium* is a more northerly species and appears to have its southern limit in Arkansas. The European *Euconulus fulvus* occurs in the USA as it has a boreal distribution but the common species outside this zone is *E. chersinus*. This is found all over Arkansas and is like a large, tall *fulvus*. In addition a form with denticles on the body whorl is found, *E. dentatus*, but this appears to be a calciphile and in Arkansas is restricted to the limestone areas of the state.

Strobilops is one of the most interesting genera of snails, for their present distribution is the eastern US and into Central America, but very similar forms are found in the European tertiary fauna. In size and shape they are not unlike *Spermodea* providing that the discoidal *Discoströbilops hubbardi* is excluded. I find these little snails quite fascinating and within Arkansas they show well the division of the state into a SE and NW division and the more northerly affinities of the NW. All three of the Arkansas species can be found crawling in wet weather on the surface of rotten logs that have lost their bark but retain the smooth surface beneath. *S. aenea* is often common in such places, particularly in damper localities on sweetgum logs. In the low woodlands of SE Arkansas *S. aenea* is found with *S. texasiana* but in the upland woods of NW Arkansas, *aenea* occurs with *S. labyrinthica*; *labyrinthica* and *texasiana* do not occur together. The upland/lowland boundary is well defined as a diagonal running from SW to NE Arkansas and along this line occur all three species, *labyrinthica* restricted to the higher ground, *texasiana* at the foot of the hills and *aenea* in both habitats. In their distribution over the entire USA, *aenea* and *texasiana* are found in the south-east with *texasiana* having the more southerly distribution. *S. labyrinthica* is predominantly a

north-eastern form.

I have mentioned the small zonitid snails of the genus *Striatura* but others of the family resemble the European genera more closely. *Zonitoides arboreus* is an abundant snail all over the USA and indeed all over the world for it has been widely distributed as a pest in greenhouses. It is aptly named as it lives in rotting wood. It resembles *Z. nitidus* but is smaller, with a lower spire, less gloss and paler colour; the animal lacks the deep blue-black of *Z. nitidus*. *Hawaia minuscula* is another species that has been distributed all over the world but its name is singularly inappropriate. It is an American species and its occurrence in Hawaii is due to introduction. This is another whitish snail. Several species of small zonitids allied to *Retinella* occur in the USA but more impressive is *Mesomphix*. *Mesomphix*, like *Stenotrema*, has its centre of diversity in the southern Appalachian mountains but two or three species occur in Arkansas. They resemble the European genus *Retinella sensu stricto* in their shells. A further group, again most diverse in the Appalachians is *Ventridens*. These tightly coiled pale coloured shells often have lamellae in the mouth and of the two Arkansas species one has this feature and one does not. The former, *V. demissus*, is widespread and appears to be a calcifuge and the other, *V. ligera*, is more calciphile but occurs both in upland and lowland Arkansas.

The commonest Arkansas slug is *Philomycus carolinianus* which lives under logs, tree bark and so on. *Philomycus* is mottled with black and brown in indistinct longitudinal rows and very sticky. As elsewhere several European slugs have been introduced, notably *Deroceras laeve* which is widespread in wet habitats. I have seen other limacid slugs in gardens and *Limax flavus* on waste land but the native slug fauna of the eastern US is not particularly well developed and this came as somewhat of a surprise, bearing in mind the large areas of acid woodland and the potential for evolution of slug species.

One of the biggest problems when dealing with an unfamiliar fauna is identification. The land molluscs of the USA have not been as thoroughly studied as those of Western Europe.

Nevertheless there is the magnificent two-volume (four-part) monograph by H.A. Pilsbry. Pilsbry described in detail all forms of land molluscs of the USA and Canada known to him at the time. Of course, since then there have been taxonomic revisions, splits and the description of new species. Many of these have been published in **Nautilus**. Amongst the workers on North American molluscs mention must be made of Leslie Hubricht who has described many new forms.

Arkansas is one of the least studied of even the well known eastern USA molluscs and this means that new observations on species distribution and ecology can readily be made. This, and the thrill of finding something new, are all part of the experience of a new fauna and undoubtedly makes all the effort well worthwhile.

Selected bibliography

Burch, J. B. *How to know the eastern land snails*. Wm. C. Brown Co., Dubuque, Iowa, 1962. (A good guide to land snails of the US eastern seaboard.)

Emerson, W. K. and Jacobson, M. K. *The American Museum of Natural History, Guide to Shells*. Alfred A. Knopf, New York, 1976. (Land, freshwater and marine shells of the eastern North American seaboard from Nova Scotia to Maine.)

Hubricht, L. *The distribution of the native land molluscs of the eastern United States*. *Fieldiana, Zoology*, New Series, No. 24, 1985. (An impressive compilation of much data from the literature and his own collecting. Some clear distribution patterns emerge from this work which gives maps for all the land molluscs known from east of the Rockies, with brief notes on ecology and key references.)

Pilsbry, H. A. *Land snails of North America (north of Mexico)*. Monograph 3, Academy of Natural Sciences of Philadelphia, Pennsylvania, vol. 1, part 1, 1938, vol. 1, part 2, 1940, vol. 2 (2 parts) 1940. (Still the only comprehensive account of the molluscan fauna of the whole of North America.) □

Danish Marine Molluscs

An annotated checklist of recent marine molluscs of Danish waters by Kathe R. Jensen and Jørgen Knudsen has been published by the Zoological Museum, Universitetsparken 15, DK-2100 Copenhagen Ø, Denmark, price US\$12 (70 DKr) including packing and postage. ISBN 87-7834-108-6.

Observations on the development of dentition in small juveniles of certain species of Mytilidae:

Modiolula phaseolina, Musculus discors, Modiolarca tumida, Mytilus edulis, Crenella decussata, Rhomboidella (syn. Crenella) prideauxi, Gregariella sp., Modiolus modiolus

J.E. Phorson

Durham

Introduction

The Mytilidae are sometimes described as having a hinge line without teeth but sometimes with tooth-like crenulations. Alternatively, they may be classified (especially in palaeontology) under the Order of Dysodonta, dysodonts being considered as essentially toothless, or with only rudimentary teeth, or with small, weak teeth close to the beaks. A study of bivalve pelagic larvae from the North Sea by C.B. Rees in 1950 is reported in the *Treatise on Invertebrate Paleontology* (Ed. R.C. Moore). This report describes a band of larval teeth on the prodissoconch of certain bivalves, including *Mytilus*, recalling the taxodont teeth of the Nuculacea and Arcidae. The present study notes the existence of taxodont-like teeth on post-larval (dissoconch) shells of certain of the Mytilidae. As the shell develops further, these teeth change in form, migrate or largely disappear by the time the shell is mature. The ontogeny of post-larval shells reveals a number of diverse and changing means by which the two valves are held in correct alignment while opening and closing or are locked in correct alignment when the valves are in the closed position.

Dentition, crenulations and ligament

An obvious function of dentition is to provide both a fulcrum and a strong point of attachment which will resist the efforts of predators to open the shell. In addition, the teeth provide a hinge which inhibits sideways rotation of the valves along the line of the commissure. In other words, the two valves must remain correctly aligned one with the other while opening and closing. For taxodont or taxodont-like teeth to perform this latter function efficiently they must lie in a straight or nearly straight band. Hence the larval and early post-larval shells of the species here described are all

approximately D-shaped, the teeth being located along the straight portion of the D. In the case of the smallest post-larval juveniles the band of teeth is divided at or near the centre by what may be a resilifer. These taxodont-like teeth are only the precursors of the adult teeth (where these develop). As the shell grows, the two halves of the band of teeth separate, migrate and change shape to become the rather simple protuberances which sometimes perform the function of teeth in the more mature shell or may disappear altogether. On larger juveniles the traces of the precursor, taxodont-like teeth may still be visible on these protuberances. A part of the band of taxodont-like teeth may be retained vestigially (as in *Modiolula phaseolina*) under the beak or may develop into a functionally important band of crenulations along the margin posterior to the beak (as in *Crenella decussata*).

As the shell develops, the precursor teeth become less important, their function being progressively taken over by the ligament which begins to develop behind the beak and migrates along the posterior margin of the shell. At the same time the outline of the shell is modified so as to provide the straight or near-straight edge for the ligament which, to operate efficiently, must be long and straight. In adult shells it is the strength of the straight ligament which takes over from the juvenile dentition in ensuring the correct alignment of the valves when opening and closing.

In some species additional crenulations which do not originate from the precursor teeth may develop along the margin. For example, in *Mytilus edulis* three or four strong crenulations develop on the margin forward of the beak and are retained into the adult state; in some species another band of weaker crenulations develops along, or in prolongations of, the line of the growing ligament, giving it additional stability, but these crenulations may be lost later. In some species crenulations of a different kind develop along the ventral margin, these crenulations being associated with costae radiating from the beak. The function of such marginal crenulations is to ensure the correct alignment and security of the valves when closed, but they have a further advantage in that they allow the valves to be held very slightly apart to permit the passage of water while still ensuring a correct alignment and some measure of security from predators. Moreover, the associated costae lend strength to the whole shell, a corrugated structure being stronger, weight-for-weight, than a smooth one.

The species illustrated

The illustrations have been drawn free-hand while the specimen was being viewed under a microscope at 100x magnification. As the drawings were executed without the benefit of a camera lucida it has not been possible to provide a common scale bar for each figure, but the approximate dimensions are given for each individual specimen. In most cases the figures are of selected individuals out of a much larger growth series, many intermediate sizes not being shown. The illustrations should also be a guide to the identification of very small juveniles.

Only eight species of Mytilidae are dealt with here since satisfactory growth series of other species are not at present available to the writer. It seems reasonable to infer analogous development in the case of other species.

The *Treatise on Invertebrate Paleontology* (Moore, 1969) describes (in a different section, pp. N1007–N1010) the larval shells of recent and fossil Ostreidae. These have short strips of regular teeth ('larval tooth precursors') which persist for a while as 'relict larval tooth precursors' until obliterated by the growth of the strong ligament area under the beak.

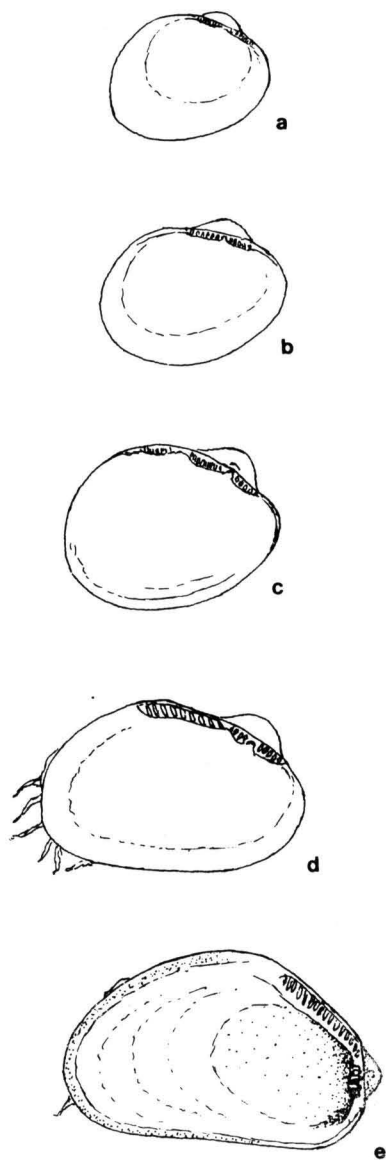


Fig. 1. *Modiolula phaseolina* (Philippi, 1844)

Fig. 1. *Modiolula phaseolina* (Philippi, 1844)

From Low Newton-by-the-Sea, Northumberland NU242246 Jan. 1995. Approximate sizes are measured from L. to R. across the illustration as presented.

a. 0.4 mm b. 0.5 mm c. 0.6 mm d. 0.9 mm e. 1.4 mm

All left valves, internal view.

Description

- a. Here a straight bar of taxodont-like teeth with a median division (?resilifer) lies under the beak.
- b. These teeth have developed and extended.
- c. The posterior half of the teeth extends further along the posterior margin.
- d. This extension of the teeth strengthens and develops together with the ligament along a straight length of margin.
- e. The straight ligament is well established, with reinforcing crenulations which will disappear in adult shells. The relict strip of taxodont-like teeth under the beak persists into the adult stage.

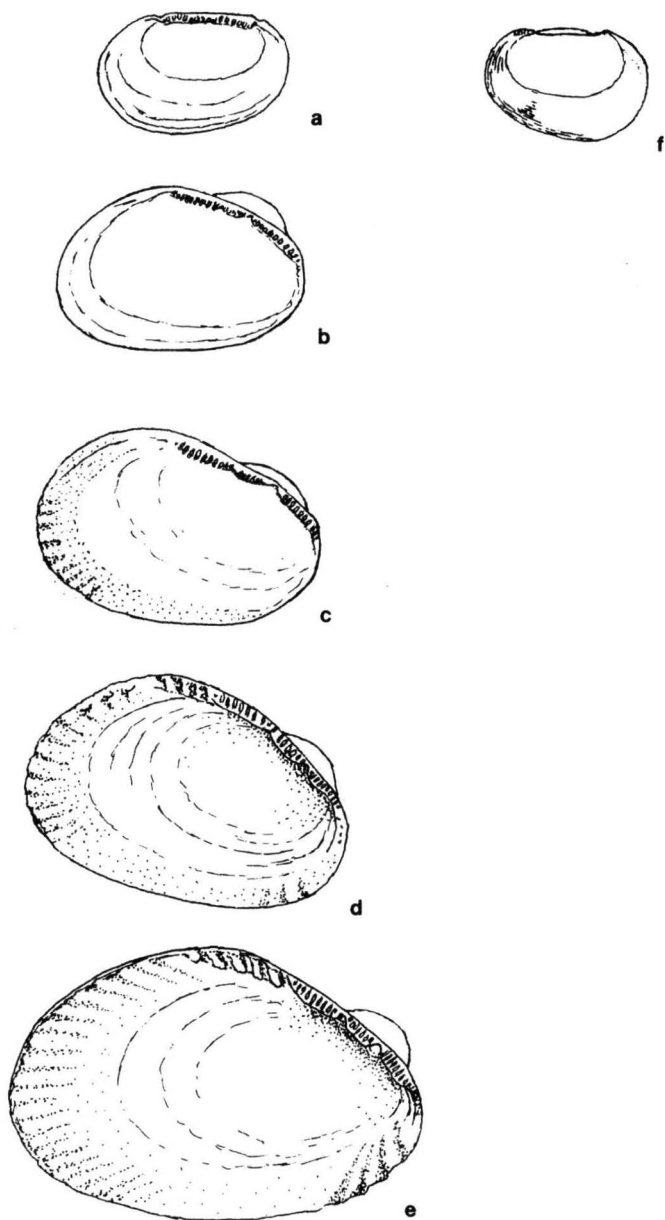


Fig. 2. *Musculus discors* (L., 1767)

Fig. 2. *Musculus discors* (L., 1767)

a–d. From Low Newton-by-the-Sea, Northumberland NU242246 Jan. 1995.

e. From Harlyn Bay, N. Cornwall SW874757 June 1988.

Approximate sizes are measured from L. to R. across the illustration as presented.

a. 0.5 mm b. 0.7 mm c. 0.8 mm d. 0.9 mm e. 1.3 mm

f. 0.4 mm.

a–e. Left valves internal view. f. Left side of closed pair.

Description

- a. An equilateral, D-shaped shell with a band of taxodont-like teeth along the straight margin.
- b. A median gap in the teeth widens and the teeth extend.
- c. A section of the posterior portion of the teeth separates off along the line of the developing ligament. The shell has now changed outline to provide a straight edge for the ligament. Crenulations and associated costae begin to develop round the posteroventral margin.
- d. The extended band of teeth behind the beak grows further along the straight margin bearing the developing ligament. A few new, strong crenulations begin to develop (on the margin only) posterior to these. The posteroventral band of marginal crenulations, with associated costae, grows stronger. A new, smaller group of marginal crenulations with associated costae begins to develop on the anteroventral margin.
- e. All the features observed in (d) have developed further, anticipating the adult shell.

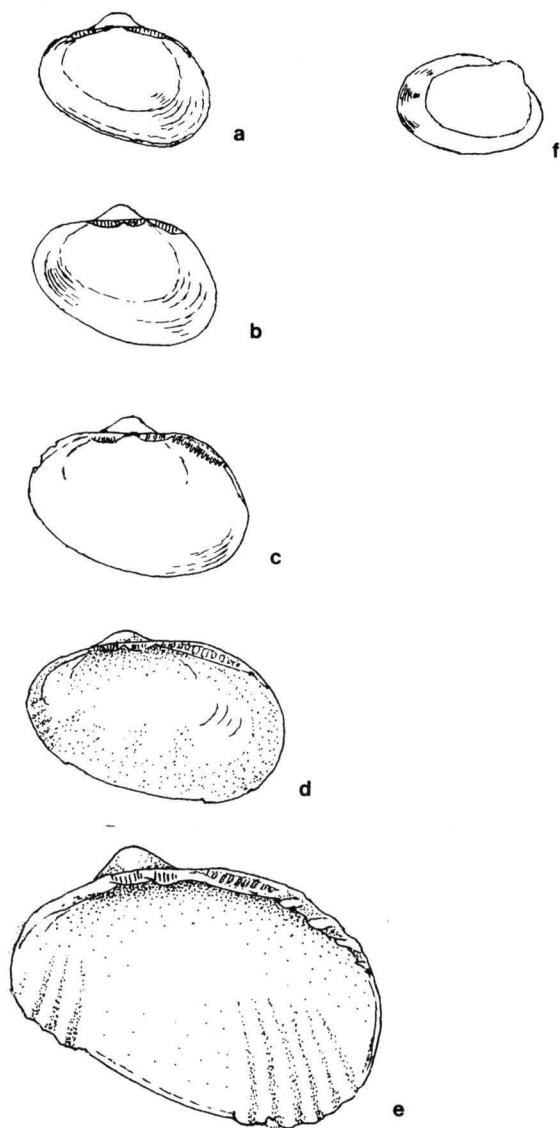


Fig. 3. *Modiolarca tumida* (Hanley, 1843) (syn. *Musculus marmoratus*)

Fig. 3. *Modiolarca tumida* (Hanley, 1843) (syn. *Musculus marmoratus*)

a-e. From Low Newton-by-the-Sea, Northumberland NU242246 Jan 1995.

f. From W. side of Pointe de Penvins, S. Brittany, France, June 1991.

Approximate sizes are measured from L. to R. across the illustrations as presented

a. 0.3 mm b. 0.35 mm c. 0.6 mm d. 0.8 mm e. 0.9 mm

f. 0.25 mm

a-e. Right valves, internal view. f. Right side of closed pair.

Description

- a. A small specimen much less equilateral than *M. discors* of a similar size. A further difference is that, in profile, the beak extends well beyond the dorsal margin, a diagnostic feature which persists into adult shells (see Tebble (1976) p.39, Fig. 20). There is a long band of taxodont-like teeth with a median gap.
- b. The line of teeth has developed with a posterior section separating off.
- c. This posterior section of teeth has developed further along the line of the growing ligament.
- d. The teeth and ligament have developed further. Crenulations and short costae are visible along the anteroventral margin.
- e. The original taxodont-like teeth are still present; the extended band of teeth under the ligament is stronger; three strong crenulations have appeared in prolongation of the ligament; two bands of marginal crenulations with associated costae are present.

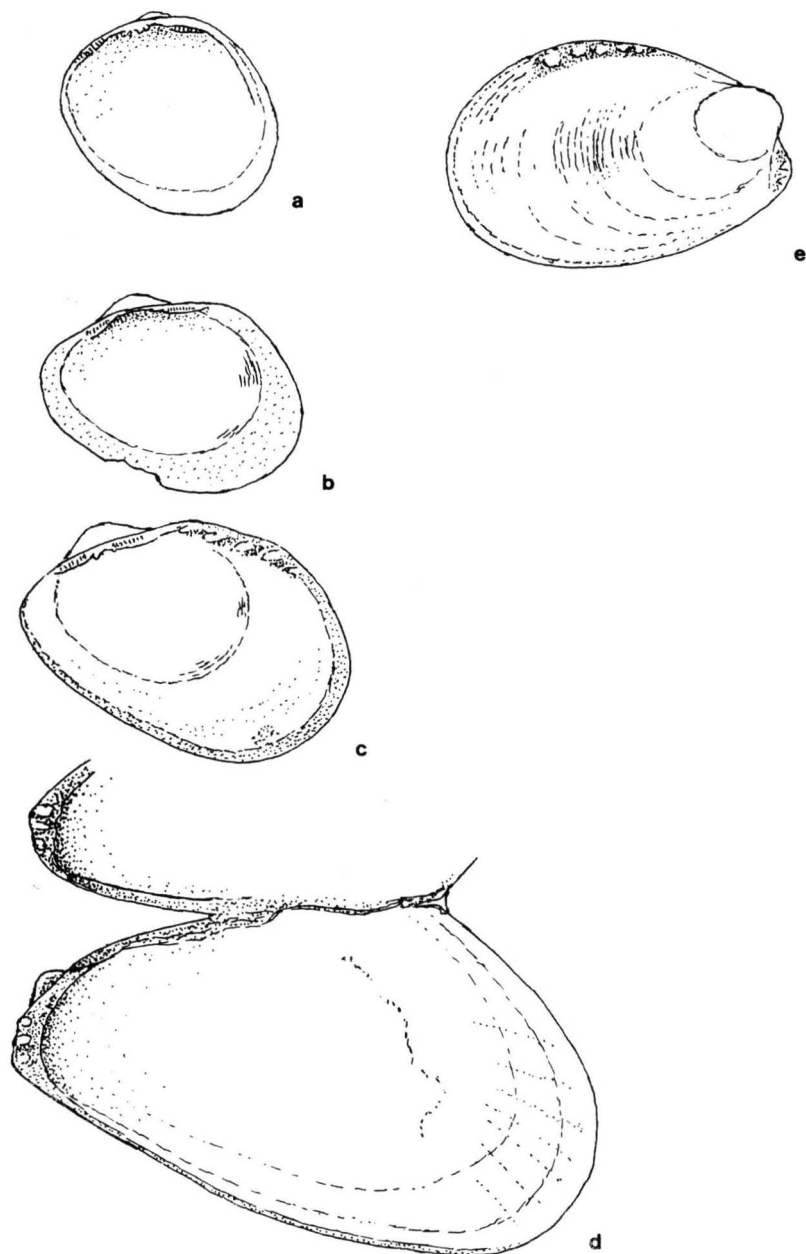


Fig. 4. *Mytilus edulis* (L., 1758)

Fig. 4. *Mytilus edulis* (L., 1758)

From Low Newton-by-the-Sea, Northumberland NU242246 Jan 1995

Approximate sizes are measured from L. to R. across the illustrations as presented.

a. 0.3 mm b. 0.4 mm c. 0.9 mm d. 2.3 mm e. 0.9 mm

a-d. Right valves, internal view. e. Right valve of closed pair.

Description

Note: In the case of this species it is not easy to find very small post-larval shells which show the taxodont-like teeth and median gap as seen in (a). When newly opened, small specimens often have the margin under the beak covered with hardened gummy material which it is difficult to remove. On the other hand, valves which have lain separated in shell sand for some time may have lost the detail of the teeth. On a good specimen (not too fresh, not too old) the teeth can only just be seen at 100x magnification.

- a. A specimen having a line of teeth with median gap.
- b. These teeth have extended and the shell profile has altered, developing a straight line posterior to the beak.
- c. The ligament is developing and migrating in a posterior direction and a few strong marginal crenulations can be seen. Similar crenulations can also be seen in (e) from the outside through the semi-transparent shell. These crenulations are not present on older shells.
- d. The taxodont-like teeth are now lost. Three strong marginal crenulations have appeared on each valve just in front of the beaks and these persist into the adult shell. A strong, straight ligament has developed well away from the beaks.

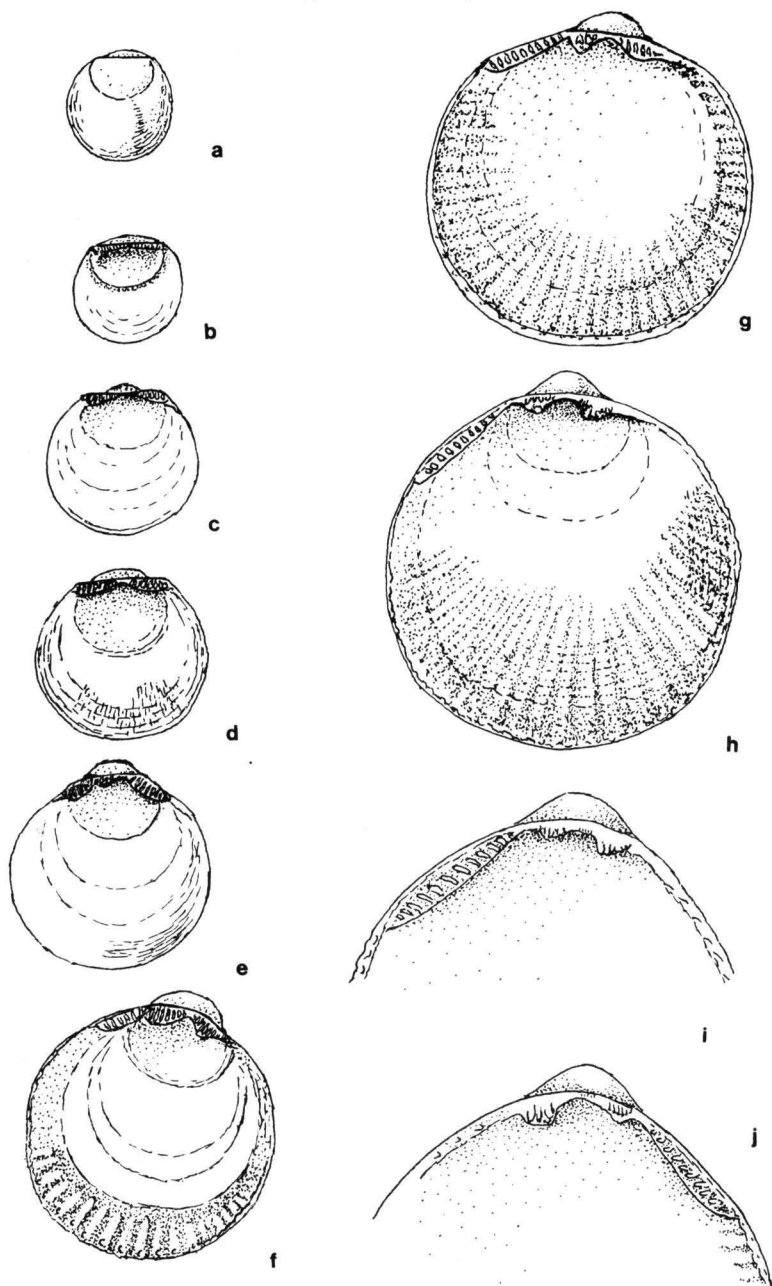


Fig. 5. *Crenella decussata* (Montagu, 1808)

Fig. 5. *Crenella decussata* (Montagu, 1808)

From Low Newton-by-the-Sea, Northumberland NU242246 Jan 1995.

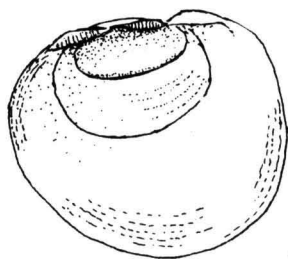
Approximate sizes are measured from L. to R. across the illustrations as presented.

a. 0.3 mm b. 0.3 mm c. 0.4 mm d. 0.5 mm e. 0.6 mm
f. 0.7 mm g. 0.9 mm h. 1.05 mm i. Detail; whole shell:
1.3 mm j. Detail; whole shell: 1.2 mm

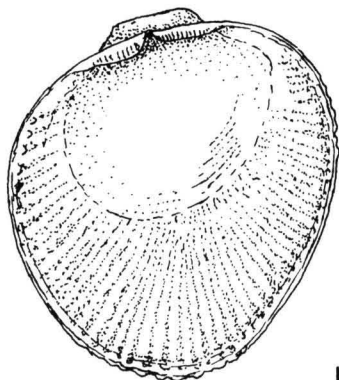
a. Closed pair, external view. b–d. L. or R. valves indeterminate, internal view. e–h. Left valves, internal view.
i. Hinge detail, left valve. j. Hinge detail, right valve.

Description

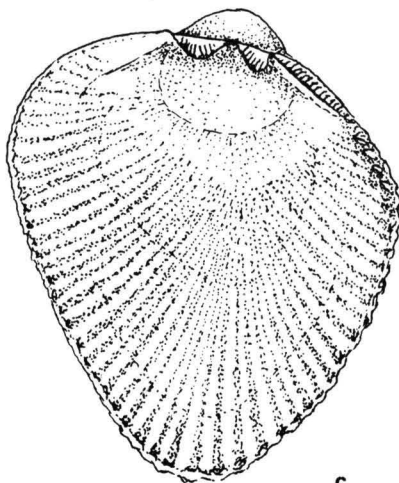
- a. External view of a small post-larval shell, very equilateral and with D-shaped prodissoconch.
- b. Internal view of a shell of similar size with D-shaped prodissoconch and a straight bar of teeth with a very small median gap.
- c,d. Showing development of the teeth.
- e. The posterior half of the teeth has separated into two groups.
- f. There are now three groups of teeth: the posterior group is extending with the ligament as the latter migrates along a straight margin posterior to the beak. The two other groups of precursor teeth are beginning to thicken and protrude. Crenulations and associated costae have developed along the ventral margin.
- g. Small marginal crenulations with associated costae are now round almost the whole of the margin.
- h. Under the ligament there is a strong, straight band of marginal teeth whose function now appears to be to anchor the ligament. The precursor teeth have become two protuberances on which vestigial traces of the precursor, taxodont-like teeth remain. Crenulations continue to grow all around the margin and their associated costae lengthen. These costae are crossed by growth lines giving a decussate appearance to the outside of the shell.
- i, j. Fairly mature shells, L. and R. valves, respectively.



a



b



c

Fig 6. *Rhomboidella* (syn. *Crenella*) *prideauxi* (Leach, 1815)

**Fig. 6. *Rhomboidella* (syn. *Crenella*) *prideauxi*
(Leach, 1815)**

a. From Whitesands Bay, Nr St David's, Wales SM732265 Sept. 1986.

b,c. From Crackington Haven, N. Cornwall SX141969 May 1990.
Approximate sizes are measured from L. to R. across the
illustrations as presented.

a. 0.7 mm b. 1.0 mm c. 1.4 mm

a,c. Right valves. b. Left valve. All internal view.

Description

These shells follow much the same developmental sequence as those of *C. decussata*, although from an early stage the profile is markedly different.

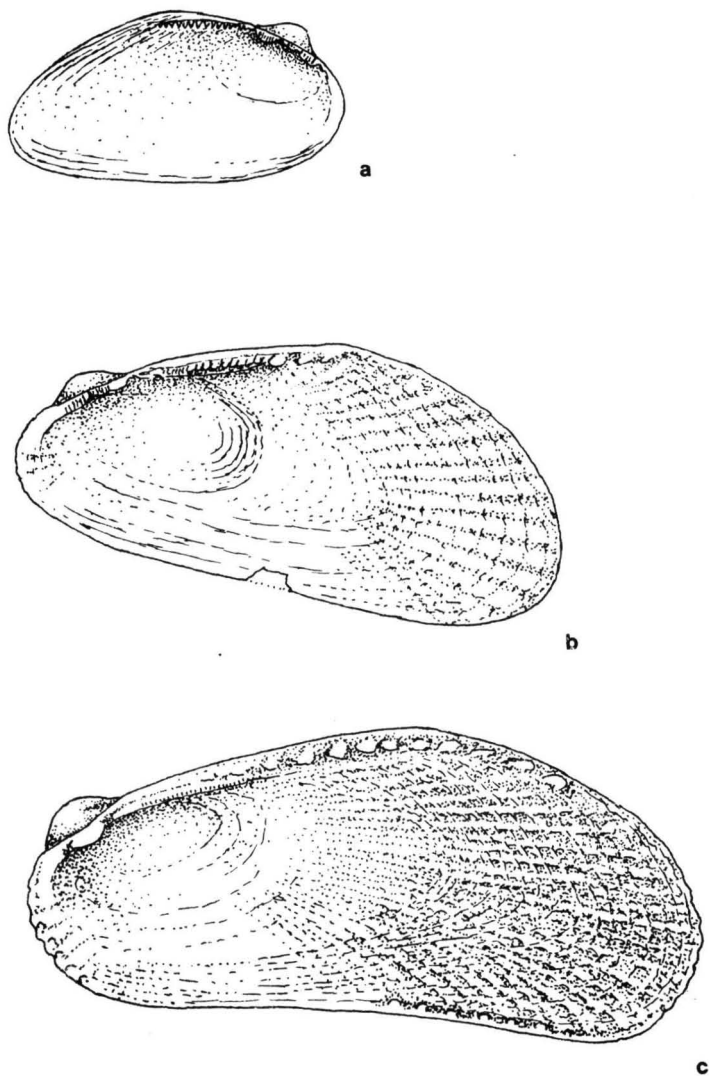


Fig. 7. *Gregariella* sp.

Fig 7. *Gregariella* sp.

From Hendaye, France (Biscay) Aug. 1982.

Approximate sizes are measured from L. to R. across the illustration as presented.

a. 0.9 mm b. 1.3 mm c. 1.7 mm

a. Left valve. b,c. Right valves. All internal view.

Description

Specimens out of shell and taken at Hendaye, France (Pyrénées-Atlantiques). Probably *G. fischeri* (Locard, 1897). Specimens show development analogous to that of previous species.

- a. Specimen with a strip of fine teeth in two groups with a median gap. Posterior to these, a further band of teeth has developed along the straight line of the growing ligament.
- b. Posterior to the beak, the straight line of the margin has lengthened considerably in order to accommodate the growing ligament. Three additional, stronger crenulations have developed at the posterior end of the ligament. Around the posterior margin, finer crenulations have developed with their associated costae. Just forward of the beak, there are the beginnings of a few marginal crenulations, also with associated costae.
- c. The taxodont-like precursor teeth are now absent and have been replaced by a blunt protuberance. The ligament occupies a long, straight margin posterior to the beak and is supported by strong marginal crenulations. Round the posterior and posteroventral margin there are weaker crenulations laying down the broad posterior band of costae which radiates from the beak. There is a smaller group of crenulations laying down the anterior band of costae. Growth lines give a decussate appearance to the two bands of costae. A few of the crenulations on the ventral margin are stronger, adding to the sureness of the lock when the valves are closed.

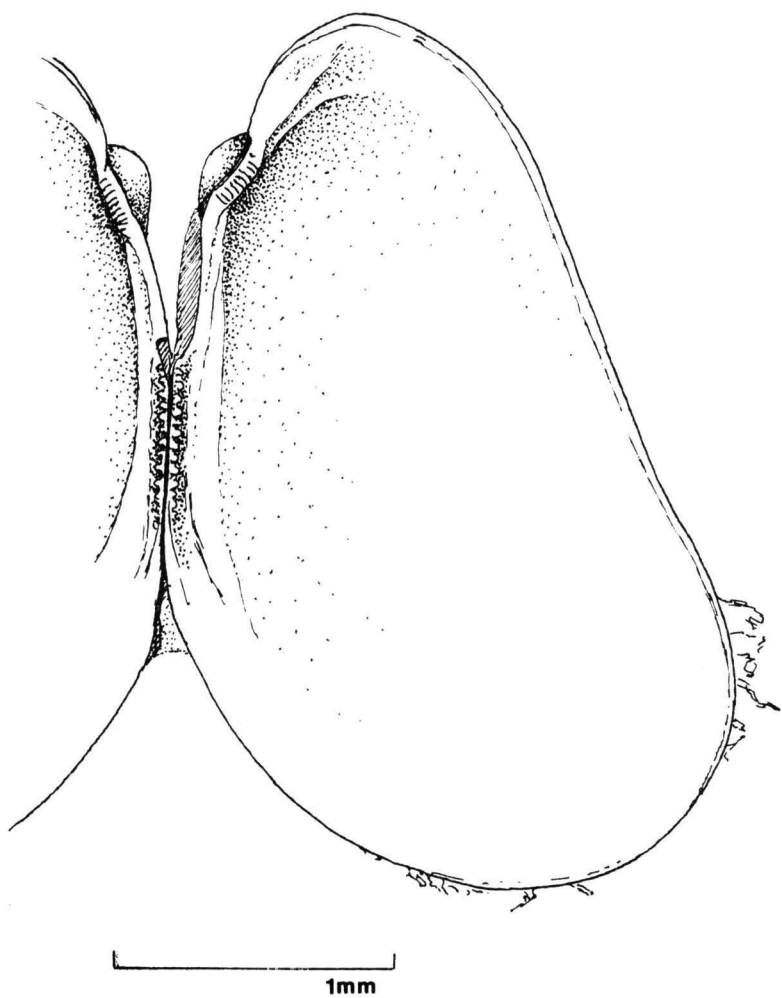


Fig. 8. *Modiolus modiolus* (L., 1758)

Fig. 8. *Modiolus modiolus* (L., 1758)

From Longhoughton, Northumberland NU264157 Apr. 1995.

Scale bar approximate. Left valve of joined pair, internal view.

Description

Not many small juveniles of this species have been available. The present specimen, however, shows vestigial traces of earlier taxodont-like teeth. There is a strong, straight ligament with an associated strip of fine teeth now serving to anchor the ligament. The rest of the margin lacks teeth and crenulations. No teeth or vestigial teeth or crenulations are present on mature specimens, the strong ligament alone ensuring the correct alignment of the valves when opening and closing and when closed.

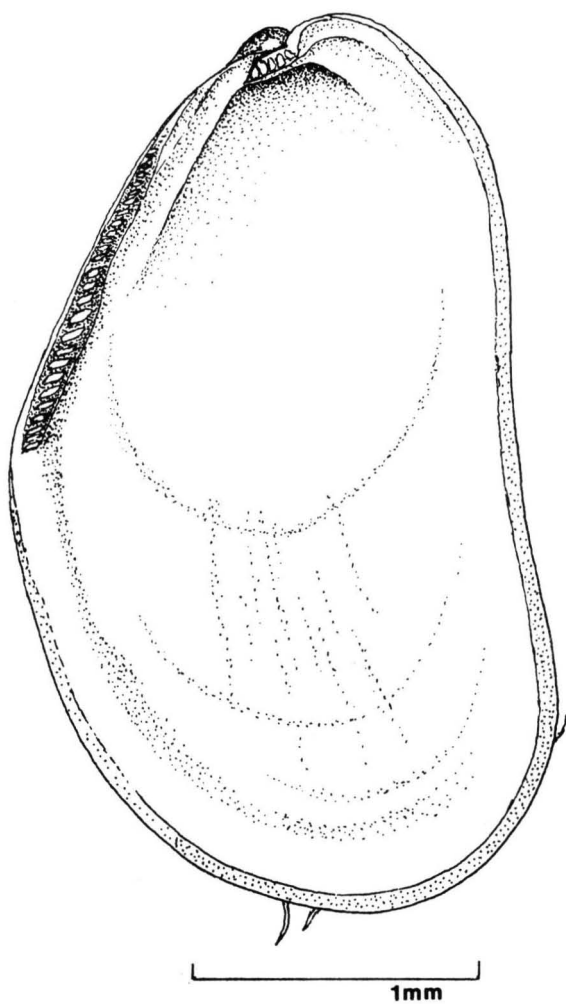


Fig. 9. *Modiolula phaseolina* (Philippi, 1844)

Fig. 9. *Modiolula phaseolina* (Philippi, 1844)

From Low Newton-by-the-Sea, Northumberland NU242246 Jan. 1995.

Specimen for comparison with *Modiolus modiolus* (Fig. 8) of similar size. Scale bar approximate. Left valve, internal view.

Description

This illustration of a larger *M. phaseolina* is added to provide, for comparison, a specimen of similar size to that of *M. modiolus*. In the adult stage of this species the teeth under the ligament are lost but the short strip of teeth under the beak is retained.

References

- Moore, R. C. (Ed.) 1969. *Treatise on Invertebrate Paleontology*
Part N, Vol. 1 Mollusca 6 pp. N94 – N101 (Bivalve ontogeny and
dentition of prodissoconch hinges);
Part N, Vol. 3 Mollusca 6 pp. N1006–N1013 (Ontogeny of oysters).
Moore, R. C., Lalicker, C. G. and Fischer, A. G., 1952. *Invertebrate
Fossils* (Order DYSODONTA and Mytilacea).
Tebble, N., 1976. *British Bivalve Seashells*. pp. 38–49 (Mytilacea).

□

Conchological Society of Great Britain & Ireland

RESEARCH GRANT – RULES

1. The CSGBI has a fund from which it is able to make grants for the purpose of molluscan research.
2. Preference will be given to projects which focus on molluscan biogeography, ecology, conservation and palaeontology.
3. No grant will normally exceed one hundred and twenty five pounds.
4. Subject to availability of funds, the Society will award grants up to a maximum of five hundred pounds in a single year.
5. Applications are invited from members and non-members. The latter will be encouraged to join the Society. Professional malacologists will be eligible to apply for grants. Officers of the Society are not eligible.
6. Recipients of grants will be expected to produce a written account in one of the following forms:
 - 1) A paper should be submitted to the *Journal of Conchology*, subject to the usual editorial and review conditions.
 - 2) A substantial article for the *Conchologists' Newsletter*.
 - 3) If the grant awarded by the Society is one of several awarded to one project which will be published elsewhere, the recipient should contribute an account of the work carried out for the *Conchologists' Newsletter*.
7. Recipients of grants will be ineligible to apply for further grants within a period of 3 years.
8. Grant applications will be considered by a committee composed of the Non-marine and Marine National Recorders and the Conservation Officer. Recommendations will be submitted to Council for approval.

Molluscs of the northern Wey

June E. Chatfield

Alton, Hampshire

The River Wey that flows through Guildford in Surrey and joins the Thames at Weybridge has two sources, the southern Wey rising on acid sandstone near Haslemere in Surrey and the northern Wey from chalk springs in Alton, Hampshire. The two branches join at Tilford. The two headwaters have different character, water chemistry, history and natural history.

The southern Wey is known for its systems of water meadows: the sluices of these near Liphook have been conserved in recent years through the River Wey Trust. Although concentrating on the historical side, The River Wey Trust (southern) has also investigated the natural history and published a booklet outlining all aspects of the southern tributary. (*The Southern Wey: a Guide*, The River Wey Trust, 1988. 12 London Road, Liphook, Hampshire GU30 7AN. Tel. 01428 722162).

Whilst the focus for the formation of the Trust to look after the southern Wey was based on water meadows, the stimulus for the Northern River Wey Trust was low flow. The river in Alton has been frequently dry in recent years and has been the subject of a consultants' report commissioned by Thames Water. Although inaugurated in 1990, the Northern River Wey Trust was inactive until its relaunch with a public meeting and display in Alton in February 1995. It has now set up specialist working groups covering natural history, history and wardening and has plans for a booklet similar to that issued by the Southern River Wey Trust. My role is the co-ordination of the natural history group.

Records of molluscs and other aspects of natural history of the northern branch of the river exist in field notebooks and are being extracted. There is a need to continue and extend the monitoring of the mollusc fauna. Initial field work has been undertaken from the source in Alton to Farnham town centre and around Tilford. A Conchological Society field meeting (see Field Meetings 1996) is scheduled for Saturday 25 May 1996 and will include the river

from Elstead upstream beyond Tilford. A further informal day of field work is planned for the Tilford to Farnham stretch. As well as helping the River Wey Trust, records for the Surrey stretch will be fed into the recording scheme on molluscs for Surrey held at the Surrey Wildlife Trust.

A field meeting of the Society visited the River Wey near Godalming, beyond the confluence of the two headwaters, and this was reported by Jan Light in the *Conchologists' Newsletter* for September 1995.

The northern Wey rises from the chalk at Alton. The derelict watercress beds in Flood Meadows near the source provide a valuable freshwater and wetland habitat. After flowing through the town the river is ducted under the brewery site and emerges to enter King's Pond, an eighteenth century mill pond. At King's Pond the water is augmented by further spring sources from the chalk of Windmill Hill. On leaving the pond, the river flows through the industrial estate where it joins the Caker Stream which receives the effluent from the Alton sewage works. At the confluence with the Caker Stream, the river is wider and flows eastwards, bounded mostly by pastureland, to Farnham. As a result of grazing the riverside vegetation and therefore wetland habitat is limited and the banks are trodden by cattle. At Farnham the river flows through public parks where the waterside vegetation is more luxuriant, and this also provides opportunities for molluscs. The route can then be followed by public footpaths to the confluence with the southern Wey at Tilford, with access to the river at limited points.

Arising from chalk springs the water of the northern Wey is calcareous and combined with much variety of habitat in depth and nature of substratum, it has a rich molluscan fauna, prolific in both species and numbers of individuals. The section through Flood Meadow and the Alton trading estate has an exceptional diversity of species for a first order stream which would normally support only three or four. In the river as a whole, there is a good spread of molluscan families. Freshwater prosobranchs include *Valvata piscinalis*, *Bithynia tentaculata* and *Potamopyrgus jenkinsi*. The freshwater pulmonates are represented by *Lymnaea*

palustris, *L. stagnalis*, *L. peregra*, *Physa heterostropha*, *Planorbium* *corneum*, *Planorbis carinatus*, *P. planorbis*, *Anisus vortex*, *Gyraulus albus*, *Bathymorphus contortus*, *Hippeutis complanatus* and *Ancylus fluviatilis*. Bivalves include *Sphaerium corneum*, the distinctive *Pisidium amnicum* and other smaller species of *Pisidium*. The wardening team will be asked to keep an eye out for shells of *Anodonta* on the bank. Typical wetland species on the bankside vegetation consist of *Succinea putris*, *Oxyloma pfeifferi*, *Zonitoides nitidus*, *Deroceras laeve* and *Ashfordia granulata*, all based on live records. Further fieldwork will inevitably augment this provisional list as well as delimiting the areas of the river and habitats supporting particular species.

I will be pleased to receive any records which members may have for the northern Wey and also welcome anyone participating in future fieldwork. □

Field Studies Council June Chatfield's Mollusc Course

at Juniper Hall, Dorking, Surrey
Friday 11 October – Sunday 13 October 1996

An introduction to slugs and snails around the classic collecting site at Box Hill. Being on chalk this area has a good range of species, including the Roman Snail. Course fee (residential) £96. Further details and bookings from: The Warden, Juniper Hall Field Centre, Mickleham, Dorking, Surrey RH5 6DA. Tel. 01306 883849

CABINETS FOR SALE

Mary Saul's collection of the mollusca of Sabah has found a permanent home in the Zoological Museum of the Netherlands, and she now has four storage cabinets for disposal. Made from Borneo timber, they are based on Dr R. Tucker Abbott's design as described in his *American Seashells* – dimensions 38 ins high; 24 ins wide; 24 ins deep, each with 9 moveable shelves at 2 1/4 inch intervals. Any offers? She will be in the UK from 26 March at: [REDACTED] Little Malvern, Worcs. [REDACTED] 6LG. Tel. [REDACTED]

Conchological Society of Great Britain and Ireland

MINUTES

1066th (Ordinary) meeting

**held on 21 October 1995 in the Demonstration Room of
the Natural History Museum starting at 2.30 pm**

In the chair: Dr Richard Preece with 36 members and friends present.

Apologies for absence: Mrs McMillan, Mr and Mrs Rands, Mrs Fogan, Mr Dance, Mrs Light, Dr Kerney, Dr Colville, Dr Willing, Mr Negus, Mr de Bartolomé, Mrs Long.

Minutes of the last meeting (of 20 May 1995): Read and accepted.

Matters arising: None.

Nomination and election of new members: 11 full members:

- Dr S. Kosuge, Institute of Malacology, Tokyo, 6-36 Midoricho 3 chome, Tanashi City, Tokyo 188, Japan.
- Mr L.H.R. Hamblin, [REDACTED] Romford, Essex [REDACTED]
- Mrs G. Evans, [REDACTED] Nantgaru, Mid Glamorgan [REDACTED]
- Dr J. Otero-Schmitt, Avenida de las Ciencias S/W, Santiago De Compostela, 15706, Spain.
- Dr G. Faci, [REDACTED] Zaragoza, 50006, Spain.
- Dr W.O.C. Symondson, School of Pure & Applied Biology, University of Wales College of Cardiff, PO Box 915, Cardiff CF1 3TL.
- Mr J. Hunnisett, [REDACTED] Winfrith, Dorset [REDACTED]
- Dr J.A. Gibson, [REDACTED] Kilbarchan, Renfrewshire [REDACTED]
- Mr J.R. Tuck, [REDACTED] Truro, Cornwall [REDACTED]
- Dr T. Cossignani, Malacologia, Via Adriatica Nord 240, Cupra Marittima, 63012, Italy.
- Mr R. Araujo, Museo Nacional de Ciencias Naturales, José Gutiérrez Abascal, 2, 28006, Madrid, Spain.

Announcements and correspondence:

Dr Preece announced that the papers from last year's Malacological Pioneers conference has now been published in *Archives of Natural History* 22:3. A copy was available to view.

Lecture of the day:

Speaker: Robert Chandler (Riddlesdown High School)

Title of talk: *The ammonites of the Bradford Abbas Fossil Bed of Dorset.*

Any other business: There was a sale of books.

Meeting closed at 5.00 pm.

Chairman.

Appendix: Members' exhibits

- Mr R. Chandler Ammonites from the Bradford Abbas Fossil Bed
- Mr F. Pinn Conchology in *Gentleman's Magazine* of 1755.
- Mrs C. Street Some interesting specimens from Gott Bay, Tiree, Hebrides
- Miss J. Sawyer Three shells from the shore of the Dead Sea
- Mr K. Brown 1. Book: *Seashells of Brazil* by E. Rios, 2nd revised edition, 1994
 2. Book: *Coastal Brazilian Seashells* by E. Rios
 3. Brazilian shells for comparison
 4. Press cuttings
- Ms J. Reynolds 1. Miscellaneous Institutional Members' publications
 2. *Achatina fulica* – free to any members who want them.



1067th (Ordinary) meeting

held on 18 November 1995 in the Demonstration Room of the Natural History Museum starting at 2.30 pm

In the chair: Dr Richard Preece with 30 members and friends present.

Apologies for absence: Miss Hill, Mr Boyce, Miss Sawyer, Mrs McMillan, Mr & Mrs Rands, Mr Negus, Mrs Fogan, Mr Philp, Mr de Bartolomé, Mrs Long, Dr Oliver, Mr Tracey.

Minutes of the last meeting (of 21 October 1995): Read and accepted.

Matters arising: Volume 22 part 3 of the *Archives of Natural History* is available by post from the Society for the History of Natural History, c/o Natural History Museum, Cromwell Road, London SW7 5BD at a cost of £8.

Nomination and election of new members: 2 student members:

- Mr N. Dulvy, Population Biology Sector, University of East Anglia, Norwich NR4 7TJ.
- Mr Y. Beneat, [REDACTED] Concarneau, 29900, France.

Announcements and correspondence:

A notice for the 1996 Paris shell show, and a letter from an Australian collector offering shell exchanges for European species were put on display for any interested members to take details.

Lecture of the day:

Speaker: Dr Peter Tattersfield (Chapel-en-le-Frith)

Title of talk: *Patterns of non-marine molluscan diversity in East Africa.*

Any other business:

There were still some places at the Molluscan Workshop on 25 November.

Meeting closed at 4.35 pm.

Chairman

Appendix: Members' exhibits

- Dr E.O. Bishop Sexual dimorphism and regional subspeciation in the genus *Lambis*
- Mr C.P. Palmer Larval shells of *Gryphaea*, Lower Jurassic
- Mrs J.M. Light Non-marine mapping schemes in the Pyrenees and Switzerland
- Mr K. Brown
 1. *Gibbus lyonetianus* (Pallas 1774) – endemic Mauritian land snail
 2. Book: C. Michel, *Marine Molluscs of Mauritius*
 3. Book: J. Drivas & M. Jay – *Coquillages de la Réunion et de l'île Maurice*
 4. Variation in *Conus eburneus*
 5. 'Bubbles' assorted shelled Opisthobranchs
 6. Book: D. Bosch, S.P. Dance, R.G. Moolenbeek & P.G. Oliver, *Seashells of Eastern Arabia*
- Dr M. Willing *Cepaea* fridge magnets
- Ms J. Reynolds
 1. Institutional Members' publications
 2. Conchological Society Posters – free!
 3. *Achatina fulica* – free!



The Editor wishes to apologise to any members who had to pay excess postage on their last issue of the Newsletter. This problem has now been resolved.

Diary of Meetings

Conch. Soc. Field Meetings for 1996 are listed separately.

Wednesday 20 March 1996, Milton Keynes: Malac. Soc. of London Annual meeting and AGM. Microevolution. The Open University, Milton Keynes. Contact: Dr Peter Skelton, Earth Sciences, Open University, Milton Keynes MK7 6AA, Tel. (01908) 653325.

Saturday 23 March, London: Conch. Soc. indoor meeting. Annual General Meeting. Presidential address, Richard Preece: The Mollusca of the Pitcairn Islands: Ancient and Modern. The Natural History Museum at 14.30.

Saturday 13 April, Leeds: Yorks. Conch. Soc. field meeting. Kirkstall Valley nature reserve and canal. Meet at Armley Mills car park, SE 257357 at 11.00. Contact: David Lindley, Tel. [REDACTED]

Saturday 4 May, London: Conch. Soc. indoor meeting. Dave Aldridge (University of Cambridge). Bitterling: Fish with Mussels. The Natural History Museum at 14.30.

Saturday 11 May, Wharfedale, Yorks.: Yorks. Conch. Soc. field meeting. Birks Wood and Buckden Gill. Meet at the National Park car park, SD 942774 at 11.00.

Friday 17 to Sunday 19 May: Mollusc course at Flatford Mill Field Centre, Suffolk. Tutor: Ian Killeen. Life on the Seashore. Further details from Flatford Mill Field Centre, East Bergholt, Colchester CO7 6UL. Tel. (01206) 298283.

Saturday 15 June, Ampleforth, Yorks.: Yorks. Conch. Soc. field meeting. Ampleforth Lakes. Meet at the public house in the village, SE 5878 at 11.00.

Saturday 27 July, Malham: Yorks. Conch. Soc. field meeting. Darnbrook Farm, near Malham. Meet at the National Trust offices, SD 887673 at 11.00.

Saturday 17 August, Godalming: Conch. Soc. Slug Workshop.

Saturday 7 September, East Yorkshire: Yorks. Conch. Soc. field meeting. Great Givendale, E. Yorks. Meet at the chapel, SE 813539 at 11.00.

Saturday 28 September, London: Conch. Soc. indoor meeting. Justin Gerlach (University of Oxford): The Land Shells of the Seychelles. The Natural History Museum at 14.30.

Saturday 5 October, Nidderdale: Yorks. Conch. Soc. field meeting. Mid-Nidderdale. Meet at bridge over the River Nidd, SE 286596 at 11.00.

Friday 11 to Sunday 13 October: Mollusc course at Flatford Mill Field Centre, Suffolk. Tutor: Ian Killeen. Life on the Seashore. Further details from Flatford Mill Field Centre, East Bergholt, Colchester CO7 6UL. Tel. (01206) 298283.

Friday 11 to Sunday 13 October: Mollusc course at Juniper Hall Field Centre. Tutor: June Chatfield. Slugs and snails around Box Hill. Further details from Juniper Hall Field Centre, Mickleham, Dorking, Surrey RH5 6DA. Tel. (01306) 883849.

Saturday 26 October, Leeds: Yorks. Conch. Soc. Annual General Meeting. Leeds City Museum at 13.00.

Saturday 9 November, London: Conch. Soc. indoor meeting. Emily Glover (Institute of Archaeology, London). Molluscs and Man in the Arabian Peninsula. The Natural History Museum at 14.30.

Saturday 30 November, Woking: Conch. Soc. Molluscan Workshop.

Saturday 14 December, London: Conch. Soc. indoor meeting. Christine Street (Barking). Islands and Shell-sand. The Natural History Museum at 14.30. □

Life on the Seashore

**A weekend field study course to be held
at Flatford Mill Field Centre**

on 17-19 May or 11-13 October 1996

Tutor: Ian Killeen

Full details from: Edward Jackson, Director, Field Studies Council,
Flatford Mill Field Centre, East Bergholt, Colchester CO7 6UL.

Tel. (01206) 298283

Malta Land Snails

A new monograph *The non-marine molluscs of the Maltese Islands* by F. Giusti, G. Manganelli and P.J. Schembri has been published in 1995 by the Museo Regionale di Scienze Naturali, Via Giolitti, 36-10123 Torino, Italy. The price of Monografie XV is L. 130,000.

Field Meetings 1996

Hon. Programme Secretary:

Ian Killeen

Felixstowe, Suffolk, [REDACTED]

Tel. [REDACTED]

Important

*Please remember to inform
the leader if you are attending
a field meeting.*

Saturday 20 & Sunday 21 April

ISLE OF WIGHT

Leader: Bill Pocock ([REDACTED])

As last year, the first field trip of the year will concentrate on Tertiary Fossils. Over the two days we will visit various locations covering as wide a range as possible of the Oligocene beds. A mainly molluscan fauna, fossils are plentiful and well-preserved. A wide range of species occur from beds which range from freshwater (with land species) through brackish to full marine. By Oligocene times evolution was almost up to date and many of the species are very recognisable. *Helix*, *Viviparus* and *Theodoxus* are three genera that come to mind, the last with colour preserved. Of obvious interest to the palaeontologist, cliff exposures will give interest to the marine enthusiast and the rough limestone based nature of many of the exposures will provide land snail collecting opportunities.

So something for everyone. Interested? If so, give me a ring and I will let you have more details of ferry times, accommodation and the itinerary. The weekend will be organised so that members can join and leave to suit.

Saturday 25 May

TILFORD AREA, SURREY

Leader: Jan Light ([REDACTED])

Further recording in the Wey valley to provide data for the Surrey non-marine mollusc atlas. It is hoped to examine four or five squares from Elstead to the confluence of the North and South branches of the River Wey above Tilford. Recording at the 1995 field meeting downstream at Godalming resulted in the discovery of *Vertigo moulinsiana* in the riverside fens.

Meet at the Woolpack public house on Elstead village green (Map Reference SU907437) at 10.30 am. Bring a picnic lunch. Telephone the leader in good time if you will need meeting at a railway station.

**Saturday 29 June – Saturday 6 July
BRITTANY, FRANCE.**

Leader: Ian Killeen ()

A week long meeting to provide data for the DOMMIC Channel Atlas project (see leaflet sent with this Newsletter for background information). It is the intention to systematically record up to a dozen shores along part of the coast between St Brieuc to west of Roscoff, although at the time of writing (4 January) the main area is yet to be decided. Sites will include a range of habitats: extensive rocky shores with weedy lagoons, mixed muddy gravel shores and long sandy bays with potentially rich strandlines. A preliminary recording trip in 1995 provided exceptionally rich lists with several species rarely found on the English side of the Channel.

The leader will not be arranging the accommodation for all those attending, although we may be renting a house which could be used as a meeting point and communal laboratory. There is a wide range of accommodation available in this part of Brittany including good Chambres d'Hôte (B&B). It is suggested that the party stays in the same area and all those hoping to attend should contact the leader without delay for further information **before** making accommodation arrangements.

Provisional dates

27 July – NORFOLK: Freshwater recording.

Please note that the telephone number given on the programme card is incorrect. The leader, Derek Howlett, may be contacted on ()

31 August and 1 September – SOMERSET:
Non-marine recording.

19 October – LONDON: Non-marine recording.

James Eddowes Cooper 1864–1952

J.E. Cooper, a past President of the Conchological Society (1932), is to be featured in a display at the new Herne Bay Museum in Kent. Cooper retired to Herne Bay and made an extensive collection of the local fossils, many of which he donated to the Herne Bay Museum.

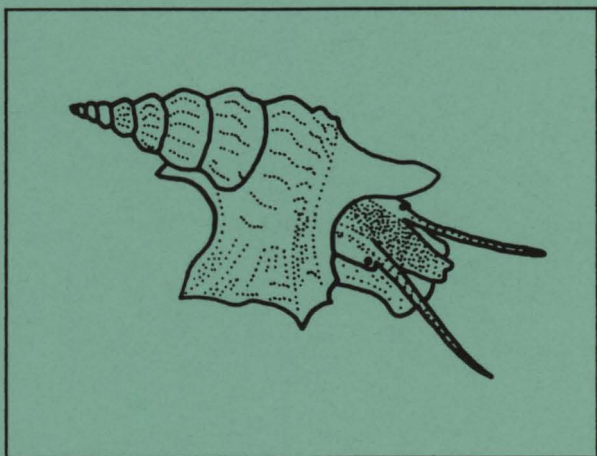
Anyone with letters, papers, memories or, in particular, photographs of Cooper is requested to contact Ralph Anderson, Assistant Curator at Canterbury Museums, High Street, Canterbury, Kent CT1 2JE, Tel. (01227) 452747.

The Conchologists' Newsletter

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In Fowler's footsteps: Field meeting to south-west Cornwall, 12–16 July 1995

Jan Marissa Light

██████████ Godalming, Surrey ██████████ and

Stella Maris Turk

██████████, Camborne, Cornwall ██████████

It is our impression – and correct us if we are wrong – that the field meeting that we led this summer was the first that the Society has held in Cornwall although the Porcupine Society organised field work in Cornwall in 1984 and 1992 and recorded many molluscs. This is surprising since the county has a long and current history of interest and visits by many members of the Conchological Society. The attractive shores with highly diverse flora and fauna have been a focus for marine biologists, and the richness of the shell-sand which can be collected from certain favoured localities will yield a species list that rapidly climbs into three figures and provides the shell collector with well-preserved material to sort through the cold months of the year when venturing onto the shore is a less inviting prospect.

The conchologist most usually associated with Cornwall is T.G.W. Fowler. He was an enthusiastic and exhaustive collector specialising in the larger marine species of this country. Indeed, he was particularly drawn to outsize specimens and had examples of many species on the British list. His collecting involved numerous dredging trips and he went to all the localities which are now regarded as classic sites for conchologists to visit. Prior to his death in 1967, most of his Mollusca collection went to the Natural History Museum in London and this contained many specimens collected from Cornwall. From Fowler's publication list (McMillan, 1968) it is clear that he published very little but the majority of the 10 papers concern Cornish molluscan finds. He lived in Cornwall for many years and was domiciled at Sennen when he died. Some of Fowler's records are in the Reports of A.P. Gardiner who was Marine Recorder (1931 until his death in 1951). Gardiner also lived in Cornwall for a time: he taught biology and chemistry at Falmouth between 1906 and 1912 and made subsequent visits. Many Cornish records, mainly from 'APG', are to be found in the Conchological Society's Census notebooks.

Referring to Falmouth and Helford, Gardiner (1934) observes that *'These Cornish beaches were not what they were 30 years ago when I worked them year in and year out for 6 years. During the War an oil tank ship went on the rocks and was burnt there. For some years the flora and fauna were wiped out. In 1931 life was nearly but not quite normal near the site of the disaster. Gillan Creek, towards the mouth of the Helford River, might at one time have served as the happy hunting ground of good biologists – its fauna was ruined in one night by a drift of oil from a wreck on the Eddystone.'*

Ronald Winckworth was the first Marine Recorder (1924–1931) and he recorded in Devon and Cornwall when he spent a year as Assistant Naturalist at the Marine Biological Association Laboratory just after the First World War (Ellis, 1951). Every one of the other Recorders has visited Cornwall, and one (SMT) has lived in West Cornwall all her life.

The aim of our July field trip was to record from several shores along the south coast with the dual purpose of obtaining updated data for the Channel Atlas and adding to the already full lists of molluscs present, especially the smaller species often overlooked by non-specialist and specialist alike.

On the evening of the 11th, a preliminary introductory meeting took place at the Institute of Cornish Studies' Cornish Biological Records Unit (CBRU) near Camborne where final decisions about which shores to visit were made. Plans for a dredging trip were set in motion. As a result a selection of shores to take account of differing substrate types, degree of aspect/exposure and location in terms of the Channel Atlas mapping units was chosen. During the five days, 12 shores were visited either by the group as a whole or by subgroups or individuals and a dredging trip took place on Friday morning. Paul Gainey from CBRU joined us on some of the shores. Three other shores were investigated immediately prior to the meeting.

Marazion – SW 516302

The first site chosen was the extensive sandy and rocky shore east of Penzance which affords access by way of a causeway to St Michael's Mount. This shore was surveyed by a group of Porcupine Society members in the autumn of 1992 when a range of habitats including rock, concrete, exposed and sheltered sands, algal and *Zostera* beds was sampled. One of us (JML) was on that trip and

remembering the extensive and mature community which had developed on the eastern side of the causeway, I was baffled and disappointed to find that parts of it had disappeared to be replaced by a blanket of sand with a few rock outcrops projecting like small islands above the sand and shallow water. Working such shore as was left, which consisted of the weedy boulder shore which fringes the north-east foot of St Michael's Mount, I came upon evidence of habitat destruction and consequent mortality. Many boulders had evidently been moved or blanketed with sand and were showing early signs of re-orientation and regrowth of the encrusting hard and soft organisms which provide the food of so many of the less familiar species which contribute to lengthy species lists; *Trivia*, *Lamellaria*, opisthobranchs. Such echinoids as were found were all juveniles. Occasional patches of fresh *Zostera* proved to be rooted over an anoxic layer of sand and decaying foliage from the previous generation. A feature I remembered from the 1992 visit was the ubiquity of adults of *Turbonilla lactea* on the undersides of the rocks. Fewer were found this time. Notwithstanding the apparent decline in the condition of the site, a long list of molluscs was recorded, and the reader is referred to Bamber (1992) for a more complete list of species for the site. Such a dramatic change at Marazion served to highlight the fact that despite the conservation and protection measures that are commonly advocated and practised by Conservation bodies and local groups around the British Isles, the ill-directed bulk transport of sediment by a winter storm can seriously disrupt (albeit probably temporarily) a hitherto stable and well-developed intertidal community.

SMT comments that Cornish beaches are particularly prone to great movements of sand on – and indeed off – shores. However, some of the observed disturbance on this occasion could be due to the recent work of South West Water which has been involved in a giant scheme to re-direct all the sewage which has hitherto been discharged into the rather closed system of Mount's Bay, to St Ives Bay on the north coast.

Turnaware Point – SW836383

At the point where the River Fal feeds into the Carrick Roads there is a narrowing of the waterway and at spring tide low water a bar extends across from the east bank towards the west side and then curves north thus forming a narrow rapids system as the river

empties at low tide. Shallow tidal marine rapids are often associated with rich habitats and this is a site which traditionally has yielded an interesting list of marine invertebrates since at low tide it provides a relatively flat extensive area of mixed shore of mud, muddy sand, gravel and embedded cobbles and rocks. The shore was worked on a falling tide. The pulmonates *Ovatella myosotis* and *Leucophytia bidentata* were found living in their textbook zones on the shore and an assemblage of molluscs representing the combination of shore types was found within the relatively small area. Notably, live *Ostrea edulis* was ubiquitous although we were warned by the local harbourmaster not to take them for food because of red tides. It was disappointing that the tide did not ebb to its full extent, partly as a result of the south-westerly wind. The full extent of Turnaware bar was not revealed and this is certainly a shore which would warrant another visit when an excellent low tide is predicted. In addition to records obtained in the field, sample of sponge, weeds and epifauna attached to submerged rocks yielded a further 15 small species.

In order to avoid the loss of a daily shore site, a dredging trip was planned for Friday morning. This involved an early start for some of the party in order to be on Falmouth Quay at 6.45 am for a trip which would last for the morning. Sadly a much anticipated event was disappointing in its results. We had hoped to sample, amongst others, the *Zostera* beds and maerl gravels, but the equipment failed to collect sediment but succeeded in netting large quantities of weed including kelp. Undeterred we vigorously washed the weeds in buckets of seawater on board and sieved the resultant solutions. Although these samples did yield several molluscan species the long list of sublittoral species that we had hoped for did not materialise. It does, however, highlight the importance of working what little is available.

Helford River – SW757268 (Helford Passage) and SW 793273 (Prisk Cove)

On Friday afternoon the party divided into two. Led by Ian Killeen one group explored the gravel and sandy shore on the north bank of the Helford River. JML led a second group to Prisk Cove which is a rocky shore at the Helford River entrance, south-west of Rosemullion Head. Smaller groups looked at other localities in the area and those who had not joined the dredging trip visited shores elsewhere in Cornwall.

The Helford Passage group found an extensive shore comprising mainly muddy gravels and a few stones colonised by weeds, sponges, etc. The only rocky outcrops were confined to the upper shore. Despite its unenticing appearance a long and diverse list of living animals was obtained including bifaunal bivalves, e.g. razors and *Lutraria lutraria* as well as small gastropods, pyramidellids, and pulmonates.

Parking cars at Mawnan Church, Prisk Cove is accessed by a scramble down a steep wooded bank which gives way to a cliff of rock and loose scree allowing access to a rocky shore backed by large fallen blocks and boulders. Rounding a small headland a wide platform of channels and pools running parallel to the sea is created by the dip of the Middle Devonian strata. Within this reef system an area of coarse shell sand creates a shallow lagoon at low tide. The rare chiton, *Leptochiton scabridus* was found on the underside of partially embedded boulders in its classic habitat (Light & Baxter, 1990). Because of the tight timetable within which we were operating (to accommodate dredging) we did not have much time left to work this shore. The weed malacofauna was rich and included *Jordaniella nivosa* and it is definitely a site worth further study.

Helford Passage and Prisk Cove, with Men-aver (see below) lie within the Helford Voluntary Marine Conservation Area for which scientific data is constantly being gathered. Over the years a total of 280 mollusc species has been found in the River, on- and offshore (Turk & Tompsett, 1993). The discovery of *Leptochiton scabridus* at Prisk Cove is an addition to this list, and no doubt others will be new or updated when all the material has been examined. The only authentic Cornish record of *L. scabridus* is from Falmouth in 1934 (Fowler, 1939), later described by Gardiner (1941) who says that Fowler's specimens were '*nearly at extreme low tide under stones as big as a coal scuttle and covered with a rust-like deposit*' – whether the deposit was on the stones or the molluscs is not clear. At Prisk Cove the rocks were indeed large and the undersides covered with rust deposit. The chitons themselves tend to collect black deposits of manganese or iron.

**The Lizard – SW737165 (Kennack)
and SW701114 (Vellan Drang)**

Two sites were worked by the group. Kennack Sands and Caeveracks Reef is a site on the south-east side of the Lizard

which is easily accessible and provides habitat for sand and rock communities. The shore is backed by caves, and diligent searching by some members yielded live animals of *Otina ovata*.

Vellan Drang consists of a platform of Precambrian metamorphic rocks including the famous Lizard serpentinite. The site was chosen as a representative shore within its Channel Atlas unit and with its exposed aspect, this most southerly point of the British Isles mainland might have yielded a relatively low diversity list of molluscs especially as neighbouring Kynance Cove had been inspected earlier in the week as a potential excursion site. The site revealed an extensive complex of reefs, pools, large boulders, gulleys and so on, thus providing a great range of habitats, although the extent of the shore meant that only a small area could be sampled. Not unsurprisingly the site was exceptionally rich in its malacofauna with 56 species recorded alive.

Men-aver Beach – SW797249

On the last day we amalgamated to work one of Fowler's favoured sites. Situated on the south side of the Helford River, the beach forms a small bay west of and sheltered by Nare Point. The same Devonian rocks encountered at Prisk Cove here provide a series of dipping ledges and overhangs which produce numerous sheltered runnels and pools and crevices. Larger shallow pools which remain permanently submerged at a high level on the shore have infralittoral character. Large numbers of *Leptochiton scabridus* were seen especially between the muddy laminae of the slaty rocks. Using a technique of on-site weedwashing and rock-brushing into large buckets, an excellent list of molluscs was obtained including *Thracia distorta* and *Rostanga rubra*. The style of rock outcrop also provides caves at a favourable position on the shore for the development of an idiosyncratic cave malacofauna. Whilst the tide completed its ebb, some members made a preliminary search of these caves but, hampered by darkness, postponed a full search until after tide-turn by which time stalwart members of the group had returned to their cars to round up torches. Hopeful of finding living animals of *Paludinella littorina*, during the last hour six pairs of eyes scanned the walls of the caves looking in areas where the right combination of height in relation to HWM, moisture, fissility, and crust/film algal development occurred. *Ovatella myosotis* was seen crawling openly on the rock surface, and at a height some 30 cm below, specimens of *Otina ovata*

crawled along lines of fissure. In caves in Pembrokeshire *Paludinella littorina* colonies living in apparently identical habitats have recently been found (Killeen & Light, 1994). The species remained elusive at Men-aver and, being late in the afternoon of the last day of an energetic field trip, the hunt was abandoned – for the time being!

At the time of writing full site lists have not been completed. Several participants took samples from weed and rockwashings to sort at home and the results of these will be integrated into full lists which can be obtained by interested members from JML for the cost of photocopying. We would like to thank all those who worked hard to contribute records.

References

- Bamber, R.N.**, 1992. PORCUPINE autumn field trips to Marazion/St Michael's Mount and Castle Beach, Falmouth. *Porcupine Newsletter* 5(6): 117–124.
- Ellis, A.E.**, 1951. Obituary: R. Winckworth, 1884–1950. *J. Conch., Lond.*, **23**: 157–162.
- Fowler, T.G.W.**, 1939. Abnormal *Acanthochitona crinita* Pennant. *J. Conch., Lond.*, **21**: 141.
- Gardiner, A.P.**, 1934. The littoral zone. *J. Conch., Lond.*, **20**: 65–76
- Gardiner, A.P.**, 1941. Marine Recorder's Report. *J. Conch., Lond.*, **21**: 254–255.
- Killeen, I.J. & Light, J.M.**, 1994. A survey of the marine prosobranch mollusc *Paludinella littorina* on the Pembrokeshire coast. CCW Science Report no. 62, Countryside Commission for Wales, Bangor.
- Light, J.M. & Baxter, J.M.**, 1990. *Leptochiton scabridus* (Jeffreys, 1880) – a live record from County Donegal, Ireland. *J. Conch., Lond.*, **33**: 318–9.
- McMillan, N.F.**, 1968. Obituary: Thomas George William Fowler, 1880–1967. *J. Conch., Lond.*, **26**: 333.
- Turk, S.M. & Thompsett, P.E.**, 1993. *Studies on marine life of the Helford River* No. 3. A list of invertebrates and fishes recorded from the Helford River. Report to the Helford Voluntary Marine Advisory Group.

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Collectors in East Africa

No. 24: E.A. Mearns (1856–1916)

B. Verdcourt

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Edgar Alexander Mearns, a great field naturalist who also described over 150 new birds was born at Highland Falls, New York State on 11 September 1856, the son of a Scot, Alexander Mearns and Nancy Mearns (née Carswell). His preliminary education was at the local Donald Highland Institute. His interest in natural history developed early and as early as 1875 he was in correspondence with several European collectors from whom he obtained many specimens. He began a survey of mammals and birds of the Hudson Highlands. Studying medicine at the College of Physicians and Surgeons (later to become Colombia University) he obtained his doctorate in medicine in 1881. He applied to join the army and after passing the Army Medical Examining Board examination had a good deal of time in hand before he received his commission when he entered as a First Lieutenant Assistant Surgeon on 3 December 1883; by the time of his death he held the rank of Lieutenant Colonel, Medical Corps. He went to New York in October and worked in the American Museum of Natural History. He had already earlier in the year presented them with a series of skins and eggs of North American and European birds. In the short time available to him he named, labelled and catalogued the quite considerable European bird collection at the Museum. His entry into the army curtailed his ambitious project on the Hudson Highlands; what was to be a complete survey of the Vertebrates was a restricted report on the birds alone, based on material he had found himself about his home, published in 1878.

During his army career he travelled a great deal often to places of his own choosing and wherever he went he made time to engage in field survey work. At his first posting, Fort Verde in a desolate and arid part of Arizona, he displayed another interest. He excavated the ruins of an ancient American civilisation in the vicinity and rescued thousands of relics from oblivion and wrote an article on 'Ancient dwellings of the Rio Verde Valley' published in *Popular Science Monthly* for October 1890. Minnesota followed, then a period acting as a surgeon to the Mexican United States

International Boundary Commission at El Paso (1892-4) during which he recorded mammals which resulted in a publication *Mammals of the Mexican border of the United States*. Virginia and Texas were next until the outbreak of the Spanish American War in 1898. This resulted from disturbances in Cuba and the blowing up of the battleship *Maine* in Havana harbour. The Americans occupied Cuba and the Philippine Islands; under the peace treaty in 1899 Puerto Rico and the Philippines came under American control and Cuba became independent. Mearns served as a Brigade Major in Cuba and later organised the hospital camp at Chattanooga. His time at Fort Yellowstone was rewarding and resulted in valuable collections. Then followed two tours of duty in the Philippines, 1903-4 and 1905-7. He never wasted a moment of his time and it comes as no surprise to learn that on his way to the Philippines on his second tour he had a few hours on Guam on 20 July 1905 and managed to collect 23 species of birds among other things. Whilst in the Philippines he managed to get attached to any punitive expedition which was being launched against the Moro tribes. A story is told that on one of these he shot a rare parrot which fell into a Moro compound; Mearns climbed over the stockade and retrieved it under what was understatedly described as 'difficulties'! He was at this time in a poor state of health.

He was later stationed at Fort Totten NY in 1902 and in 1909 invited to join the Smithsonian African Expedition of that year led by Col. Theodore Roosevelt (1858-1919) who had become the 26th President of the United States from 1901-1909. For this expedition Mearns was retired from active service on 1 January 1909 'assigned to active duty by his consent' and ordered to 'report in person to the President of the United States for duty.' After travelling over much of Kenya including Mt Kenya the expedition went to the Lado Enclave and down the White Nile to the coast. Mearns collected land snails during this expedition which of course was chiefly after big game and birds for the American museums. His activity during this expedition won for him from the local natives the title 'the man who never sleeps' (something like *mtu asiyelala* I imagine!) and Roosevelt stated he was by far the best shot of the party (bird collectors usually are). William Healey Dall (1845-1927) wrote a short account of what he considered were new land snail species (Dall, 1910) and stated '[the species] were chiefly of the characteristic East African types, *Limicolaria* and the

like which take a good deal of careful study to work out'. A proposed general report on the collection seems never to have appeared and the collection may still be unnamed. Later Mearns joined the Frick expedition in 1911 which started from Djibouti thence to Dire Dawa, Addis Abeba, Lake Abaya, Galla country, Lake Stephanie, S. Lake Rudolf and Nairobi; he collected 5,000 birds on this expedition and an extensive series of small mammals.

As if birds and mammals were not enough Mearns made huge collections of plants and his name is well known to anyone working on African plants, the epithet *mearnsii* being not infrequent. He collected plants wherever he went and at the time of his death, Miller of the United States National Museum writing in the *Dictionary of American Biography* (12:483) stated his contributions to the National Herbarium were greater than of any other man. Add this to the 7,000 mammals, 20,000 birds, 5,000 reptiles, 5,000 fishes and heaven knows how many invertebrates it is obvious his contributions to the Museum were enormous. He had been elected a patron of the Museum in 1890.

He wrote about 125 scientific and popular papers and books, the first being published in 1878 concerning the capture of several rare birds near West Point NY. One obituary writer emphasises that his great field activity actually prevented him from publishing more scientific work and that his greatest contribution was providing future workers with adequate material on which to work. Most of his life he was of course not close to adequate collections and libraries needed for systematic work. At the time of his death he was in the middle of working up his large African collections and vast masses of notes from the Philippines were still unpublished.

He married Ellen Wittich and they had a son and a daughter; the son, a gifted astronomer, died of diphtheria in 1912 at the age of 26.

He died in Washington DC on 1 November 1916 from diabetes in his 61st year. Sir F. Banting's cure for the disease with insulin was some six years in the future. He was not buried at Arlington National Cemetery but his wishes were respected. His ashes were kept in the National Museum for some time then buried at the base of a boulder on Plummer's Island in the Potomac River with a tablet to his memory on a nearby tree.

His name is commemorated in *Mearnsia* Merr. (= *Metrosideros* Banks ex Gaertner) (Myrtaceae), *Mearnsia* a swift from Mindanao and *Mearnsella* a genus of fishes from the same island. He was a member of the Linnaean Society of New York, a founder member of the American Ornithologists' Union (in October 1883) and of the National Geographic Society. Colleagues stressed his pleasant personality, that he was never heard to criticise others and was much liked by other fellow officers and his men.

Once again I am indebted to Carol Gokce of the British Museum (Nat. Hist.) Library for leading me to sources of information I would never have otherwise discovered.

***List of Molluscs described from material collected by
Edgar Alexander Mearns in Kenya***

Buliminus mearnsii Dall, 1910. Kenya, southern part of N'Guaso (=Eusso) Nyiro (USNM 214 299, syntypes). *Cerastua bambuseti* (von Mts.).

Buliminus roosevelti Dall, 1910. Kenya, Mt Kenia (=Kenya), 2400–3150 m. (USNM 214300, syntypes (also material at Berlin, British Museum (Nat. Hist.), Hebrew University Jerusalem, National Museum, Nairobi)). *Cerastua roosevelti* (Dall).

Limicolaria catharia Dall, 1910. Uganda Railway, Kapiti Plains* [=Kenya, Machakos/Masai Districts, c 1°40'S, 37°00'E] (USNM 214301 syntypes). *Limicolaria martensiana catharia* Dall.

References

Anon, 1917. *Am. Mus. J.* 17:78 (in Museum Notes).

Brodhead, M.J., 1991. Of mice and mastodons: contributions to the literature of mammology by officers and men of the United States Army in the nineteenth century. *Arch. nat. Hist.* 18(3): 363–374.

Dall, W.H., 1910. New landshells from the Smithsonian African Expedition. *Smithson. misc. Collns.* 56, No. 10: 3 pp. (1910).

Hume, E.E., 1942. *Ornithologists of the United States Army Medical Corps*. Chapter XX: 295–323. Baltimore.

Phillips, A.R., 1940. Edgar Alexander Mearns (1856–1916), Pioneer Northern Arizona Naturalist. *Plateau* 13(1): 1–5.

Richmond, C.W., 1918. In memoriam: Edgar Alexander Mearns. *Auk* 35: 1–18. (Reprinted in Rep. Smithson. Instn. for 1917: 649–662 (1919)).

Slater, W.L., 1917. Obituary. Edgar Alexander Mearns. *Ibis* 10th Ser. 5: 250–251. □

* These are the plains which straddle the railway near Stony Athi before reaching the Athi Plains further west.

Woodland molluscs and coppicing

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The purpose of this article is to consider the effect of coppicing on the terrestrial molluscan fauna of woodlands. Coppicing is a practice which has long been considered to be beneficial to wildlife but recently this viewpoint has been called into question (Hambler & Speight, 1995; Fuller & Warren, 1995; Whitbread & Jenman, 1995). However, its influence on molluscs, if any, appears to have been little studied.

Also during recent times, a major conservation charity has been advocating a widespread reinstatement of coppicing regimes, especially in southern England (anon., 1995; 1995–96), claiming that one of the benefits would be to provide timber for charcoal production, thereby reducing pressure on tropical forests as a source of barbecue fuel for the British market. Given the potential grant aid available and the recent upsurge of interest in rural crafts, the proposed extensive reinstatement of coppicing might well occur in the future. Consequently it is reasonable to ask whether the practice is entirely favourable for wildlife.

One argument often used in favour of coppicing is that it is traditional and that species have come to depend upon it. However, although this harvesting technique has been in operation for centuries, the time span involved is very unlikely to have been long enough for such dependence to evolve; rather, some types of animal and plant simply have been able to exploit the conditions provided. There are undoubtedly some species which are winners in this situation but the question remains as to how many, perhaps less obvious ones, are losers. Does coppicing really enhance overall diversity or not? Claiming that the practice is traditional and that wildlife has existed alongside it for centuries simply avoids the question.

Another reason why coppice woodland may be looked upon favourably is that in many regions of England nearly all ancient woodland show signs of regular coppicing in the past (ancient often being defined as in continuous existence since at least 1600 AD but in practice many such woods are far older). Hence in these areas, subjective comparisons with respect to biodiversity might be made between old coppiced woodland and secondary woods of

much more recent origin. Clearly, for the present purpose, comparison should be between coppiced and uncoppiced ancient woodlands, even if in some parts of Britain the latter are very scarce.

The general appeal of coppice woodland doubtless stems from its open nature which allows sunlight to penetrate so that in the first few years after cutting, the woodland floor often becomes carpeted with swathes of attractive flowering plants. Some butterfly species also benefit from the increase in available radiant energy, for example the Wood White *Leptidea sinapis* (Hall, 1981), and as the coppice stools regenerate songbirds are provided with more potential nesting sites. Hence this type of habitat can have considerable aesthetic appeal. However, as pointed out by Hambler & Speight (1995), the question to be asked is whether a few kinds of flowering plant, butterfly and bird provide a fair indication of the requirements of many thousands of other species known to inhabit deciduous woodland, notably fungi, non-flowering plants and invertebrates. In short, what is good for a handful of species may not necessarily be beneficial for all. Thus, even among butterflies it appears that coppicing can be detrimental to some species, for example the Black Hairstreak *Strymonidia pruni* and White Admiral *Ladoga camilla* (Hall, 1981). Evidence suggests that coppicing is, on balance, damaging to woodland spiders and moths (Stirling & Hambler, 1988; Waring, 1988). Many moisture-dependent plants, notably mosses, liverworts and lichens, cannot survive the sudden drying out of their environment wrought by this practice (Rose, 1976).

Regarding molluscs, there appear to have been only two studies which considered the effects of coppicing. Berry (1973) investigated the molluscan fauna of Ham Street Woods in Kent and noted in passing that, '*cutting and the associated disturbance of the substrate eliminate Mollusca almost completely*' but that '*dense coppice stands of a single tree species are, in any event, host to few snails*'. No specific data are provided to justify these statements but they illustrate the important point that in considering the effect of coppicing on any species or higher taxonomic group there are essentially two aspects involved. Firstly there is the short term effect of one coppicing event and secondly the much longer term consequence of rotational coppicing of a whole woodland. If, as Berry suggests for some Mollusca, a species is eliminated by a single cutting, then what is critically important is the rate at which it can recolonise the coppiced site from adjacent uncut areas. If it is unable to do so with sufficient rapidity then inevitably it will be exterminated by rotational cutting in the longer term. The second

of the two statements made by Berry suggests that in Ham Street Wood at least, long term coppicing might have been detrimental to terrestrial molluscs. The only species of note recorded by Berry was the slug *Limax cinereoniger*, which is considered to be characteristic of old, undisturbed woodland (Kerney & Cameron, 1979; Kerney & Stubbs, 1980) but it is not stated whether this species occurred in the coppice plots or elsewhere in Ham Street Woods.

In a study of Hayley Wood, Cambridgeshire, Paul (1978a) carried out surveys of eight plots at various times following cutting. This work indicated that the species living in the wood at the time did survive specific coppicing events quite well. *Deroceras reticulatum* and *Cepaea nemoralis* were apparently more common in the recently coppiced plots than elsewhere, perhaps a consequence of the additional shelter provided by the resultant dense layer of ground vegetation. In the short term at least, in Hayley Wood there was no evidence to suggest that any species was adversely affected by coppicing, findings which seemingly contradict those of Berry noted above. However, these two studies may not be comparable because the time interval between cutting and the carrying out of survey work may have differed. Also, the extent of disturbance to the ground layer, due to clearance and general tidying up, may not have been the same at the two sites.

Hayley Wood was coppiced, quite possibly for a thousand years, until early in the twentieth century when the practice ceased. It was then reintroduced on a small scale from 1963. Paul (1978a, 1978b) recorded 31 species from the whole wood and 26 from the post-1963 coppice plots. Significantly, none of these are species considered by Kerney & Stubbs (1980) to be characteristic of ancient woodland. These characteristic species are: *Acicula fusca*, *Vertigo substriata*, *Leiostryla anglica*, *Spermodea lamellata*, *Ena montana*, *Phenocolimax major*, *Limax cinereoniger*, *Limax tenellus* and *Zenobiella subrufescens*. Of these, Kerney (1966) stated that *A. fusca*, *S. lamellata*, *E. montana* and *L. tenellus* are normally easily exterminated by disturbance of their habitats. *L. cinereoniger* is also considered to be intolerant of disturbance (Kerney & Cameron, 1979). It is highly probable that climatic factors play a significant role in determining the distribution of several of these species in Britain but *A. fusca*, *V. substriata*, *L. anglica*, *S. lamellata* and *E. montana* at least, were more widespread in the south during the Flandrian period (Kerney, 1976). Hence it is possible that their absence from many ancient woodlands, such as Ham Street and Hayley Woods, may be a consequence of the severe, periodic disturbance caused by coppicing.

In contrast to many of the ancient woodlands in southern

England, those in other parts of the country, for example along the coast of north-east Yorkshire, do not show signs of regular coppicing in the past (Cooke, 1987). Some of the latter clothe steep-sided valleys and would have been unsuitable for timber extraction in days gone by. Several of these ancient woodlands contain a molluscan fauna which is both species rich and of high quality (Wardhaugh, 1996 and in press). With up to 40 terrestrial species present they are among the richest documented woodlands in the country and in some, *V. substriata*, *L. anglica*, *S. lamellata*, *L. cinereoniger* and *Z. subrufescens* are not uncommon, with *A. fusca* known at two sites. Of these, all except *L. cinereoniger* and *A. fusca* have a distinct northern or northern and western distribution suggesting the need for a maritime climate yet the north-east Yorkshire woodlands under consideration, although near the sea, are in an area with the lowest mean annual rainfall in Britain. It is therefore possible that lack of disturbance, for example by coppicing, may have been a significant factor influencing their survival to the present day.

It would appear that for a fair appraisal of the effects of coppicing on woodland Mollusca, much more investigation is required. To this end, the author would welcome any comment or further information regarding the idea expressed above.

References

- anon., 1995. Trees for the wood. *Lifelines* (WWF), autumn 1995, p. 3.
- anon., 1995-96. Charcoal production is just the job. *WWF News*, winter 1995-6, pp. 8-9.
- Berry, F.G., 1973. Patterns of snail distribution at Ham Street Woods National Nature Reserve, east Kent. *J. Conch., Lond.*, **28**: 23-36.
- Cooke, R., 1987. *Cleveland Inventory of Ancient Woodland (Provisional)*. Nature Conservancy Council (now English Nature), Peterborough.
- Fuller, R.J., & Warren, M., 1995. Management for biodiversity in British woodland, striking a balance. *British Wildlife* **7**: 26-37.
- Hall, M.L., 1981. Butterfly research in ITE. Institute of Terrestrial Ecology, Abbots Ripton, Huntingdon.
- Hamblen, C. & Speight, M.R., 1995. Biodiversity conservation in Britain: science replacing tradition. *British Wildlife* **6**: 137-147.
- Kerney, M.P., 1966. Snails and man in Britain. *J. Conch., Lond.*, **26**: 3-14.
- Kerney, M.P., 1976. *Atlas of the non-marine Mollusca of the British Isles*. Institute of Terrestrial Ecology, Cambridge.

- Kerney, M.P. & Cameron, R.A.D.**, 1979. *A Field Guide to the Land Snails of Britain and North-West Europe*. Collins, London.
- Kerney, M.P. & Stubbs, A.**, 1980. *The Conservation of Snails, Slugs and Freshwater Mussels*. Nature Conservancy Council (now English Nature), Peterborough.
- Paul, C.R.C.**, 1978a. The ecology of Mollusca in ancient woodland. 2. Analysis of distribution and experiments in Hayley Wood, Cambridgeshire. *J. Conch., Lond.*, **29**: 281–294.
- Paul, C.R.C.**, 1978b. The ecology of Mollusca in ancient woodland. 3. Frequency of occurrence in west Cambridgeshire woodlands. *J. Conch., Lond.*, **29**: 295–300.
- Rose, F.**, 1976. Lichenological indicators of age and environmental continuity in woodland. In: *Lichenology: progress and problems. Systematics Association Special Volume 8*. (Edited by Brown, D.H., Hawksworth, D.L. & Bailey, R.H.), 279–307. Academic Press, London.
- Stirling, P.H. & Hambler, C.**, 1988. Coppicing for conservation: do hazel communities benefit? In: *Woodland conservation and research in the clay vale of Oxfordshire and Buckinghamshire. Research and Survey in Nature Conservation*, **15** (Edited by Kirby, K.J. & Wright, F.J.), 69–80. Nature Conservancy Council (now English Nature), Peterborough.
- Wardhaugh, A.A.**, 1996. The terrestrial molluscan fauna of some woodlands in north-east Yorkshire, England. *J. Conch., Lond.*, **35**: 313–327.
- Wardhaugh, A.A.**, in press. The terrestrial molluscan fauna of some woodlands in north-east Yorkshire, England: a framework for quality scoring and association with old woodland flora.
- Waring, P.**, 1988. Responses of moth populations to coppicing and the planting of conifers. In: *Woodland conservation and research in the clay vale of Oxfordshire and Buckinghamshire. Research and Survey in Nature Conservation*, **15** (Edited by Kirby, K.J. & Wright, F.J.), 82–94. Nature Conservancy Council (now English Nature), Peterborough.
- Whitbread, A. & Jenman, W.**, 1995. A natural method of conserving biodiversity in Britain. *British Wildlife* **7**: 84–93.

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Biodiversity Challenge: an agenda for conservation in the UK (second edition)

A brief summary of this landmark in biodiversity conservation.

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The term biodiversity is currently an oft-used 'buzz word', but what does it mean? Biodiversity clearly relates to the variety of life, but can be more fully explained by considering it to encompass species variety, genetic variation within a species and ecosystem variation.

In 1992 the UK Government attended the United Nations Conference on Environment and Development in Rio de Janeiro, the so called 'Earth Summit'. As a part of the output from this summit the UK Government, together with another 152 countries, signed the Convention on Biological Diversity. This required each signatory to, 'develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity'.

In December 1993 the voluntary conservation sector led by a group of six bodies (including the RSPB, the World Wide Fund for Nature, Plantlife, Friends of the Earth, Butterfly Conservation and the Royal Society for Nature Conservation, together with endorsements and contributions from a wide range of smaller organisations including the Conchological Society) produced a first edition of *The Biodiversity Challenge*. This set out a systematic approach to the conservation of UK biodiversity. In early 1994, the Government published its own, much vaguer first response to the Rio commitments in the form of *Biodiversity: the U.K. Action Plan*.

The second enlarged and refined version of *The Biodiversity Challenge* was launched in early 1995 as a practical vision for the implementation of the UK Action Plan. *The Biodiversity Challenge (second edition)* adopts a straightforward overall aim: to look searchingly at the current state of UK biodiversity and to set out a clear vision for the future. This document provides an audit of UK biodiversity and proposes objectives and detailed targets for both species and habitats. The report argues that for ultimate success, conservation objectives and targets must be built into all aspects of Government policy and action.

The overall goal of *The Biodiversity Challenge* is, 'to conserve and enhance biological diversity within the UK and to contribute to the conservation of global biodiversity through all available mechanisms'. The main objectives set out to:

- maintain and enhance populations and natural ranges
- conserve internationally important species and habitats
- conserve threatened species and habitats
- conserve species and habitats characteristic of local areas
- restore degraded ecosystems of importance
- maintain genetic variation.

It is stated that species and habitat targets should be realistic, time linked, and qualitative and quantitative. The establishment of priorities is stressed in order to direct limited resources effectively. The various species Red Data Books (RDB) already produced or in preparation, are seen as a useful guide to locate many of the priority species. It is pointed out that there is also an urgent need for an RDB for habitats. Species targets are produced for the following categories:

- those endemic to the UK
- threatened with global extinction
- where the UK holds an important international population
- rare or localised species
- species that have recently become extinct.

Habitats qualifying for targets include those:

- that support priority species
- where the UK holds an important global proportion
- that are rapidly declining in area or quality
- that are of limited area
- that are listed under Annex 1 of the EU Habitats and Species Directive.

The Biodiversity Challenge sets out to provide a synthesis of the actions needed to achieve its goal. It presents a call to harness the expertise that exists in the UK in order to improve a situation that is seen as, 'prejudiced by inadequate monitoring, incomplete and outdated reviews of status and insufficient knowledge to reverse the declines of many species and habitats'.

An important and central feature of *The Biodiversity Challenge*, is the appreciation that, 'in order to achieve sustainable

development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it'. It is therefore seen as vital to make biodiversity objectives integral components of planning and practice in the economy for activities such as agriculture, forestry, transport, energy generation, water supply, manufacturing and coastal and marine exploitation. In other words, biodiversity needs to become part of 'the weft and weave' of all aspects of the life of the country. To this end environmental education is also recognised as being vital for the long term success and effectiveness of an ongoing national biodiversity policy.

The Biodiversity Challenge does not shy away from the cost implications of its proposals. It is perhaps surprising that in many cases the implementation of biodiversity plans cost very little or even show an economic return when all benefits of operating sustainable economic policies are taken into consideration.

The bulk of the second *Biodiversity Challenge* consists of appendices. The first section outlines details of species and habitats of conservation concern or interest. These include:

- **UK species of international importance:** This is not intended to be a comprehensive list. Of the three invertebrates included one, *Leioscyla anglica*, is a mollusc. The UK and Ireland have majority of the world total of this species.
- **Declining UK Species:** This section includes 133 species, four of which, *Helicigona lapicida*, *Monacha cartusiana*, *Myxas glutinosa* and *Segmentina nitida*, are molluscs.
- **Localised UK Species:** No molluscs are listed in this category although candidate species such as *Lauria sempronii* do exist.
- **Rare UK Species:** One mollusc, *Myxas glutinosa*, is mentioned in this section.
- **Species that have become extinct in the UK this century:** No molluscs are mentioned.

A second appendix section concerns proposed target species and habitats.

- The species section includes 600 targets including 40 Mollusca. These are: *Anisus vorticulus*, *Ashfordia granulata*, *Catinella arenaria*, *Cerastoderma glaucum*, *Clausilia dubia*, *Ena montana*, *Helicella itala*, *Helicodonta obvoluta*, *Helix pomatia*,

Hydrobia neglecta, *Hydrobia ventrosa*, *Lauria sempronii*, *Leiostyla anglica*, *Limax tenellus*, *Lymnaea glabra*, *Margaritifera margaritifera*, *Margaritifera auricularia*, *Modiolus modiolus*, *Myxas glutinosa*, *Nucella lapillus*, *Ostrea edulis*, *Oxyloma sarsi*, *Pisidium conventus*, *Pisidium pseudosphaerium*, *Pisidium tenuilineatum*, *Pseudamnicola confusa*, *Pseudanodonta complanata*, *Segmentina nitida*, *Sphaerium solidum*, *Tenellia adspersa*, *Truncatellina callicratis*, *Truncatellina cylindrica*, *Valvata macrostoma*, *Vertigo alpestris*, *Vertigo angustior*, *Vertigo genesii*, *Vertigo geyeri*, *Vertigo hillebrandi*, *Vertigo modesta*, *Vertigo moulinsiana*.

- The habitats section outlines 26 main habitat types including targets for: ancient broadleaf woodland, arable, broadleaf and conifer plantation, Caledonian pinewoods, caves and mines, coastal lagoons, dunes and dune slacks, hard rock cliffs, intertidal flats, limestone pavement, four types of lowland grassland (calcareous, calcifugous, neutral and wet), lowland heathland, upland heathland, lowland raised bogs, machair, montane, open waters, rivers/streams, saltmarsh, shingle, soft rock cliffs, swamp, fen and carr, wood pastures and parks.

Each habitat target is laid out to include targets, important sites, threats, and threatened and important species supported by that habitat.

The Biodiversity Challenge concludes with sample action plans. There are 44 species action plans including 8 for Mollusca. These include plans for *Catinella arenaria*, *Margaritifera auricularia*, *Margaritifera margaritifera*, *Myxas glutinosa*, *Pseudanodonta complanata*, *Vertigo geyeri*, *Vertigo genesii* and *Vertigo angustior*. Each plan is composed of a statement giving details of current status, main threats, objectives, broad policies and proposed actions.

Habitats are represented by summary action plans for six priority habitats. These include Caledonian pinewoods, estuaries, lowland heathland, lowland raised bogs, lowland wet grassland and rivers and streams. Each habitat plan includes targets, threats, audit actions, priorities, monitoring and research, safeguards and site management, physical planning and land-use regulation, economic instruments and decision making, awareness and education.

The Conchological Society is fortunate to have been involved in the production of both editions of *The Biodiversity Challenge*. We have outlined general statements in relation to the whole document, made changes to the species target list and written the eight molluscan species action plans.

At the end of 1995 the Government published its second biodiversity contributions in the form of *Biodiversity: The UK Steering Group Report (vols 1 & 2)*. These will be described and discussed in the following *Conchologists' Newsletter*. It is encouraging to see that the Government has adopted much of the approach and content of the second edition of *The Biodiversity Challenge*, even using versions of many of the original species action plans for molluscs.



Terrestrial Invertebrate Taxon Advisory Group Mollusc Sub Group Meeting, 30 January 1996

Ms J.E. Reynolds

London

The inaugural meeting of this group was held at the Natural History Museum on 30 January 1996. The participants were Dave Clarke (Zoological Society of London), Fred Naggs (Natural History Museum), Mary Seddon (National Museum of Wales), Martin Drake (English Nature), Alan Gardner (Britsnail Ltd), Warren Spencer (Bristol Zoo), Pat Wisniewski (Martin Mere Wetland & Wildfowl Trust) and Jackie Pedley and myself from the Conchological Society of Great Britain & Ireland. Apologies were received from Paul Pearce-Kelly (ZSL), Les Noble (Edinburgh University), Andrew Cunningham (Veterinary Invertebrate Group), Elizabeth Platts (Malacological Society), David Briarley (CSGBI) and Martin Willing (CSGBI).

The Terrestrial Invertebrate Taxon Advisory Group (TITAG) is part of the Federation of Zoos of Great Britain & Northern Ireland. The Mollusc Sub Group is a new specialist division, established to promote and coordinate display, captive breeding and conservation of terrestrial molluscs. Members will primarily include zoos or zoological collections who are already members of the Federation of Zoos but also any serious breeders of slugs and snails, conservation bodies and Societies involved with Mollusca. This was reflected by the range of invited participants, who included a commercial snail (Escargot) farmer/advisor, Museum curators, Society and conservation body representatives and professional and amateur breeders. The group is expected to remain as a small core of people initially, meeting about once per year and producing an annual report. It will provide a source for exchange of information about captive breeding, which in turn can enhance overall knowledge of molluscan biology and increase public awareness of the subject.

Once introductions were over, Dave Clarke distributed copies of the Owl TAG leaflet as a discussion document. It was agreed that a similar leaflet should be produced, stating objectives for the Mollusc Sub Group, but these had first to be established. The main aims were agreed as follows:

- to promote and encourage cooperative breeding programmes
- to study and improve husbandry methods
- to advise zoos on suitable taxa for display and how to maintain them
- to educate the public
- to liaise with bodies involved in the study, conservation and captive breeding of Mollusca

In order to meet these aims a list of recommended publications and guidelines for identification, keeping and breeding giant African land snails (*Achatina fulica*) were considered priority objectives. Later objectives include the introduction of studbooks and participation memos.

Members of the group exchanged lists of which taxa they kept. Jackie Pedley had more species (24 then, but she acquired two more by the time she went back to Staffordshire) than anyone else present except the Invertebrate Conservation Centre at London Zoo. She does have more genera than they do as their collection is dominated by *Partula*. The discussion then turned to breeding programmes, which was the chief topic of the day. Apart from the obvious fact of that all those present kept slugs and snails, breeding programmes were considered especially important for other reasons. Very little is known about the biology of many species, for example, age span, breeding cycle, food preferences, and breeding programmes could answer many questions. Candidate species for programmes could therefore include not just those that are obviously endangered, but also those for which biological information is lacking. As a by-product more material could be made available for genetic analysis, useful in turn in conservation, especially in cases of isolated populations, for example.

There was much general discussion amongst the group about which species would make suitable candidates for programmes. Suggestions included *Geomalacus maculosus* (already kept in captivity by some group members) and many of the species which are included in *The Biodiversity Challenge* action plans (thanks to the sterling efforts of our Hon. Conservation Officer, Dr Martin Willing). It was not without significance that many of the species concerned are rare on the worldwide scale, but with the majority of the population in Britain, i.e. near endemics (e.g. *Lauria sempronii* 80% in GB, *Leiostyla anglica* 75% in GB), as this new group is UK

centred. Other suitable candidates included groups where the taxonomic status needs to be resolved, such as anomalous populations of *Trichia* in Devon. The conservation of subspecies or morphological varieties was considered as low priority. Species endangered at a higher taxon level (as in the example of Partulidae where the entire family is at least at risk) were considered highest priority for captive breeding. Using outdoor enclosures and habitat re-creation was also considered to be an option, particularly in the case of Martin Mere Wetland & Wildfowl Trust, for many British species. This could provide for those species that have very specific habitat requirements, such as *Catinella arenaria* which is limited to calcareous fens. Such sites could accommodate a number of species and it was felt that a link with the Aquatic Invertebrate Taxon Advisory Group (AITAG) would be beneficial. The small size of many British species was felt to limit their use for display purposes in zoos. This obstacle could be overcome by the use of macroscopes and other equipment such as that used for ants. Keeping several small British species can also help reflect the zoos' conservation aims and be a useful tool for displaying biodiversity.

Tropical species were then discussed, including the *Partula* programme, and other Polynesian snails. Giant African land snails were also considered particularly important, as most zoos and other institutions that keep snails for display have these, often with minimal knowledge. As explained earlier, an advice leaflet on this subject was considered a big priority objective for the group. Mr Gardner has much experience in this area, and has developed diets for these snails and for other (Escargot) snails, including different formulae for size or breeding. For experienced breeders a useful introduction to displays would be *Archachatina bicarinata*, the type of the genus. It is threatened in the wild by the spread of *Achatina fulica*, so is in need of conservation as well as being interesting because it has a sinistral shell. Discussion centred on the relative merits of breeding for display or for conservation. All agreed that species fulfilling both criteria would be best, as these could act as 'flagships' for other endangered molluscs. The Florida tree snail *Liguus* was thought to be suitable on these counts, and for research into *Euglandina*, which is also native to this area. It was thought that there might be difficulty in obtaining specimens. Other suitable species were island endemics, for example *Leptaxis*

undata from Madeira, *Hemicycla* from the Canaries and *Succinea sainthelena*. *Corilla* snails from Sri Lanka are threatened by possible deforestation. *Parmocella* and *Ariolimax columbianus* (banana) slugs were also considered, their size and colour making them interesting subjects for animal handling sessions by zoo keepers.

Mary Seddon spoke about the forthcoming IUCN Red Data list. She distributed data on the revised criteria for categories of vulnerability. She explained in more detail some of the changes to categories, e.g. 'extinct in the wild' for *Partula* instead of 'extinct', and new categories such as 'data deficient'. Previously the list had centred on Europe and the Americas, but now aims to be more global with the inclusion of Africa, Asia and other areas where there are known to be interesting or geographically isolated species. In total some 14,000 species of mollusc are included. A two-way link will enable TITAG Sub Group to prioritise species and provide information for the Red Data Book.

The formal session of the meeting ended by agreeing priorities and setting a date for the next meeting. The priorities were to:

- draw up a leaflet
- make a list of 'info bites' to enhance displays
- make a list of recommended publications
- produce a giant African land snail leaflet
- link with AITAG.

The next meeting will be at the Molluscan Conservation Conference at the National Museum of Wales in November. □

Twelfth International Malacological Congress, 3–8 September 1995

David Long

Cheltenham

This very successful congress was organised by Angel Guerra and Francisco Rocha of the Instituto de Investigaciones Marinas, Vigo, on behalf of Unitas Malacologia and under the auspices of the Consejo Superior de Investigaciones Cientificas, the Cephalopod International Advisory Council and the Sociedad Española de Malacologia. It was held at Vigo, an important fishing port and industrial centre on the classical ria (drowned estuary) coastline of north-east Spain near the border with Portugal.

Based at the Cultural Centre of the Caixavigo and the adjacent Casa des Artes do Concello de Vigo, the Congress was attended by over 400 delegates from 57 countries.

After registration on 3 September, the Congress was in session on 4, 5, 7 and 8 September with one day, Wednesday 6th, set aside for official excursions. An immense amount of ground was covered in 5 symposia, 3 free lectures and 4 workshops. These ranged over all Classes of Mollusca, the marine, freshwater and land environments, evolution and the fossil record, phylogeny and systematics, medical and applied malacology, the functional morphology of Cephalopods, endemism in the marine realm, and data bases. Nearly 250 Congress posters were displayed in the Casa des Artes. This venue also served as the coffee break centre and the place where national malacological societies, and others, set out their stalls – the Conchological Society and the Museum of Wales among them.

The formal opening on the 4th was followed by a keynote address from Winston Ponder (Australian Museum, Sydney) in which he urged malacologists to become wider in their perspectives, so that malacology would achieve higher visibility in science in general. Ways to do this included showing how studying molluscs is relevant to current issues of global concern, and more use of non-specialist journals for publishing results, thus reaching those who did not generally read exclusively malacological periodicals.

There was a good Conchological Society presence – those

attending included Helena Chesney, Barry and Anne Colville, David Heppell, Ian Killeen, Jan Light, Graham Oliver, Elizabeth Platts, Richard Preece and myself – and the Malacological Society and Museum of Wales were well represented. Richard spoke (Holocene molluscan successions from two tufa sequences in northern France) as did Graham (Endemism in the Arabian Sea); Elizabeth was a joint organiser of the data base workshop, and Ian (distribution and ecology of *Paludinella*) and Jan (mapping marine molluscs of the English channel) exhibited posters.

The mid-week excursions, organised by Viajes Atlantico, Santiago were to Santiago de Compostela and to the Mino region, including one to a Celtic villages. As these coincided with the tail end of a hurricane getting to the eastern side of the Atlantic a third excursion, to the Cies islands, could not take place. Both trips catered for conventional sightseeing, provided a very relaxing lunch, and allowed opportunities to search for non-marine molluscs. These were enthusiastically taken up, at least in the Santiago excursion, by Conchological Society members and Japanese delegates. One interesting find was *Zonitoides excavatus*, found by Richard Preece, accompanying *Balea perversa* and other molluscs in the acid woodland of a large estate between Santiago and Vigo.

There was a busy social programme in the evenings which included receptions by the Sociedad Española de Malacología and the Mayor of Vigo, the latter at Castrelo, a very beautiful classical guitar concert by David Russell and a really memorable congress dinner at the Parado Conde de Gondomar, Baiona on the 8th. I now know what seafood really is!

My overall impression was of a continuing diverse and energetic science, not at the same point of progress in every country. Many current studies, such as those on how pollution affects mollusca, medical and applied malacology, and malacology applied to food production, clearly have implications much wider than mollusca. And malacology continues to be important in such studies as palaeontology, phylogeny, ecology and biodiversity.

Good progress was made on determining the way ahead, in terms of data base control and harmonisation, for the Check List of European Marine Mollusca (CLEMAM), including the development of a common format with the MALACOLOG database of Western Atlantic marine gastropods. Gary Rosenberg (US) is to act as editor-in-chief for the CLEMAM/MALACOLOG

project, with Serge Gofas (France) as taxonomic editor of the European list. It was hoped the same approach could also be adopted for, for example, European non-marine molluscs or groups of western Palearctic land molluscs.

But perhaps the most important feature of the congress was not the formal programme, but the opportunity to meet other malacologists, often from far distant countries, over coffee or a beer, and at meals. There is nothing like putting a face to a name and finding out what we have in common.

The Society's stall did well. This was largely due to the hard work of Helen and Mike Weideli and Ian Killeen in preparing goods and publications, to Graham Oliver's provision of transport, and to the effort put in by those manning the stall, especially Jan Light and Ian Killeen. Many thanks to you all.



British Marine Books

- *The Marine Nature Conservation Review. Rationale and Methods* edited by Keith Hiscock will be published in June and may be ordered from:

Marine Conservation Branch
Joint Nature Conservation Committee
Monkstone House
Peterborough PE1 1JY, UK

- *Coasts and Seas of the United Kingdom*

The JNCC (Joint Nature Conservation Committee) Coastal Directories Projects. A directory of the North Sea Coastal Margin (£45.25), Region 12. Wales: Margam to Little Orme (£78.00), Region 5. North-east England: Berwick-on-Tweed to Filey Bay (£75.00), Region 6. Eastern England: Flamborough Head to Great Yarmouth (£78.00) and Region 13. Northern Irish Sea: Colwyn Bay to Stranraer, including the Isle of Man (£78.00) are available from:

The Natural History Book Service Ltd.
2-3 Wills Road
Totnes, Devon TQ9 5XN, UK.

**Society visit to the British Antarctic Survey,
Madingly and University of Cambridge
Zoological Museum, Downing Street ,
Cambridge on 27 June 1995**

Celia Pain

Rainham, Kent

Nineteen conchologists spent a gripping day in Cambridge last summer, well worth the very early start which some people made.

The first part of the day was at the British Antarctic Survey (BAS). An extensive programme had been arranged for us to cover the morning. To start, there were presentations by the senior scientists on the history and an overview of current research, including geology, atmospheric sciences, hydrology and biology of the Antarctic and its surrounding seas. Naturally we learned a lot about ice, its formation, age and cover of the continent and seas. The BAS has an extensive meteorological and upper atmosphere programme. BAS was the first to discover the hole in the Antarctic ozone layer that is so detrimental to life. BAS scientists continue to monitor this phenomenon from their ground stations and upper atmosphere measurements.

There are three biological programmes: (1) The Pelagic Ecosystems Studies runs a ship-based research programme which investigates most components of the Southern Ocean food web, concentrating on how the different organisms are related to one another; (2) Higher Predator Studies undertakes research on birds and seals at the bases on Bird and Signy Islands, investigating physiology, behaviour and population biology; (3) Ecological and Physiological Adaptations examines how plants and animals are adapted to the Antarctic marine environment; most of the work is carried out at Signy and Cambridge.

After coffee, when there was a chance to talk to the scientists, look at poster displays and to obtain publication, the group was divided into two for a tour of BAS. This included the laboratories, scanning electron microscope, stores and the aquarium. I think everyone found the aquarium the most thrilling part of the day's activities. To have a live four-inch seal slater walking around your hand or ice fish attacking your fingers was the highlight of the tour. As the aquarium is kept around freezing most of us donned

jumpers as well as the obligatory laboratory coats. Physiological and behavioural work is carried out at this temperature because this is the temperature at which the creatures normally live. We saw several fish including ice fish and Antarctic cod and a variety of invertebrates. The most striking thing about the invertebrates is that many of them are gigantic. This includes a very large pink sea anemone, a pycnogonid (sea spider) *Decalopoda australis*, an isopod (sea slater) *Glyptonotus antarcticus*, and an oval bivalve, *Lanternula elliptica*. The limpet *Nacella cocinna* and the brachipod *Liothrella uva* were not particularly large. The *Nacella* is common throughout the Antarctic and exhibits morphological changes with depth. Those living near the shore, form *polaris*, are taller, ribless and relatively heavy, whereas those from deeper water, form *concinna*, are flatter, thinner with ribs. A discussion about gigantism reached no conclusion!

We were all intrigued and impressed with the stores from which the needs of scientists living in the Antarctic are supplied. Different layers of clothes in umpteen sizes to ensure survival in the intense cold, food, medicines, transport such as Sno-cats and scientific equipment for use on shore and on the two BAS survey vessels.

We left at lunch time, a group of very impressed conchologists. Our thanks are due to the staff of the BAS and Dr Lloyd Peck who made the initial arrangements; we enjoyed it very much, thank you.

After lunch in a pub we went to the centre of Cambridge and visited the Zoology Museum in Downing Street. This is of course a museum for teaching undergraduates so the number of molluscs on display was limited. Most of the party adjourned to the more than adequate supply of bookshops in Cambridge at the end of the afternoon.

□

European Malacological Index 1994-5
Published by Cupra Marittima in Italy
at 20,000 Italian Lira

Kevin Brown
Isleworth, Middlesex

This book can only be described as a curate's egg. It contains much useful information, but is presented in a format which is sometimes difficult to use and is far from comprehensive in coverage.

The first section of the book covers museums and is fairly representative of the book as a whole. There are entries for 34 museums in Italy, 4 in Belgium, 2 each in France, Germany and Holland, and one each in Switzerland, Greece, Cyprus and Austria. There are no entries for any museums in Great Britain, Ireland, Spain, Sweden, Denmark, etc. The length of each entry varies from a simple paragraph giving name and address only to a full page covering name, address, opening hours, public transport, size of public displays and reserve collections, details of important collections incorporated in the museum, publications, museum history and even a photograph of the museum building! Some of these entries appear in English, some in Italian, some in French and one in Dutch. This variation in language, together with the variation in entry length, suggests little editorial oversight. This perhaps explains why there is no logical arrangement of the entries, either alphabetical or by country, forcing the reader to check all the entries, either alphabetical or by country, forcing the reader to check all the entries if looking for a particular museum or for museums in a particular country. It may also explain the inclusion of details of a Dutch magazine in the section on museums!

The second section covers 'Associations, Research Institutes, Magazines, and Books' and here out of the 31 specialist associations of which I am aware within Europe only 13 receive mention, the Suffolk Naturalists' Society being the only British Association mentioned. Coverage of books is similarly very limited.

The third section covers Shell Shows in Europe and is reasonably complete. This is followed by a section entitled 'Photographic Review' which contains passport size photographs of

various European Shell Collectors and Dealers. While this is perhaps interesting I cannot think of any possible reason to refer to the section.

The last section provides contact names and addresses and is conveniently divided into national sections. The lists contain a mix of collectors, dealers, professional scientists, libraries, museums and clubs, but it can be difficult to differentiate between these. It is annoying to note that the various national lists contain details of several museums and associations not covered in the appropriate sections of this book. For example, the Conchological Society of Great Britain and Ireland, the Malacological Society of London and the British Shell Collectors' Club are mentioned in the British section but are not listed under associations. Some 8 out of 45 British entries given contain some inaccuracy in the address and it is worrying that this level of inaccuracy may be continued in other national lists.

This book is issued as an annual publication, and my comments all relate to the 1994/5 edition. It is to be hoped that subsequent editions will benefit from some stronger editing. Even as the book stands it contains much information that will be useful to anyone hoping to link up with some like-minded collectors, or planning a trip in Europe.

□

Conchological Society of Great Britain and Ireland

MINUTES

**1068th (Ordinary) meeting
held on 16 December 1995 in the Demonstration Room of
the Natural History Museum starting at 2.30 pm**

Announcements of deaths: The death of R. Tucker Abbott, member since 1974, was announced.

In the chair: Dr Richard Preece with 32 members and friends present.

Apologies for absence: Mr & Mrs Rands, Mrs McMillan, Mr Crowley, Mrs Light, Mr de Bartolomé, Dr Kerney, Dr Chatfield, Mrs Fogan, Miss Fogan, Dr Rundle, Mr Gillard.

Minutes of the last meeting (of 18 November 1995): Read and accepted.

Matters arising: None.

Nomination and election of new members: Two full members and one student member nominated and elected.

Full: Miss J. Cook, [REDACTED] Rustington, West Sussex [REDACTED], Mr A. Wakefield, [REDACTED] Buckhurst Hill, Essex [REDACTED]

Student: Mr R.A. Meyrick, Dept of Zoology, University of Cambridge, Downing Street, Cambridge CB2 3EJ.

Announcements and correspondence:

The Society display boards were at Portsmouth City Museum of Natural History from 6 December 1995 to 6 January 1996 in conjunction with a shell display of British & Worldwide Marine & Non-marine Shells by Mr Terry Wimbleton. There was also to be a Shell Identification Day on Saturday 6 January, free to all. Dr June Chatfield & Mr Wimbleton would be present to identify shells brought in by members of the public.

Lecture of the day:

Speaker: Chris Meecham (National Museum of Wales)

Title of talk: *The glass menagerie – the work of Leopold & Rudolph Blaschka*

Any other business: A presentation was made to Mr Tom Pain to commemorate his 50th year as a member of the Society.

Meeting closed at 5.05 pm.

Chairman.

Appendix: Members' exhibits

- | | |
|---------------------|---|
| • Mr P.T. Wimbleton | Artefacts in connection with past Society |
| • Mr F. Pinn | Molluscs and their Egg Cases |
| • Mr K. Brown | 1. Book: T. Walker, <i>Stanley Gibbons Collect Shells on Stamps</i> |

- Dr M.J. Willing
- Ms J. Reynolds

2. Book: R.T. Abbott, *American Seashells*
3. Variation in *Thais cingulata*.
Info re: JCCBI forthcoming conference
1. Glass snails
2. Institutional members publications
3. Marzipan snails – 50p each
4. Photos of snails belonging to Miss J. Pedley.



**1069th (Ordinary) meeting
held on 10 February 1996 in the Demonstration Room of
the Natural History Museum starting at 2.30 pm**

Announcement of deaths: Mr Lewis Blaker, member since 1991.

In the chair: Dr Preece with 26 members and friends present.

Apologies for absence: Mr & Mrs Rands, Mrs McMillan, Mr Crowley, Mr de Bartolomé, Rev Long, Dr Colville, Mr Tracey, Dr Chatfield, Mr & Mrs Negus, Dr Kerney, Mr Philp, Dr Oliver.

Minutes of the last meeting (of 16 December 1995): Read and accepted.

Matters arising: Portsmouth Museum had extended their booking for the Society display boards until the end of February. They are expected to be used by Haslemere Museum in April.

Nomination and election of new members: Five full members and three family members were elected:

Full: Dr D. Painter, [redacted] Norwich, Norfolk [redacted], Mr S. Gori, [redacted], 57123 Livorno, Italy; Mr A. Bertrand, Laboratoire Souterrain, CNRS, Moulis 09200, France; Mr J. Ekins, [redacted] Rushden, Northants [redacted], Dr P. Kirby, [redacted] Netherton, Peterborough [redacted]

Family: Mrs C. Buckle, [redacted] Boxmoor, [redacted], Mr P. Anderson/Ms J. Anderson, c/o Corporate Planning, Subic Bay Metropolitan Authority, Administration Building (229), Subic Bay Freeport, Philippines.

Announcements and correspondence:

1. The Museum Municipal do Funchal wish to exchange publications. Any member wishing to do this on an individual basis should contact the Membership Secretary for details.
2. Mrs Rands sends her thanks to members for the card circulated in November.

Lecture of the day:

Speaker: Mr Fred Pinn (London)

Title of talk: *Marine Fieldwork in the Tropics*

Papers to be read: None

Any other business: None

Meeting closed at 4.55 pm.

Chairman

Appendix: Members' exhibits

- Mr P.T. Wimbleton Sub fossil *Cepaea nemoralis* (L. 1758) from Dog's Bay, West Galway, Ireland. Collected by Mr R. Welch 1908.
- Miss S. Davies Juvenile Slugs
- Mr K. Brown 1. Book – *Olive Shells of the World* by R.F. Zeigler & H.C. Porrela
2. Book – *Atlas of the Living Olive Shells of the World* by E.J. Petuch & D.M. Sargent
3. Book – *Revision of the genus Ancilla Lamarck, 1799* by R.N. Kilburn
4. Specimens of *Oliva* and *Ancilla*
5. Book – *Hong Kong Seashells* by J. Orr
6. Book – *The Non-marine Molluscs of the Maltese Islands* by F. Giusti, G. Manganelli & P.J. Schembri
- Dr M.J. Willing Draft of Third Quinquennial Review of Wildlife & Countryside Act 1981
see: 1. Fan mussel p. 32
2. *Catinella arenaria* p. 52
3. Pearl mussel p. 50–51
4. other species p. 102
- Ms J.E. Reynolds Institutional members' publications.



**1070th (Annual General) meeting
held on Saturday 23 March 1996 in the Demonstration Room of
the Natural History Museum starting at 2.30 pm**

In the chair: Dr Preece with 39 members and friends present.

Apologies for absence: Mr Pinn, Mrs McMillan, Mr Dance, Dr Chatfield, Mr de Bartolomé, Mr & Mrs Rands, Rev Long, Mrs Turk, Mr Negus, Mrs Fogan, Miss Fogan, Mr Worth.

Appointment of two scrutineers to count postal votes: Mrs Pain and Mr Long were appointed.

Minutes of the last Annual General Meeting (of 18 March 1995): Read and accepted.

Matters arising: None.

Nomination and election of new members: One full member and one student member nominated and elected:

Full:

- Mr S.O.V. Price, [REDACTED] Wallington, Surrey [REDACTED]

Student:

- Mr C.G. Grimes, [REDACTED] Bath, Avon [REDACTED]

Report of the Council by the Hon. General Secretary: Read and accepted.

Report of the Hon. Treasurer: Read and accepted.

Report of the Hon. Membership Secretary: Read and accepted.

Report of the Hon. Non-Marine Recorder: Read and accepted.

Report of the Hon. Marine Recorder: Read and accepted.

Report of the Hon. Programme Secretary: Read and accepted.

Report of the Hon. Conservation Officer: Read and accepted.

Presidential address:

Dr R.C. Preece

Title of talk: *The Mollusca of the Pitcairn Islands: Ancient & Modern*

Announcements and correspondence:

- Mr Negus sent his thanks for the get well card circulated at the last ordinary meeting.
- Mr Killeen was presented with a book token in recognition of his ten years' service as Hon. Programme Secretary.
- Mr Palmer was presented with a cake to mark his birthday.
- Mr Killeen reminded members who wished to attend the Brittany field meeting that they needed to notify him in advance.

Election of Auditors: Mr N. Light and Mr D. Worth were elected.

Results of the postal ballot: The following were elected:

Officers:

President	Dr R.C. Preece
Hon. General Secretary	Ms J.E. Reynolds
Hon. Membership Secretary/Treasurer	Mr M.D. Weideli
Hon. Editor (<i>Journal</i>)	Dr P.G. Oliver
Hon. <i>Newsletter</i> Editor	Miss R.E. Hill
Hon. Marine Recorder	Mrs J.M. Light
Hon. Non-Marine Recorder	Dr M.P. Kerney
Hon. Programme Secretary	Dr R.C. Honnor
Hon. Conservation Officer	Dr M.J. Willing

Ordinary Council members (to serve a three-year term):

Mr I.J. Killeen	Mrs H.M. Weideli	Ms H.C.G. Chesney
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Any other business: None

Meeting closed at 5.00 pm.

Chairman

Appendix: Members' exhibits.

- Mr P.T. Wimbleton
 1. Holocene sub fossils from Ireland –
Cepaea nemoralis var *majus* – Dog's Bay,
Galway West; var *sinistrum* – Donegal;
var *bandorum* – R. Welch
 2. *Helix aspersa* – scalariform
 3. Sinistral forms
 - *Cernuella virgata* (da Costa 1778)
 - *Helicella itala* (L. 1758)
 - *Cepaea hortensis* (Müller 1774)
- Mrs C. Street Juvenile *Simnia patula* and photography
- Dr R.C. Preece Artefacts, shells and literature about the
Pitcairn Islands
- Mr I.J. Killeen and
Mrs J.M. Light Poster displays
- Dr B. Verdcourt Various cuttings from newspapers and
magazines
- Mr K. Brown
 1. Book – Y. Goto & G. Poppe, *A Listing of
Living Mollusca*
 2. Book – P. Jansen, *Seashells and Central
New South Wales*
 3. Press cuttings
- Dr M.J. Willing Various:
 1. Biodiversity (Steering Group Report)
 2. Newbury Bypass – various cuttings
 3. British Wildlife (our wildlife report)
- Ms J.E. Reynolds
 1. Institutional members' publications and
other items received by the Hon.
Secretary including exchanges etc.
 2. Scrap book
 3. Slug cards for sale (made by Miss J.
Pedley)
 4. Books – *Software Superslug and the
Natty Novelty Knitting* by Joyce Dunbar
- Mr D.C. Long More Abbey Wood Molluscs
- Dr B. Colville *Hemicycla migueli* Groh et al. 1996 and
associated sub fossil shells from Gomera.

□

Diary of Meetings

Conch. Soc. Field Meetings for 1996 are listed separately.

Saturday 15 June, Ampleforth, Yorks.: Yorks. Conch. Soc. field meeting. Ampleforth Lakes. Meet at the public house in the village, SE 5878 at 11.00.

Saturday 27 July, Malham: Yorks. Conch. Soc. field meeting. Darnbrook Farm, near Malham. Meet at the National Trust offices, SD 887673 at 11.00.

Saturday 17 August, Godalming: Conch. Soc. Slug Workshop. See Field Meetings, page 673.

Saturday 7 September, East Yorkshire: Yorks. Conch. Soc. field meeting. Great Givendale, E. Yorks. Meet at the chapel, SE 813539 at 11.00.

Saturday 28 September, London: Conch. Soc. indoor meeting. Justin Gerlach (University of Oxford): The Land Shells of the Seychelles. The Natural History Museum at 14.30.

Saturday 5 October, Nidderdale: Yorks. Conch. Soc. field meeting. Mid-Nidderdale. Meet at bridge over the River Nidd, SE 286596 at 11.00.

Friday 11 to Sunday 13 October: Mollusc course at Flatford Mill Field Centre, Suffolk. Tutor: Ian Killeen. Life on the Seashore. Further details from Flatford Mill Field Centre, East Bergholt, Colchester CO7 6UL. Tel. (01206) 298283.

Friday 11 to Sunday 13 October: Mollusc course at Juniper Hall Field Centre. Tutor: June Chatfield. Slugs and snails around Box Hill. Further details from Juniper Hall Field Centre, Mickleham, Dorking, Surrey RH5 6DA. Tel. (01306) 883849.

Saturday 26 October, Leeds: Yorks. Conch. Soc. Annual General Meeting. Leeds City Museum at 13.00.

Saturday 9 November, London: Conch. Soc. indoor meeting. Emily Glover (Institute of Archaeology, London). Molluscs and Man in the Arabian Peninsula. The Natural History Museum at 14.30.

Wednesday 20 to Friday 22 November: Molluscan Conservation: A Strategy for the 21st Century. Conference to be held at the National Museum of Wales, Cardiff. Further details from Mary Seddon [REDACTED] or Ian Killeen [REDACTED].

Saturday 30 November, Woking: Conch. Soc. Molluscan Workshop.

Saturday 14 December, London: Conch. Soc. indoor meeting. Christine Street (Barking). Islands and Shell-sand. The Natural History Museum at 14.30. □

Field Meetings 1996

Hon. Programme Secretary:

Rupert Honnor

Henley-on-Thames

Oxon. RG9 6PJ

Tel. [REDACTED]

Important

Please remember to inform the leader if you are attending a field meeting.

Saturday 29 June – Saturday 6 July

BRITTANY, FRANCE

Leader: Ian Killeen [REDACTED]

A week-long meeting to provide data for the DOMMIC Channel Atlas project. It is the intention to systematically record up to a dozen shores along part of the coast between St Brieuc to west of Roscoff. Sites will include a range of habitats: extensive rocky shores with weedy lagoons, mixed muddy gravel shores and long sandy bays with potentially rich strandlines. A preliminary recording trip in 1995 provided exceptionally rich lists with several species rarely found on the English side of the Channel.

Members intending to attend this field meeting should contact Ian Killeen **IMMEDIATELY**, if they have not already done so!

Saturday 27 July

NORFOLK BROADS NEAR NORWICH

Leader: Derek Howlett [REDACTED]

The meeting will record the rich molluscan fauna to be found in two different fenland sites near Norwich (hopefully including *Anisus vorticulus*). Firstly, in the large dyke systems and small broads accessible (by large punt) from the Wheatfen Nature Reserve, and possibly Rockland Broad itself. Secondly, on foot, around the dykes and drains of Herons Marsh (part of a RSPB reserve). It is expected that both sites should yield some interesting records for aquatic Mollusca. The order of the visits to the two sites will depend on the tidal conditions.

Contact Derek Howlett for further details (leave a message on the answerphone!). Members can be picked up from Norwich railway station by prior arrangement. Accommodation information can be obtained from Norwich Tourist Information (01603 666071).

Meet at the Ted Ellis Trust Wheatfen Nature Reserve, Surlingham (TG325057) at 10 am.

Saturday 31 August and Sunday 1 September

SOMERSET

*Leaders: Colin Gillard [REDACTED]
and Tony Smith [REDACTED]*

We shall visit a range of non-marine sites including drainage ditches where *Valvata macrostomata* has been an outstanding find, woodland, a vulnerable coastal dune strip and calcareous grassland, all being SSSI's. There should also be a slug foray on Friday evening which could be preceded by an optional extra day. All data gathered will make a valuable contribution to the Somerset Mollusc Atlas. Members wishing to attend should contact Colin Gillard for a full itinerary. All sites are within easy reach of Bridgwater.

Tourist Information Centre (Bridgwater: 01278 427652; or alternatively Taunton: 01823 336344).

Initial meeting place on Saturday at ST354271 at 10 am.

Initial meeting place on Sunday at ST296586 at 10 am.

Extra Event

**Saturday 17 August
SLUG WORKSHOP**



A follow-up to the introductory course held in 1994. The tutor will again be Stella Davies and the venue at Jan Light's home in Godalming. It is hoped that by moving the date from spring to summer different species will be mature and available for dissection. There will be a course fee. Members wishing to attend should book up with Dr Rupert Honnor.

Provisional dates

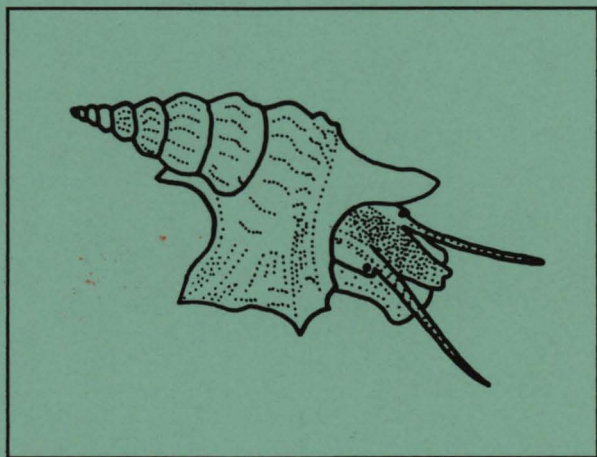
19 October – LONDON: Non-marine recording ☐

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The Mollusca of Ngorongoro, Tanzania

B. Verdcourt

Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AB

Ngorongoro Crater and the Serengeti Plains are essential localities on the itineraries of all tourists visiting East Africa these days since large numbers of animals are still to be found there. In 1964, my wife and I drove across the Serengeti as far as the Kenya border and thus back to Nairobi, camping on the way. We must have seen over a million animals of various sorts and hundreds of thousands passed us each night. There are not so many now of course and such free and easy travelling is almost impossible. Under today's very different conditions most visitors probably will not find many molluscs and a permit is needed for serious collecting. It is no longer possible for a casual tourist to walk about for long distances by themselves as was formerly easy to do. The plains are not suitable for many molluscs but the forests on the crater walls are rich in species.

The Austrian Oscar Baumann (1864–1899) was the first European to see Ngorongoro, on 18 March 1892, and he records '*at noon we suddenly found ourselves on the rim of a sheer cliff and looked down into the oblong bowl of Ngorongoro, the remains of an old crater. Its bottom was grassland, alive with a great number of game; the western part was occupied by a small lake*' (translation, see Organ and Fosbrooke 1963). It is possible that even the coastal tribes and Arabs did not know of the existence of Ngorongoro since all were terrified of the Masai. Baumann collected some snails in the area and these were written up by R. Sturany (1867–1935) who was in charge of Mollusca at the Vienna museum. Baumann later became Austro-Hungarian Consul in Zanzibar.

Ngorongoro is a caldera situated at 3° 15' S, 35° 30' E. The rim averages about 2280 m (7600 ft) and the floor 1680 m (5600 ft) above sea-level. With a floor area of about 102 square miles it is one of the largest calderas in the world. Other volcanic peaks surrounding it are impressive with six exceeding 3000 m (10,000 ft). In 1963 there were some 350 square miles of forest in the area, important as a source of water. A simplified map is given in Fig. 1 (taken from Survey of Kenya South Sheet, 1 in 1,000,000 Nairobi, 1961. Crown Copyright).

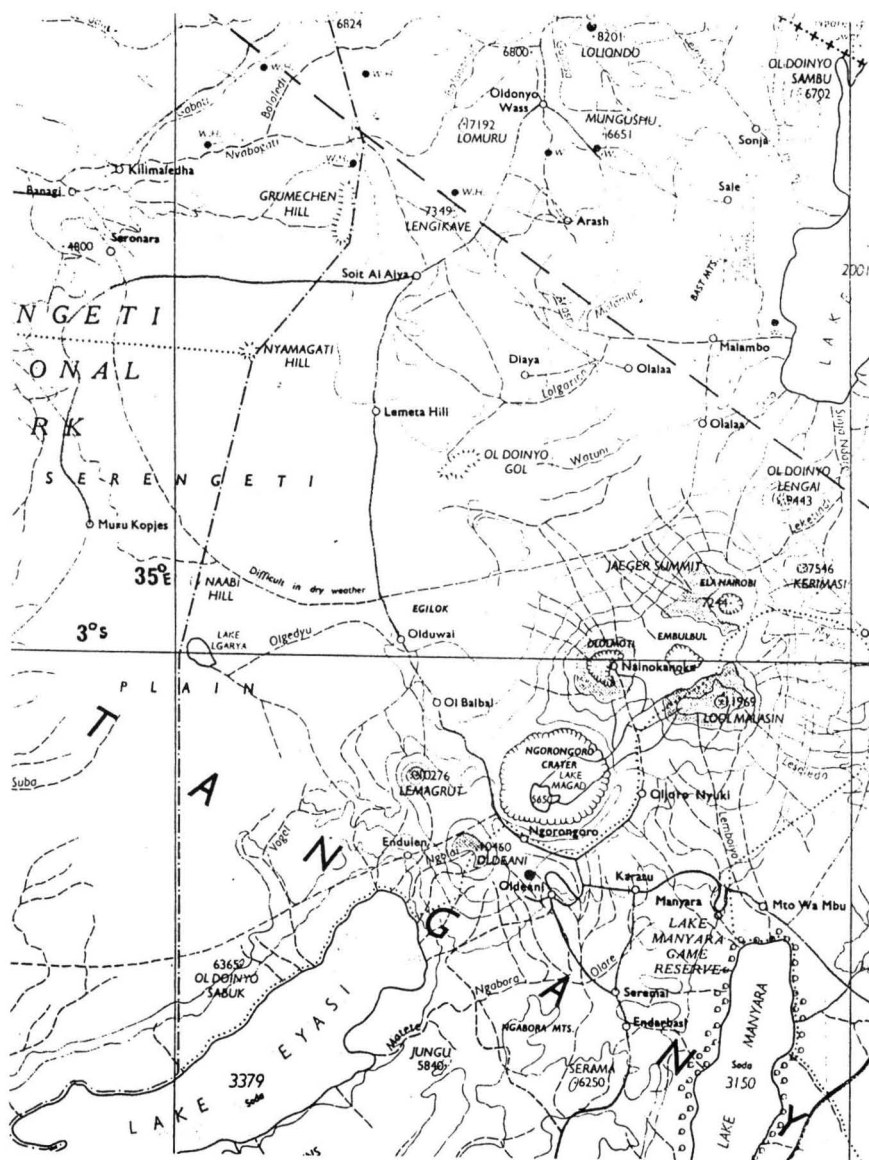


Fig. 1. Map of Ngorongoro Crater, Tanzania

List of taxa recorded from Ngorongoro and vicinity

I have been geographically elastic and included some things from rather further afield. Many cannot at this stage be identified to species being members of groups which need revision. I have not hesitated to list these since future collectors will have some idea what they should look out for and the list is of much more value for zoogeographical conclusions.

Maizaniidae

Maizania marsabitensis Verdc. Ngorongoro Crater rim, 2250 m, 19.iii.1969, Holm 224 (Verdcourt, 1991)

Maizania volkensi (von Mts.). S. Ngorongoro, 1800 m, Kohl-Larsen (Haas, 1936) (material needs reexamining)

Viviparidae

Bellamya unicolor (Oliv.). Lake Manyara, Baumann; Duma R. bed, Greenway (resembling the Lake Albert race *rubicunda*)

Ampullariidae

Pila ovata (Oliv.). Lake Manyara, Baumann; marsh in Hohenlohe Graben, Kohl-Larsen (Haas, 1936 as *Pila gradata*)

Lanistes purpureus (Jonas). Lake Manyara, Baumann (Sturany, 1894, as *L. affinis* var. *manyarana*)

Pomatiasidae

Tropidophora letourneuxi (Bgt.). Ngorongoro Crater, B. Verdcourt

Tropidophora anceps (von Mts.). Lake Manyara, Kohl-Larsen (Haas, 1936)

Planorbidae

Biomphalaria pfeifferi (Krauss). Mbulu, Webb

Biomphalaria sudanica (von Mts.). Lake Manyara, Baumann; A.C. & W.H. van Bruggen (Sturany, 1894 as var. *magna*)

These seem to be the nearest localities for bilharzia vector snails.

Succineidae

Succinea baumanni Sturany. Nyarasa Steppe; Kagera-Nilquellegebiete. Baumann (Sturany, 1894)

Succinea cf. baumanni Sturany. Near Empakaai Crater, Greenway

Succineids are abundant on seasonally wet open ground in many parts of East Africa. Unfortunately extensive spirit material available was never investigated by the reviser of the family. It is likely these species do not belong to *Succinea sensu stricto*.

Pupillidae

Lauria cf. desiderata (Preston). Ngorongoro Crater rim, 2250 m, 19.iii.1969, Holm 224 (Verdcourt, 1986)

Pachnodidae

Edouardia subeminula (Bgt.). S. Ngorongoro, 1800 m, *Kohl-Larsen* (Haas, 1936)

Cerastua lymnaeiformis Haas. S. Ngorongoro, 1800 m, *Kohl-Larsen* (Haas, 1936); Empakaai Crater, lower end of new Ngopironi (= Olgobroni) road on the SE slopes, bushland, 5.ix.1973, *Frame* (Verdcourt, 1975)

Cerastua trapezoidea masaica Verdcourt. S. Ngorongoro, 1800 m, *Kohl-Larsen* (Haas, 1936 as *Cerastus retirugis*); Ngorongoro, Sale, L.D. Verdcourt (L.D. Rogerson); Ngorongoro, east side of crater, *Greenway*; K.L. Pfeiffer: B. Verdcourt; Empakaai, along SE side of Mam (? label very worn) Lake to 2½ m (miles?, metres?) from water, 17.ix.1972, *Frame*; shell in stream bed of bigger stream on W shore of Mam Lake, 2.x.73, *Frame* (Verdcourt, 1967)

Conulinus daubenbergeri (Dautz.). S. Ngorongoro, 1600–1800 m and Oldeani, *Kohl-Larsen* (Haas, 1936); Ngorongoro Crater rim, 2250 m, 19.iii.1969, *Holm* 224; Empakaai, *Frame* (see Verdcourt, 1966 for a discussion of this species)

Subulinidae

Nothapalus iredalei (Preston). Ngorongoro Crater, 2250 m, 19.iii.1969, *Holm* 224

Nothapalus sp. aff *iredalei* (Preston) and *unctus* (Smith). Oldeani Mt., *Greenway*

Nothapalus sp. indet. Ngorongoro Crater, *J. Brown*

Nothapalus sp. juv. Ngorongoro Crater Rim, 2250 m, 19.iii.1969, *Holm* 224

Nothapalus sp. (13.5 x 4.5 mm). Ngorongoro Crater Rim, 2250 m, *Holm* 223

Nothapalus sp. Empakaai, E edge of main soda lake from water's edge to 1m (?metre) from water, 17.ix.1972, *Frame*

Nothapalus badly needs revision; material cited above is now widely dispersed and material preserved in Nairobi has not been compared with material collected since I left Nairobi in 1964. I think, however, that more than one species is involved.

Bocageia elata Haas. Ngorongoro, S slopes, 1700 m, *Kohl-Larsen* (Haas, 1936); Ngorongoro, Sale, L.D. Verdcourt; Ngorongoro Crater, *J. Brown*; Ngorongoro Crater, tree roots, *Hesse*; Ngorongoro Crater rim, 2250 m, 19.iii.1969, *Holm* 224 (juv.)

Bocageia elata Haas, var.? E part of Ngorongoro Crater rim, Oldeani Mt. and Empakaai, *Greenway* (a narrow variety or new species much more slender than Haas's figure)

Bocageia elata Haas, var. *Empakaai* along SE side of Main Lake from water's edge to 2½ m (metres?) from water, 17.xi.1972 and lower end of new Olgobroni road, 5.ix.1973, *Frame*

Bocageia sp. juv. Ngorongoro Crater rim, 2250 m, 19.iii.1969, *Holm* 223

Subuliniscus sp. S Ngorongoro, 1800 m, *Kohl-Larsen* (Haas, 1936, as *Bocageia* (*Subuliniscus*) sp.)

Subuliniscus sp. Ngorongoro Crater rim, 2250 m, 19.iii.1969, *Holm* 224 (probably the same species as the last)

Oreohomorus nitidus (von Mts.). Ngorongoro, S slopes, 1800 m, *Kohl-Larsen* (Haas, 1936, as *Subulona iredalei*); Ngorongoro Crater rim, 2250 m, 19.iii.1969, *Holm* 224; Gibb Farm, N of Karatu, Ngorongoro Safari Lodge, forest near waterfalls, 2000 m, 17.i.1976, A.C. & W.H. van Bruggen; *Empakaai*, E edge of main soda lake from water's edge to 1 m (metre?) from water, 17.xi.1973, *Frame*

Pseudoglessula monticula K.L.Pfr. Oldeani, K.L. Pfeiffer (K.L. Pfeiffer, 1952); N of Karatu, Ngorongoro Safari Lodge, Gibb Farm, forest near waterfalls, 2000 m, 17.i.1976, A.C. & W.H. van Bruggen

Pseudoglessula liederi (von Mts.). Ngorongoro Crater and Oldeani, 1800 m, *Kohl-Larsen* (Haas, 1936)

Pseudoglessula aff. *liederi* (von. Mts.). Ngorongoro, J. Brown (Verdcourt, 1967, fig. 4)

Pseudoglessula sp. juv. Ngorongoro Crater rim, 2250 m, 19.iii.1969, *Holm* 224

Curvella whytei (Smith). S. Ngorongoro, Oldeani, 1800 m, *Kohl-Larsen* (Haas, 1936)

Achatinidae

Burtoa nilotica giraudi (Bgt.). S. of Duma R. in *Acacia seyal* stands and Olduvai headwaters, *Greenway*; Jaida-Höhe, 1800 m, *Kohl-Larsen* (Haas, 1936, as *Burtoa nilotica obliqua* (von Mts.))

Limicolaria martensiana (Smith). Serengeti, Naguro, *Greenway*; Seronera, Naabe Hill, *Greenway*; Banagi Hill, *Greenway*; Soitayai, *Greenway* (including a sinistral specimen); Oldeani Mt., *Greenway*; Kissele, Lolomerik, *Greenway*; Ngorongoro, J. Brown; *Empakaai*, along trunk road at rain gauge in moorland, 2.v.1973, *Frame*; Hohenlohe-Graben, 1800 m, *Kohl-Larsen* (Haas, 1936); S side of Ngorongoro Mts., 1800–1900 m and Oldeani, *Kohl-Larsen* (Haas, 1936, as *L. cavallii* (Pollon.)), Crowley and Pain (1970) refer a specimen (ex Connolly coll.) from Soitayai (which they mistakenly include in Kenya) to

L.m.catharia Dall and at least some of the Tanzanian material must belong there. They give the distribution of this subspecies as Kenya and Uganda highlands but I know of no records from Uganda as defined by its present borders.

Helicidae

Halolimnohelix planulata (Preston). S. Ngorongoro Crater, 1800 m, Kohl-Larsen (Haas, 1936, as *Urguessella planulata*)

Halolimnohelix esau (Preston). Oldeani, 1800 m, Kohl-Larsen (Haas, 1936, as *Urguessella esau*)

Halolimnohelix gregorii (Smith). S. Ngorongoro, 1800 m, Kohl-Larsen (Haas, 1936) (dubious – if correct it belongs to *Vicariihelix*)

Halolimnohelix alticola (D'Ailly). Oldeani, 1800 m, Kohl-Larsen (Haas, 1936) (dubious – if correct it belongs to *Haplohelix*)

Halolimnohelix lateaperta Haas. S. Ngorongoro, 1800 m, Kohl-Larsen (Haas, 1936)

Halolimnohelix cf. *lateaperta* Haas. W. rim of Ngorongoro Crater, Greenway (very worn but may be Haas's species, see Verdcourt, 1975a)

Halolimnohelix sp. Ngorongoro Crater rim, 2250 m, 19.iii.1969, Holm 224

Halolimnohelix sp. juv. Ngorongoro Crater rim, 2250 m, 19.iii.1969, Holm 224

Halolimnohelix sp. ?nov. N. of Karatu, Ngorongoro Safari Lodge, Gibb Farm, forest near water-fall, 2000 m, 17.i.1976, A.C. & W.H. van Bruggen (this may well be '*U. esau*' sensu Haas)

Halolimnohelix sp. Oldeani Mt., worn fragments, Greenway

Haplohelix sp. nov. Ngorongoro Crater rim, Hesse (Verdcourt, 1975a, this had a remarkably long flagellum 22 mm long)

Haplohelix sp. Ngorongoro Crater rim, 1.iv.1964, B. Verdcourt (Verdcourt, 1975a, surely not the same species as the last since the flagellum is only 2–2.5 mm long but the shells are very similar); Naguro, worn shells, Greenway

Haplohelix sp. Ngorongoro Crater, 2250 m, 19.iii.1969, Holm 223

Haas's determinations indicating identity with Preston's species are very dubious. Shells of Helicids may appear identical yet the animals have different anatomies. I do not know how many genera and species are represented in the area but I suspect all species belong to *Haplohelix*; I have, however, used the name *Halolimnohelix* above for any material not dissected. If only one species occurs on the crater rim then features of the anatomy vary much beyond what might be expected. There is immense scope for

investigation here by local workers.

Endodontidae

Punctum cf. hottentotum (Melv. & Pons.). Ngorongoro Crater, Hesse (Verdcourt, 1991a, p. 375)

Trachycystis lamellifera (Smith). Ngorongoro, in burrow of a mole rat, 2400–2500m. 14–17.vi.1957, *Basilewsky & Leleup* in MRAC 788721–788725; Oldeani, towards E, montane forest with bamboo, 2300 m, 13.vi.1967, *Basilewsky & Leleup* in MRAC 788793–788799 (Verdcourt, 1984)

Trachycystis (Psichion) ariel (Preston). N of Karatu, Ngorongoro Safari Lodge, Gibb Farm, forest near waterfall, 2000 m, 17.ii.1976, A.C. & W.H. van Bruggen (Verdcourt, 1978)

Vitrinidae

Vitrina sp. Ngorongoro Crater, 2250 m, 19.iii.1969, *Holm* 223

Vitrina sp. Ngorongoro Crater rim, 2250 m, 19.iii.1969, *Holm* 223, 224 (shell ribbed near apex)

Vitrina sp. Empakaai, top of W rim, bushland and moorland, 11.ix.1973, *Frame*; top of S. rim in *Eleusine* grassland and also on floor of *Hagenia* forest, 18.xi.1972, *Frame*

The taxonomy of this family is chaotic so far as the East African species are concerned and it is not evident if the first mentioned, which has been dissected, is new or not, in fact it is not clear to which genus most East African species belong. I began a survey many years ago but it is far from complete. Nothing can be done with shells alone although it is possible that after a revision has been produced along anatomical lines, subtle shell characters will emerge. The above records are interesting in that, apart from a rather mysterious record from the Usambara Mts, they represent the furthest south this northern family has been discovered in Africa although the genus *Vitrina* has been used for several species in the past from western and southern Africa which actually belong to the Urocyclidae.

Urocyclidae

Atoxon hildebrandti Simroth. Laetoli Gorge, ix.1978, *M. Leahey* (Verdcourt, 1981); Serengeti Plains, Seronera, 4.v.1962, *Greenway* (Verdcourt, 1965, as *A. cf. lineatum*; van Goethem, 1977, p. 138)

Atoxon sp. C. S. Ngorongoro Mts, 1800 m, x.1933, *Kohl-Larsen* (Haas, 1936; van Goethem, 1977, p. 156)

Polytoxon robustum (Simroth). Ngorongoro Crater rim, forest, L.D. Verdcourt (Verdcourt & Polhill, 1961, as *Trichotoxon* sp.); Mbulu

District, top of Mto-wa-Mbu escarpment, about 16 km from Karatu, in *Heeria* bushland on rocky ground, *B. Verdcourt* (Verdcourt, 1965, as *Trichotoxon athrix*); Lake Manyara to Ngorongoro, 20.xi.1963, *Cloudsley-Thompson* (van Goethem, 1977)

Trochonanina plicatula (von Mts). S. Ngorongoro, 1800 m, *Oldeani Kohl-Larsen* (Haas, 1936, as *Ledoulxia permanens* (Smith) – see Verdcourt, 1960 for extensive synonymy)

Trochonina mozambicensis (L. Pfr.) sensu lato. Serengeti National Park Grumeti R., Poachers' Lookout, among boulders, c. 1500 m, 23.i.1976, *A.C. & W.H. van Bruggen*; Serengeti National Park, Naabi Hill Gate, among overgrown boulders, c.2000 m, 21.i.1976, *A.C. & W.H. van Bruggen* (Verdcourt, 1978)

Trochonanina levistriata (Preston). Hohenlohe Graben, between Jaida-See and the Schipunga Mts, 1400 m, *Kohl-Larsen* (Haas, 1936, as *Ledoulxia adjacens* Preston)

Zingis sp.? Ngorongoro Crater rim, 2250 m, 19.iii.1969, *Holm* 224 (shell like a *Trochonanina* but base much deeper than height of spire and extremely sharp keel at junction; similar to species mentioned in Verdcourt, 1990)

Angustivestis kivuensis (Thiele)? S Ngorongoro and Oldeani, 1800 m, *Kohl-Larsen* (Haas, 1936, as *Helixarion ? kivuensis*)

Gymnarion aloysiisabaudiae (Pollon.). S. Ngorongoro, 1800 m, *Kohl-Larsen* (Haas, 1936)

Euconulidae

Afroconulus concavispinus (Haas). S. Ngorongoro, 1800 m, *Kohl-Larsen* (Haas, 1936, as *Sitala concavispina*) (probably the same as *A. iredalei*, the spire sides look straight from Haas's figure)

Afroconulus iredalei (Preston). Ngorongoro Crater rim, 2250 m, 19.iii.1969, *Holm* 224

Afroconulus sp. Ngorongoro Crater rim, 2250 m, 19.iii.1969, *Holm* 223 (spire had straight sides and I appear not to have recorded at the time why I did not think it was *A. iredalei*)

Afroguppya rumrutiensis (Preston). Ngorongoro Crater rim, 2250 m, 19.iii.1969, *Holm* 224

Streptaxidae

Gonaxis (*Gonaxis*) *cylindrica* (K.L.Pfr.). Ngorongoro, forest on crater rim near rest camp, 2200 m, *K.L. Pfeiffer* (K.L. Pfeiffer, 1952, as *Edentulina* (*Marconia*) *cylindrica*)

Gonaxis (*Gonaxis*) *cylindrica* (K.L.Pfr.) var. Ngorongoro Crater, *J. Brown* (more elongate than the type)

Streptostele crassiplicata Connolly. N of Karatu, Ngorongoro Safari Lodge, Gibb Farm, forest near waterfall, 2000 m, 17.i.1976,

A.C. & W.H. van Bruggen (Verdcourt, 1978)

Streptostele minor von Mts. Ngorongoro, 1800 m, Kohl-Larsen (Haas, 1936)

Streptostele zambiensis Pilsbry. S Ngorongoro, Oldeani, 1800 m, Kohl-Larsen (Haas, 1936)

Streptostele sp. Ngorongoro Crater rim, 2250 m, 19.iii.1969, Holm 224 (large strongly ribbed species 11 x 3.7 mm)

Streptostele sp. Ngorongoro Crater rim, 2250 m, 19.iii.1969, Holm 224 (smaller species 5.2 x 1.5 mm, ribbed only below suture)

Gulella ngorongoroensis Verdc. Ngorongoro Crater rim, 2250 m, 19.iii.1969, Holm 224 (Verdcourt, 1985)

Gulella kohllarseni (Haas). S. Ngorongoro, 1800 m, Kohl-Larsen: Ngorongoro Crater, J. Brown; Ngorongoro Crater rim, 2250 m, 19.iii.1969, Holm 224; N. of Karatu, Ngorongoro Safari Lodge, Gibb Farm, forest near waterfall, 2000 m, 17.i.1976, A.C. & W.H. van Bruggen (Haas, 1936, as *Diaphera* (*Huttonella*) *kohllarseni*; Verdcourt, 1978). Brown's specimens measure 9 x 3 mm and differ from the type in having either one or two thickenings on the edges of the peristome in addition to the three teeth; Holm's specimens extend the size range still further and measure 8 x 3.5 mm 10 x 5 and 11 x 4.5 mm with often a small mid-columella denticle; Haas's types measured 7-8 x 3-3.25 mm.

Gulella commoda (Smith). N. of Karatu, Ngorongoro Safari Lodge, Gibb Farm, forest near waterfall, 2000 m, 17.i.1976, A.C. & W.H. van Bruggen (Verdcourt, 1978)

Gulella subsellae Haas. S. Ngorongoro, Oldeani, 1800 m, Kohl-Larsen (Haas, 1936)

Gulella sp. nov. N. of Karatu, Ngorongoro Safari Lodge, Gibb Farm, forest near waterfall, 2000 m, 17.i.1976, A.C. & W.H. van Bruggen (Verdcourt, 1978, p. 20, fig. 3)

Gulella sp. juv. Ngorongoro Crater rim, 2250 m, 19.iii.1969, Holm 224

Gulella sp. juv. Ngorongoro Crater rim, 2250 m, 19.iii.1969, Holm 224 (a second juvenile of a different species)

Mutelidae

Aspatharia martensi (Sturany). Ngoroine, Baumann (Sturany, 1894; von Martens, 1897; both as *Spatha martensi*)

Aspatharia wahlbergi baumannii (Sturany). Grumeti-Bach, off Lake Victoria, Baumann (Sturany, 1894, as *Spatha baumannii*; von Martens, 1897, included in *Spatha subaequilatera* von Mts); Duma R. bed and Grumeti R., Greenway. Mandahl-Barth (1954)

gives Lake Manyara as a locality but von Martens does not mention this as a locality.

Etheria elliptica Lam. Serengeti, Grumeti R., Greenway (formerly placed in a separate family Etheriidae)

Sphaeriidae

Pisidium kenianum Preston. Ngorongoro, 1600 m, Kohl-Larsen (Haas, 1936; Kuiper, 1966)

Pisidium casertanum (Poli). Ngorongoro Crater rim, Geitokitok Springs, B. Verdcourt (Kuiper, 1966, first identified as *Pisidium edouardi* Kuiper, described from Madagascar but later sunk into *Pisidium casertanum*)

Analysis of the fauna

The molluscan fauna of Ngorongoro is unquestionably relatively recent. Lacking are large typical species of *Maizania*, members of the genus *Achatina* or of the ancient section *Primigulella* of *Gulella*; large Streptaxids of the genera *Edentulina*, *Gonaxis* and *Tayloria* are also lacking and it is unlikely that any of the genera mentioned would have been overlooked. The genera mentioned are prominent in the coastal forests and those of the Eastern Arc and occurred in the Miocene in the forests of Kavirondo. Volcanic activity destroyed many floras and faunas in much of East Africa and what has returned to those areas when forest was re-established has depended on many factors, what pathways were available to the nearest available populations and the inherent powers of dispersion of various species.

The last eruption of Ngorongoro was about 2.1–2.2 million years ago but numerous drastic changes in climate occurred between then and recent times and many faunas must have been destroyed. The last pluvial period when the forested parts of Ngorongoro were in contact with or at least close enough to the extended forests elsewhere to admit migration was only some 12500 BP. This would seem too brief a period for the evolution of some apparently endemic species and it is possible some species persisted from earlier migrations in previous but still recent pluvials and that whole faunas were not totally destroyed during interpluvials. Pockets of less drastic climate may have existed. Judging by the species which existed at Laetoli between about 2.5 and 3.5 million years BP which are very similar to recent species it seems likely that the endemic species at Ngorongoro are nearer half to one million years old rather than a few ten of thousands of years but some new species may well evolve quickly. No fossil deposits have been examined in the Ngorongoro area. The

highland fauna there certainly has links with Kilimanjaro (*Halolimnohelix*) and highland areas in Kenya and Uganda. Although much must have come from the north the very imperfectly known *Zingis* shows at least some influence from the south. Several very widely distributed genera *Succinea sensu lato*, *Lauria*, *Punctum*, *Trachycystis* (including *Psychion*), *Trochonanina* etc. are part of the background fauna occurring all over the eastern areas of the continent or large parts of it. The freshwater species are of little zoogeographical significance; *Pisidium casertanum* has one of the widest distribution patterns of any mollusc.

Volcanic activity has of course persisted in the area until the present time, the falls of ash from Oldoinyo Lengai still influencing the local soils and possibly causing local extinction during strong eruptions.

Collectors

- | | |
|----------------------------|--|
| P. Basilewsky | Belgian collector |
| O. Baumann (1864–1899) | Austrian explorer and diplomat |
| J. Brown | Archaeologist and former wife of David Brown, East African Veterinary Res. Org. and later a Keeper at the Tate Gallery |
| G.W. Frame | Ecologist working at the Serengeti Research Institute in 1974 (Material went to Musée Afrique Centrale, Tervuren). |
| P.J. Greenway (1897–1980) | Botanist, East African Herbarium, Nairobi (see Verdcourt, 1981). |
| P.R. Hesse | Chemist working at East African Agriculture and Forestry Res. Org., Amani and later in Nairobi. |
| Å. Holm (1909–1989) | Swedish scientist specialising in spiders; made many trips to East Africa collecting spiders and incidentally many molluscs. Curator at Department of Zoology, Uppsala University. |
| L. Kohl-Larsen (1884–1969) | German anthropologist. |
| M. Leakey | Wife of L.S.B. Leakey (1903–1972) famous anthropologist and archaeologist, and famous herself for her very painstaking investigations. |

N. Leleup	Belgian collector.
K.L. Pfeiffer (1874–1952)	German banker and student of land molluscs; made a trip to Tanzania and wrote a paper which was published posthumously.
A.C. & W.H. van Bruggen	Zoologist, Leiden University, stationed at the Leiden Natural History Museum, and his wife.
B. Verdcourt (1925–)	Botanist, East African Herbarium and Royal Botanic Gardens, Kew.
L.D. Verdcourt [Mrs L.D. Rogerson]	Librarian, East African Agriculture and Forestry Research Organisation (first wife of B. Verdcourt).
Webbe, G.	Entomologist, Tanganyika Medical Dept., East African Insect Borne Diseases Research Organisation, Amani, Tanzania.

Localities (all southings and eastings)

Banagi Hill	2°18' 34°50'
Duma R.	River running from about the middle of the S. shore of Speke Gulf, Lake Victoria (2°50' 34°40' – 2°32' 33°25')
Elanairobi Crater	= Empakaai Crater
Embagai Crater	= Empakaai Crater
Empakaai Crater	2°56' 35°49'
Geitokitok Springs	3°12' 35°37'
Gibb Farm	= Ngorongoro Safari Lodge, about 5 km N. of Karatu, 1740 m.
Grumeti R.	Tributary of the Ruwana R. arising near its mouth on Speke Gulf, Lake Victoria (1°54' 34°57', 2°05' 33°57')
Hohenlohe Graben	?Hohenlohe See, probably same as Yaida Swamp
Jaida See	= Yaida Swamp
Kagera	Presumably the Kagera R. on Tanzania-Uganda border near Bukoba

Karatu	3°20' 35°40.5'
Kissele Lolomerik	Not traced; probably Lolomerik 2°49' 35°27'
Laetoli Gorge	3°12' 35°08'
Leitokitok Springs	= Geitokitok Springs
Mam?	?Misreading of Main Lake on Empakaai
Manyara, Lake	3°35' 35°50'
Mbulu	3°51' 35°32'
Mto-wa-Mbu	3°22' 35°52'
Naabi Hill	2°53' 35°02'
Naguro	Not traced
Ngoroine R.	Tributary of the Mara R. near its mouth on Lake Victoria ?1°35' 34°10' (= Nguruimi?)
Ngorongoro Crater	3°10' 35°35'
Ngorongoro Rest Camp	3°15' 25°31'
Ngopironi	On SE outer slope of Empakaai Crater
Nyarasa Steppe	Plains near Lake Eyasi (Eyassi) (= Nyarasa See)
Oldeani	3°21' 35°34'
Olduvai	2°57' 25°10'
Olgobroni	= Ngopironi
Poacher's Look-out	About 21 km W of Lobo Hills and 16 km W. of Lobo Lodge (1°58' 35°13')
Sale	3°10' 35°35' (water hole in crater)
Schipunga-Gebirge	Between Mbulu and N. half of Lake Eyasi (on Justus Perth's Map)
Serengeti Plains	c 2°50' 35°00'
Seronera	2°26' 34°49'
Shipunga	= Schipunga
Soitayai	2°28' 35°20'

References

- Baumann, O., 1894. Durch Massailand zur Nilquelle. Berlin.
- Crowley, T.E. & Pain, T., 1970. A monographic revision of the African land snails of the genus *Limicolaria* Schumacher (Mollusca-Achatinidae). *Annls. Mus. r. Afr. Cent. sér. 8°*, Sci. Zool. No. 177, pp. 61.
- Haas, F., 1936. Binnen-Mollusken aus Inner-Afrika. *Abh. Senckenb. naturforsch. Ges.* 431: 1-156.
- Haberlandt, M., 1900. Dr Oskar Baumann. Ein Nachruf. *Abh. K.K. geogr. Ges. Wien* 2(1): 1-20.
- Herlocker, D.J. & Dirschl, H.J., 1972. Vegetation of the Ngorongoro Conservation Area, Tanzania. *Canadian Wildlife Service Report* No. 19, pp. 39.
- Kuiper, J.G.J., 1966. Les espèces africaines du genre *Pisidium*, leur synonymie et leur distribution (Mollusca, Lamellibranchiata, Sphaeriidae). *Annls. Mus. r. Afr. Cent. sér. 8°*, Sci. Zool. No. 151, 78 pp, 15 pl.
- Leakey, M.D. & Harris, J.M., 1987. *Laetoli. A Pliocene site in Northern Tanzania*. Oxford.
- Mandahl-Barth, G., 1954. The Freshwater Mollusks of Uganda and adjacent territories. *Annls. Mus. r. Afr. Cent. sér. 8°*, Sci. Zool. 32, 206 pp, 96 figs.
- Organ, G.E. & Fosbrooke, H.A., 1963. Ngorongoro's first visitor. East African Literature Bureau, Kampala, Nairobi & Dar es Salaam.
- Pfeiffer, K.L., 1952. Neue Landschnecken aus Ostafrika. *Arch. Molluskenk.* 81: 89-102.
- Santifaller L., & Obermayer-Marnach, E. Österreichisches Biographisches Lexicon 1815-1950. Vol. 1 (A-Glä) (page 57). Graz-Köln.
- Sturany, R., 1894. Ueber die Molluskenfauna Centralafrika, pages 297-322, pl. 24, 25 of Baumann, 1894 (q.v.).
- Van Goethem, J.L., 1977. Révision systématique des Urocyclinae (Mollusca, Pulmonata, Urocyclidae). *Annls. Mus. r. Afr. Cent. sér. 8°*, Sci. Zool. No. 218, 355 pp. 720 fig., 4 pl.
- Verdcourt, B., 1960. Some further records of Mollusca from N. Kenya, Ethiopia, Somaliland and Arabia, mostly from arid areas. *Revue Zool. Bot. afr.* 61: 221-265.
- , 1965. Report on a further collection of East African slugs (Urocyclidae). *Revue Zool. Bot. afr.* 71: 274-296.
- , 1966. Notes on the genus *Conulinus* Martens (Enidae). *Arch. Molluskenk.* 95: 279-286.
- , 1967a. The East African species of the genus *Cerastua* Strand (= *Cerastus* (Martens) non Dejean) (Mollusca, Enidae). *Revue Zool.*

Bot. afr. **76**: 178–199.

- , 1967b. New taxa of *Pseudoglessula* O. Boettger from East Africa and an annotated synopsis of the East African species (Mollusca, Stenogyridae). *Arch. Molluskenk.* **96**: 43–62.
- , 1975a. On the systematic position of some East African Helicidae. 4. *Revue Zool. afr.* **89**: 934–939.
- , 1975a. The rediscovery of *Cerastua lymnaeiformis* (Haas) (Enidae). *J. Conch., Lond.*, **28**: 358.
- , 1978. Notes on East African land and freshwater snails. 11. Miscellaneous records from Kenya and Tanzania including descriptions of two new species. *Basteria* **42**: 15–26.
- , 1981a. P.J. Greenway (1897–1980). *Kew Bull.* **36**: 1–7.
- , 1981b. Longevity of a Urocyclid slug. *Conchl. Newsl.* **78**: 333.
- , 1984. *Trachycystis lamellifera* (Smith) in Tanzania (Pulmonata: Endodontidae *sensu lato*). *J. Conch., Lond.*, **31**: 373–374.
- , 1985. New taxa of *Gulella* L. Pfr. and *Ptychotrema* Mörch (Mollusca, Streptaxidae) from Eastern Africa. *J. Conch., Lond.*, **32**: 109–121.
- , 1986. Vertiginidae and Valloniidae from Åke Holm's and Åke Anderson's East African Collections. *Conch. Newsl.* **99**: 397–403.
- , 1990. An undescribed snail from Tanzania. *Conch. Newsl.* **112**: 261–265.
- , 1991a. Some notes on East African Endodontoid snails. 1. *Conch. Newsl.* **116**: 352–359, 2. *Conch. Newsl.* **117**: 371–378.
- , 1991b. *Maizania marsabitensis* Verdc. (Maizaniidae) in Tanzania. *J. Conch., Lond.*, **34**: 39.
- , & Polhill, R.M., 1961. East African slugs of the family Urocyclidae (Parts III & IV). The genus *Trichotoxon*. *J.E. Africa Nat. Hist. Soc., Spec. Suppl.* **7**, 36 pp.

□

A glass menagerie

The work of Leopold and Rudolph Blaschka

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I first became aware of the work of the Blaschkas in the early 1980s when I came across a collection of glass models, tucked away in a cabinet in the basement, at the National Museum of Wales, in Cardiff. The models represented soft-bodied invertebrate animals, mostly marine species, life-sized and extremely lifelike in their appearance.

A few years later there arose an opportunity to exhibit some of these models temporarily which prompted me to research their history. Our accession registers showed that the models had been acquired in two lots. One hundred and thirty eight models had been purchased by the old Cardiff City Museum in 1890 at a cost of seventy pounds. A further sixty two models had come from the Science Museum in 1927. The only information on the makers of the models was the name 'Blaschka'.

Further research revealed that Leopold and Rudolph Blaschka, a father and son partnership working in Germany, had made these glass models of animals during the latter half of the nineteenth century and had also made a large collection of glass flowers for the Botanical Museum of Harvard University. Correspondence with the curator of this collection yielded more information and a few copies of some photographs of the Blaschkas.

About five years ago the Botanical Museum of Harvard University and the Corning Museum of Glass, in New York State, jointly acquired several crates containing Leopold and Rudolph's personal and business effects. This material had remained in the attic of the house at Hosterwitz, near Dresden, where the Blaschkas had lived and had their studio since the 1880s.

The bulk of the material relevant to the glass animals is now held at Corning. This includes several hundred drawings made by the Blaschkas together with correspondence and business notebooks and miscellaneous equipment from the workshop in the house. A letter written by Rudolph to Professor Goodale at

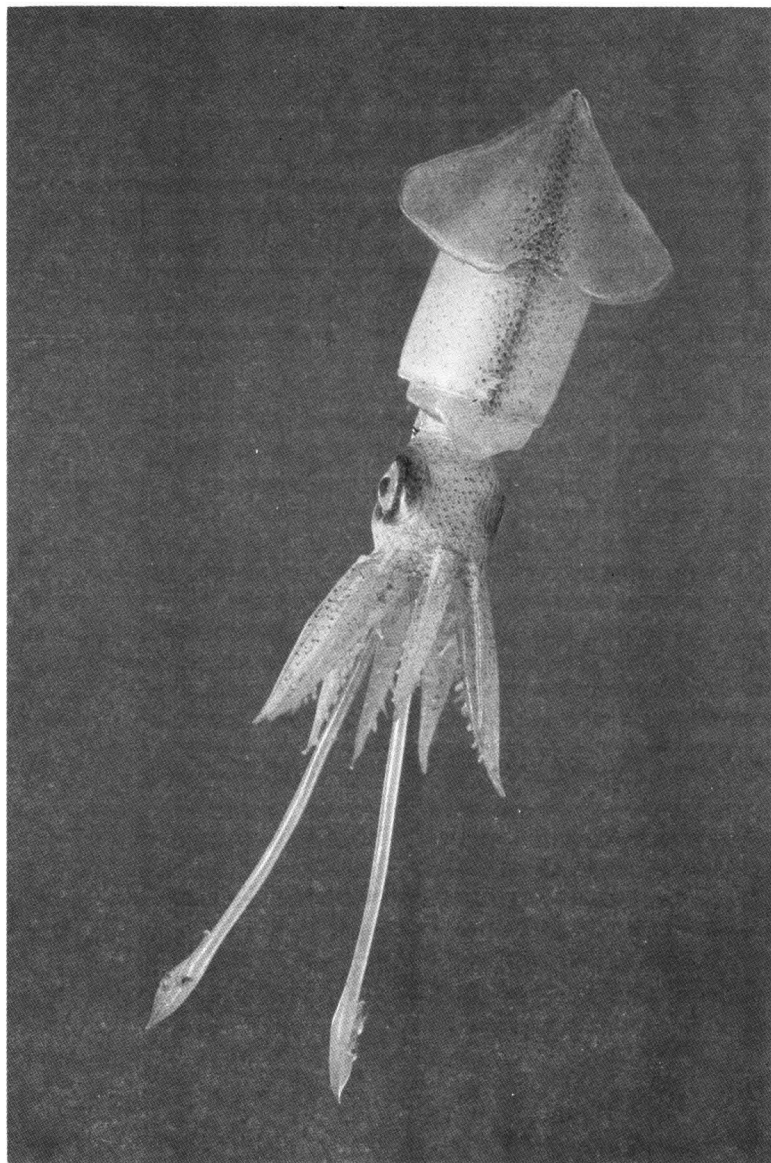


Fig. 1. Model of *Enoploteuthis owenii* Verany

Harvard in 1896 gave a detailed family history which may be summarised as follows:

The Blaschka family had been traced back to the first half of the fifteenth century when a man was registered at Prague with the name Blaschka as an artificer in decorative glass-work. Some of this mans descendants continued the craft of glass-working and glass-painting and old documents make reference to their skills at painting and fusing enamels to produce decorative effects.

By the end of the seventeenth century some of the Blaschkas were also in the business of making glass. They would lease a district of woodland and work in that area until the wood for the furnaces was used up and then move on to another area. For a time the family lived in upper Austria and then Bohemia, now the Czech Republic, where Leopold's grandfather, Franz, owned a sawmill and a glass furnace. He had four sons who were all apprenticed in the art of the family. The eldest son moved to Venice where he died without leaving family and the two youngest sons both died in the Napoleonic wars. The second son Joseph moved to Bohmisch Aicha, in northern Bohemia, where Leopold was born on 27th May, 1822, the youngest of three sons.

Leopold showed an early aptitude for painting and the suggestion was made by one of his teachers that he should study art in Vienna and Italy. However his father wished him to have a more practical training and he was apprenticed for a year in a merchant's store before moving to work with his brother and be instructed in working as a goldsmith and gem cutter for some years at Turnau. He then returned to work with his father at metal and glasswork as he was the only one of the three brothers who showed a natural aptitude for this.

In 1846 at the age of twenty four Leopold married the daughter of a local mill owner. Sadly she died only four years later during a cholera epidemic. Leopold was devastated and spent the next two years living very much as a recluse in rather poor health. In the company of a friend, a Doctor who owned a good library of natural history books, he began to study and paint plants and his health slowly recovered. However the death of his father in 1852 was another setback and he felt the need to get away from the country for a time. Early in 1853 he set sail to America on a voyage which took nine weeks. For two weeks his ship was becalmed near the Azores and he spent the time trawling for and making drawings of

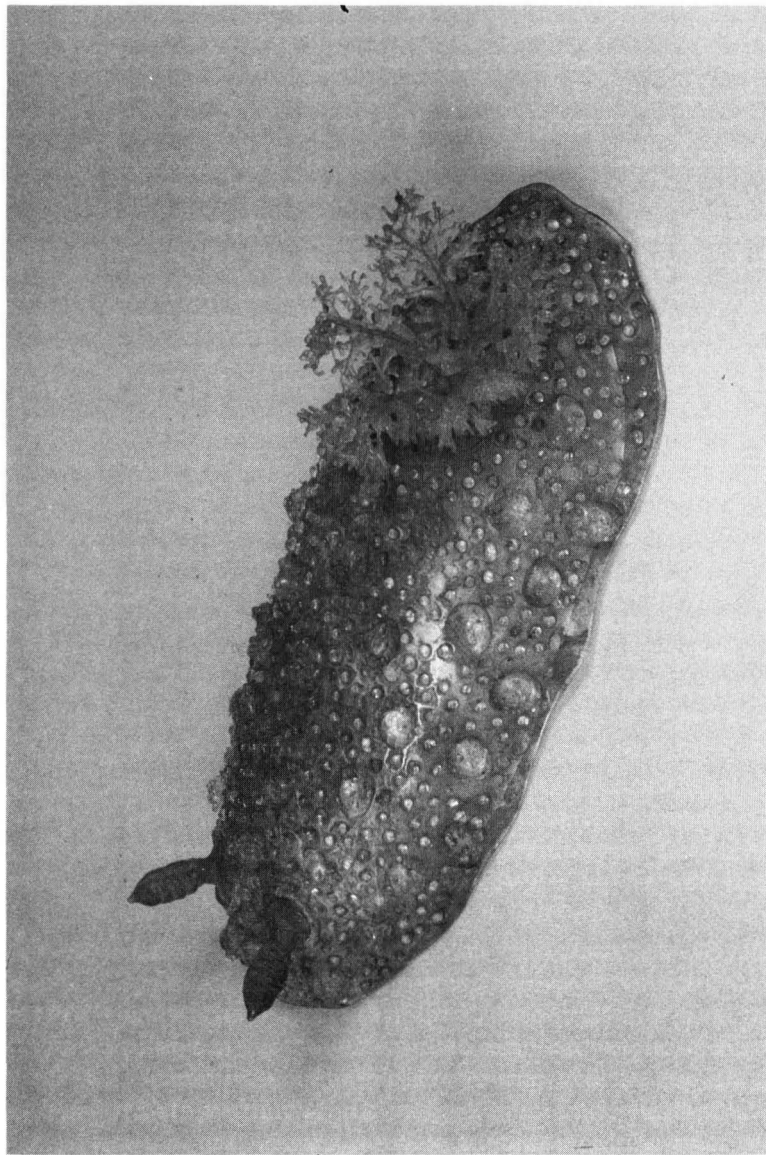


Fig. 2. Model of *Doris areolata* Ald. & Hanc.

jellyfish. This was the first time that he had seen these animals alive which he had only previously known from illustrations. He was very taken by the glass-like appearance of these animals and had the idea then that these animals could perhaps lend themselves to being modelled in glass.

In America he lived for some months in New York where he entered into business with some wholesale jewellery firms before returning home to Bohmisch Aicha in the winter of the same year. In 1854 he married again and established a workshop, in his father-in-law's house, where his position was that of supervisor of several workmen. This allowed him plenty of time to pursue his botanical studies.

His son Rudolph was born on 17th June 1857 and around this time Leopold began experimenting with making flower models in glass. He was introduced to the botanist Prince Camille de Rohan who lived nearby and who arranged to supply Leopold with specimens of orchids from his greenhouses for study. Between 1860 and 1862 Leopold constructed a series of some one hundred models representing about fifty species of orchids which were arranged on two artificial tree trunks. Rudolph makes it very clear in his letter that these orchid models were not ordered by anyone but had been made purely as an exercise to demonstrate his skill.

For a time the orchids were displayed in the castle of Prince Rohan at Prague in the hope of finding a buyer to no avail. Leopold was introduced to Professor Ludwig Reichenbach, the Director of the Royal Natural History Museum and Botanical Garden in Dresden, who arranged for the orchid models to be displayed in the pavilion of the Botanical Garden in summer 1863.

It was at about this time that an Englishman, living in Dresden, whose name was never recorded, asked Leopold whether he could make artificial sea-anemones and lent a copy of Gosse's *Actinologia Britannica* for reference. Leopold, remembering his thoughts during the sea voyage to America, readily agreed to this and produced a set of models which were purchased by Professor Reichenbach for the Dresden Museum. These models, exhibited in artificial aquaria, immediately attracted a lot of interest and Leopold was soon busy filling orders for sets of anemones for museums and private collectors across Europe. There were sixty eight models in the original sets, all but two of which were figured in Gosse's book. Each model was mounted on a base of plaster-like

material painted to give the appearance of a rocky substrate and had a small glass numbered disc attached.

In 1864 Leopold began experimenting with models of medusae and mollusca and by 1871 an early catalogue offered nearly three hundred different models. Between 1866 and 1874 there were more or less orders for models every year including those from Reichenbach. He would come along, from time to time, with an illustration from an old book or with a snail he had found and ask for models to be made although he never wanted to pay very much. Unfortunately because of the low prices which had to be charged the business did not pay well initially and Leopold was obliged to turn to other sources of income.

He began producing decorative items of jewellery, brooches, fans, ear-rings etc., which consisted of miniature bouquets of enamel flowers, set in relief, on wooden bases. Rudolph began working on these when he started assisting his father at the age of thirteen. The Blaschkas also derived an income from the production of glass eyes, mostly for blind people but also for taxidermists. This enterprise resulted by chance after Leopold had heard people complaining about the fragility of artificial eyes made in Paris. He prepared some eyes from hard solid 'glass-mass' which, though they were never advertised or offered anywhere for sale, became sought after by word of mouth. So they were obliged to keep quite a stock of eyes despite the fact that neither of them took any pleasure in the work and it was not until they moved out of Dresden, in the 1880s, to Hosterwitz, that they ceased it altogether.

In order to further their knowledge they studied zoology and anatomy and made use of the great natural history library of the Imperial Academy in Dresden. They also visited several German universities and in particular valued the assistance and friendship of Professor Ernst Haeckel of Jena. In 1879 Rudolph visited Northern Italy and the Adriatic coast to further study marine zoology. By this time a room in their house in Dresden was filled with marine tanks in which they kept specimens sent from various marine stations.

The models varied greatly in complexity and in their method of construction. Component parts were formed from both clear and coloured glass using a combination of glass blowing and lamp working techniques. The parts were then either directly fused

together or assembled with adhesives, probably animal glues.

Where necessary other materials were used in the construction. Fine copper wires were often added to reinforce or attach delicate tentacles and gills and painted paper was cleverly used to represent internal structures. They also made use of the actual shells of a variety of gastropods and bivalves in which the modelled glass body of the animal and the actual shell would be fitted together.

Great attention was paid to achieving the correct appearance of the living animals. For example a fine speckled layer of pigment, often applied to the inner surface of the glass, conveyed a jelly-like translucence. Where much thicker skin or a textured appearance was required the paint or enamel was applied in thicker coats often with gritty particles mixed in.

The simplest models that I have seen represent marine flatworms and consist of nothing more than thin glass shapes with details of colour painted onto paper loosely attached to the undersurface. Probably the most complex model which they made is the splendid group of Plumose Anemones which, at thirty five dollars, was the most expensive model in Ward's 1888 catalogue.

They were keen to accommodate customer demand and continued to increase their range accordingly. By the late 1880s their catalogues listed seven hundred different models. These included a series of anatomical preparations which were almost certainly based on their own dissections of actual specimens.

Comparison between early and later models shows a distinct tendency towards increased scientific accuracy away from the more showy early style. Here the emphasis had been on 'decoration for elegant rooms' and the models were described as such in the early catalogues.

Some of the Blaschkas' models came to be displayed at the Museum of Comparative Zoology at Harvard in the United States. Here they were seen by Professor George Lincoln Goodale who was planning the new galleries in the adjacent Botanical Museum. He became convinced that glass would be the ideal medium in which to fashion plant models and, in 1886, he visited the Blaschkas who by then were working in a studio in their house at Hosterwitz, near Dresden. He persuaded the Blaschkas to make some samples and subsequently commissioned them to produce models of plants

on a half-time contract. By 1890 the Blaschkas decided that they no longer wished to divide their time between the plant and animal models and were offered an exclusive contract with Harvard for the next ten years. After Leopold died in 1895, aged seventy three, Rudolph continued single-handedly, with periodic renewals of the contract, until 1936. He died three years later at the age of eighty two.

The entire collection of plant models, some eight hundred and forty seven life-sized and over three thousand enlarged flowers and anatomical sections, was privately financed as a memorial of the late Dr Charles Eliot Ware, a former Harvard graduate, by his widow and daughter and formally presented to the Botanical Museum in 1893.

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Shells on coins and bank notes

Fred Pinn

London

There are few tropical countries proud of their marine life that have not produced a pretty set of shell stamps, but in only a few cases have snails made their appearance on their coins. One reason for this absence, no doubt, is that the colourful shells serve as an attractive tourist advertisement, whilst the mint-masters of the world regard their coins as national representatives and therefore dignify them with royal portraits, royal beasts and any other symbol of religious or national significance. Among the few molluscan representations on coinage (Seychelles, Bahamas) the sacred chank of India – *Turbinella pyrum* – takes pride of place, because its use as a mint mark can be traced back through hundreds of years and over a large region of South-East Asia.

The former Indian State of Travancore in South India, was ruled by a very orthodox Hindu dynasty. Indeed, the last but one Maharaja was so strict in his observances that he would not allow his guests the Maharaja and Maharani of Baroda to visit the local temples as their Highnesses had 'lost caste' by going across the 'Black Water' to Europe! He was also reported to shake hands with Europeans 'gloves on' only; anyway, he had to take a purifying bath every time he had shaken hands with a white man (for instance, the Viceroy was unavoidable) ... His son, the last ruling prince, though less rigid than his father, still never dined with non-Hindus.

It all started with Rajah Martanda Varma who, after subduing all neighbouring chiefs, dedicated himself to the patron god of his line, and thus raised his status from a mere Ruler to Vice-regent of deity. The patron god was Padmanabha, or Vishnu, whose symbol is the sacred conch – *Turbinella pyrum*. It could be seen in a stylised form on the reverse of the Travancore coins until the merger into the Indian Union in 1947:

c. 1910



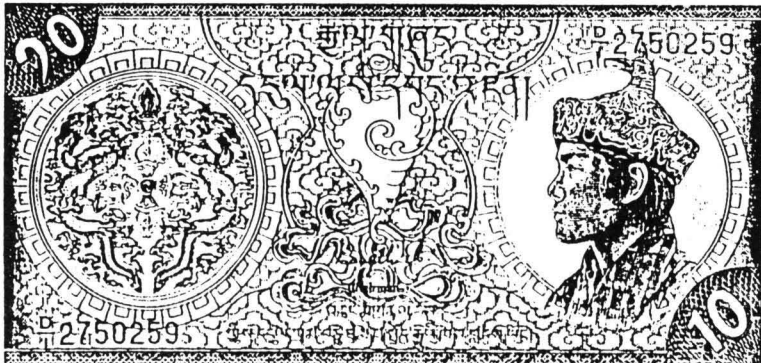
1938



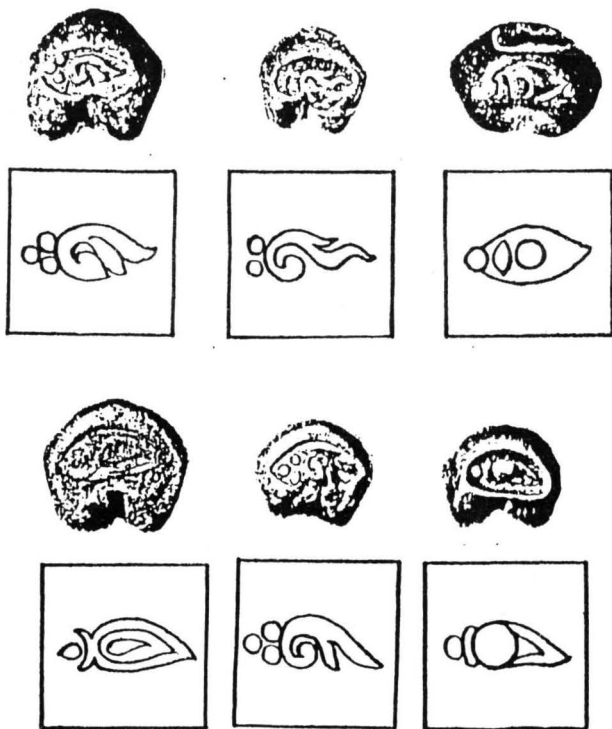
The chank, or conch, has been Vishnu's battle trumpet since dimmest antiquity and as such a symbol of divine power, victory and a bearer of good luck. The belief in its magic value was so strong that the Buddhists adopted it as the trumpet of victory of 'The Law' as preached by the Buddha but ignoring its former divine connection. Most Buddhist temples and shrines from Tibet in the north to Sri Lanka in the south and Thailand in the east will own a conch trumpet as part of the altar paraphernalia, sometimes beautifully covered in silver and gold. It is therefore not surprising that this auspicious symbol should appear on the coins of Tibet, Bhutan and Thailand:



The Bhutanese then took also the next logical step and put the conch on their paper money in a most decorative fashion:



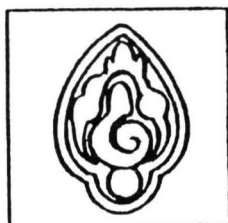
In Thailand the history of coinage is rather peculiar in that no 'flat' coins existed until their introduction in 1860. Instead there were lumps of silver in various shapes (flower money, leaf or line money, horse-hoof, pig-mouth, bar money, etc.). The most widespread of all was the bullet coin, a piece of silver bar bent until both ends met which gave it the appearance of a 'bullet'. These lumps of silver were made in several weights and duly marked with two stamps most probably indicating the mint and the king. Little is known about the significance of these marks before 1786, except that bullet coins were most likely introduced about 1250 AD. The mint marks are therefore spread over 500 years going back to the 13th century. Among the numerous marks that have been recorded is not surprisingly also the chank or conch. This appears in many variations from almost natural to strongly stylised forms:



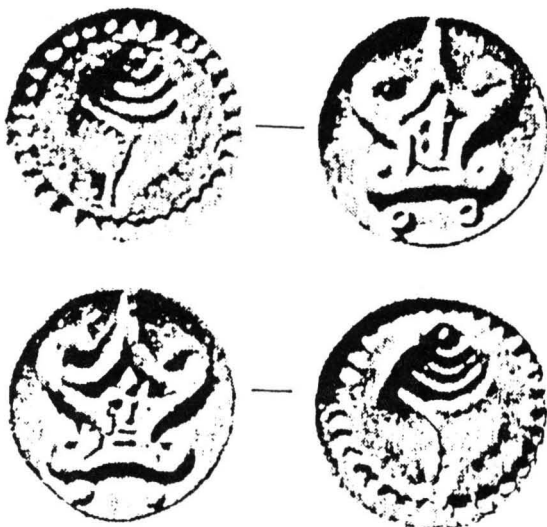
'Bullet coins' with chank mint marks

The story goes that in 1786 King P'hra Buddha Yoh Fa (1782–1809) was presented on some auspicious occasion with a magnificent conch-shell (Sang Kanok) mounted in gold; the King was so pleased with it that he at once adopted it as his personal mark and ordered it to be stamped on his bullet coins forthwith. This particular stamp is called an UNALOM, a sacred mark sometimes found on the forehead of an image of the Buddha. It takes the form of a conch-shell set up vertically on its apex. This mark is popularly known as Kra Bua, or lotus mark on account of the shape of the frame – a closed-up lotus flower:

an Unalom



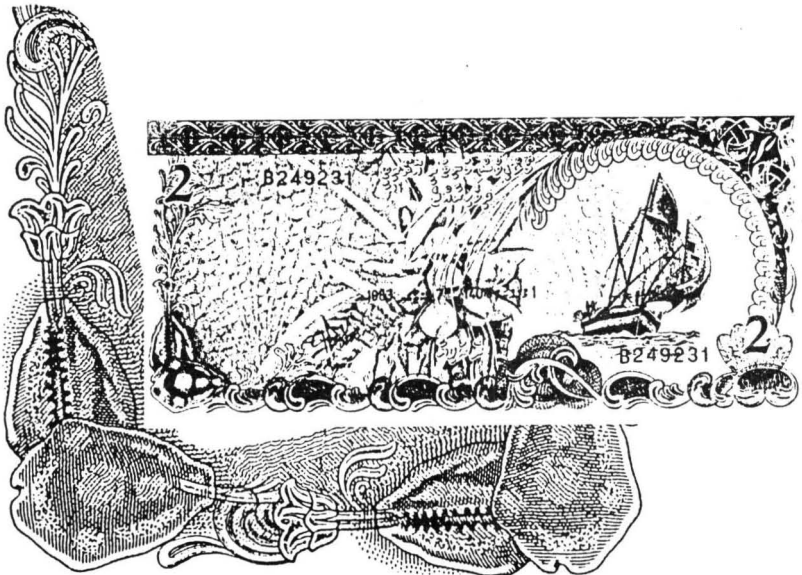
Finally, two ancient coins whose date and provenance are uncertain: though found in Thailand, they most likely originated in Aracan, now Burma, and belong to the first centuries AD. They resemble so much some Indian coins of that period that it has been suggested that they were minted in India:



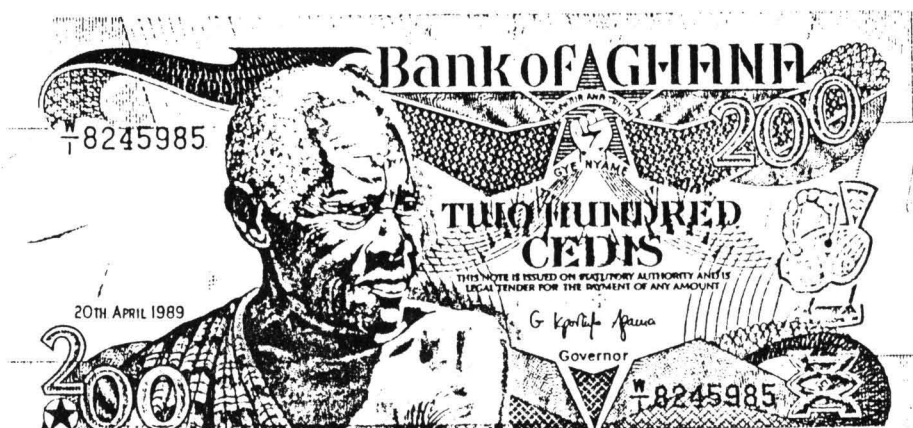
Whilst the 'sacred chank of India' was merely a religious symbol and a lucky sign, it never served as currency as such. The money cowrie (*Cypraea moneta*), on the other hand, was legal tender all over India for centuries, especially in Bengal where it took the function of 'small change', in some regions right up to the middle of this century. In fact, in some parts of India 'cowrie' became synonymous with 'standard coin', so that the petty principality of Cutch Bhuj in western India minted silver 'cowries' instead of rupees (in 1882). The illustration below depicts a 'Five Kori' piece:



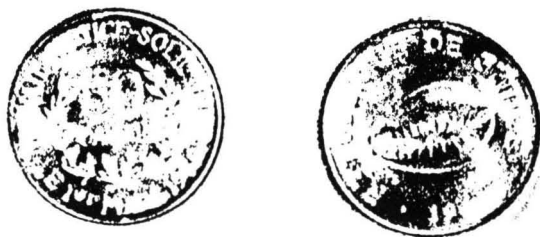
The Maldive Islands – the ancient cowrie 'mint' of many Indian Ocean countries – still remember their one-time trade monopoly in these shells in one corner of their present paper currency:



During the 19th century the money cowrie became the 'moneta franca' in many parts of Africa, in particular the western side of the continent. It was the most important means of exchange in that most despicable of all commercial enterprises – the slave trade. But little now remains of the great cowrie currency. Some shells on sale in markets as knick-knacks or for adornment, mouldering heaps here and there where they were finally discarded, cowries built into the walls or floors of old rooms as a sign of (former) wealth. Yet in two areas of West Africa, in Ghana and the vast region where Hausa is spoken, day-in-day-out even children who know nothing of the slave trade's shell money still unwittingly speak of it – for the name of the modern currency of Ghana, the CEDI, is the word for cowrie in the Akan group of languages (Fante, Twi, etc.) of Ashanti and farther south; and the Hausa name for money itself, KUDI, literally means cowrie.'



In the Republic of Guinea, however, there does not seem to have existed an indigenous name for *Cypraea moneta* and thus CAURIS continue to denominate their modern coinage:



Lastly, the Seychelles are represented by what looks like *Charonia tritonis*, the Triton's trumpet. This has no religious or historical associations except that the rupee is a reminder that the islands once came under the administration of the Viceroy of India. The real significance of the shell is the broad hint at the shell collector's paradise waiting to be explored.



□

Old and new in Shetland

Roger Tallack

Orpington, Kent

Ten years ago, in a note on some old records from Shetland, Nora McMillan commented that they were 'presented in the hope that someone will do something about them' (McMillan, 1986). After two years living in Shetland I can offer clarification on some of those records. However my own work has raised further questions which must at present remain unanswered.

First the old records listed by McMillan:

Ovatella myosotis (Drap.): J.T. Marshall made a sweeping statement about this species being very widespread (*J. Conch.*, Lond. 14: 68) 'from Jersey to Shetland'. There are no specimens from Shetland in Marshall's own collection in the National Museum of Wales (Alison Trew, pers. comm.), nor are any others known.

Lymnaea stagnalis (L.): A very unlikely record originating from R.H. Britton (1974). I have checked the marl loch at Whiteness, cited by Britton, on three occasions but failed to find any trace of the species. In fact the water in this small loch is turbid and has no submerged vegetation, with only chewed patches of rush at the edge, a very inhospitable locality. However, it has been drawn to my attention that a specimen has recently been recorded from the school pond at Hamnavoe, Burra Isle, presumably imported among weed from the mainland (Jill Blackadder, pers. comm.).

Gyraulus laevis (Alder): The 1976 Atlas record is for Flossie Loch, near Gulberwick, where it was recorded by Thomas Scott (1896). This loch is now very overgrown and peaty and no trace of the species could be found. It is, however, widespread elsewhere in South and Central Mainland, particularly on the narrow bands of limestone; a typical locality being the Loch of Asta. Scott also mentions *Gyraulus albus* (Müller) as present in this loch. However it was not included in a display of freshwater gastropods from Shetland, including specimens from Flossie Loch, shown by Scott (1897) at a meeting of the Conchological Society.

Ancylus fluviatilis Müller: As McMillan suggests there is a long-standing apocryphal record of this species attributed to Oldham.

However, was meticulous in having his finds verified and every other species he recorded during his three visits to Shetland is included in the Conchological Society's Notebooks. In the course of my stay in Shetland I explored many suitable burns but no specimens were found.

Discus rotundatus (Müller): Jeffreys' (1862) – ex 'Zetland' offers no clue to locality, nor does the record for 1902 in the Conchological Society's Notebooks attributed to R. Adkin. I discovered a small colony living within a couple of metres of a concrete pillar at Weisdale. Where they came from is unclear but since the pillar supported a drainage pipe I'm tempted to speculate that they were originally imported from the mainland. That there had been no expansion of the colony is testament to the harsh conditions prevalent in the islands.

Aegopinella pura (Alder): Another Adkin record of unknown locality. The species is confined to rocky limestone outcrops, e.g. Whiteness and Okraquoy.

Clausilia bidentata (Strom): I have been unable to check Jeffreys' record from Out Skerries, nor did I find the species in Tingwall valley (mentioned by McMillan) or at Okraquoy, the locality in the Conchological Society's Notebooks. The species does occur in some numbers on the rocky slopes on the north side of the Whiteness peninsula.

Pisidium henslowanum (Sheppard): Originally 'recorded' by Oldham from Hellier's Water, Unst, an error for the highly striated form of *P. lilljeborgii*. Also apparently found by Britton at Whiteness and best disregarded along with *Lymnaea stagnalis*!

Other records

There are several other tantalising records worthy of mention:

Margaritifera margaritifera (L.): There are several specimens in the National Museum of Scotland (David Heppell, pers. comm.). Some date from 1849, the remainder from Oldham's visits to Shetland between 1928 and 1931. All came from the Burn of Setter, Walls. Oldham gave a very specific site description (below) but despite detailed searches on three occasions at different seasons no trace could be found:

Letter from Oldham to Percy Grimshaw dated 17 July 1928:

I don't know whether you recollect showing me some specimens of

the Pearl Mussel (*M. margaritifer* [sic] from 'Walls Zetland' when I called to see you at the Museum last July. I have been in Shetland for the past three weeks making enquiries and hunting for the mussel, and last night, following a clue that had reached me, I found it in a tiny stream, the Burn of Setter, in Walls parish. This little stream – not three feet across – traverses a peat bog, and there in only a few inches of water the mussel was living among roots of Bog-bean, surely a quite unprecedented habitat for this species.

Vertigo pygmaea Müller: The Notebooks record Oldham's locality as Tingwall. However, to my knowledge no other specimens have ever been found. There is no sign of Oldham's specimen in the collection of the Natural History Museum. (Michael Kerney, pers. comm.)

Limax cinereoniger Wolf: Recorded by Dr Jo Darlington, during an ITE survey in 1975 from Kurkigarth, Voe. Specimens in the National Museum of Scotland were verified by David Heppell (pers. comm.). However, care needs to be taken in the field as a black form of *Arion ater* (L.) with an identical footsole pattern to this species is quite common in country areas.

Limax tenellus Müller: This unlikely record stems from Jeffreys, "North Mavine, Shetland, in stones in a watercourse of a mountain-mill." (1869b)

New records

In the course of my surveys several species new to Shetland were recorded. These include some where species complexes have been redefined.

Carychium tridentatum (Risso): Oldham recorded *C. minimum* Müller from Walls, where it still flourishes in a wet meadow beside the Burn of Setter. Although less widespread I have recorded its congener from two localities – in a marsh on limestone at Okraquoy, and shells from debris where a burn from the dune system at Scousborough enters the Loch of Spiggie.

Columella aspera Walden: Oldham's original record from the remote island of Foula is for *C. edentula* (Draparnaud) agg. All the specimens I found were identified as *C. aspera* although some from the calcareous dune system at Quendale showed intermediate characteristics (C.R.C. Paul, pers. comm.),

Vertigo substriata (Jeffreys): First recorded in 1993 under moss on a rock beside Tingwall Loch. The specimen was unusual in having only one parietal tooth (Michael Kerney, pers. comm.). Subsequently this turned out to be a large colony inhabiting a strip of marshland close to the shore at the western end of the loch. A second colony was later found at Whiteness, under flood rubbish, at the head of a salt-marsh and subject to occasional inundation by salt water!

Vallonia excentrica Sterki: In 1995 several old shells were found in rabbit scrapes in pastureland on the west side of the Bay of Scousborough. Diligent search of the area revealed a few individuals living among thick clumps of moss.

Arion distinctus Mabille: All the slugs of the *Arion hortensis* complex kindly dissected for me by Stella Davies were of this species.

Euconulus alderi (Gray): Both this and segregates of *E. fulvus* (Müller) were found at widely scattered localities.

Acknowledgements

I would like to offer my thanks to all those who helped me in various ways – identifying specimens, searching museum collections and finding and copying articles: Stella Davies, Dr D. Heppell, Dr M.P. Kerney, Nora McMillan, Dr C.R.C. Paul, Derek Rushton and Alison Trew.

References

- Boycott, A.E., 1929. Recorder's report (non-marine Mollusca).
Britton, R.H., 1974. The freshwater ecology of Shetland. *The Natural Environment of Shetland*, Ed. R. Goodier. van Voorst, London, pp. 119–129..
Ellis, A.E., 1951. Census of the distribution of non-marine mollusca, 7th edition. *J. Conch.*, Lond. **23** (6/7): 177–244.
Ellis, A.E., 1978. *British freshwater bivalve mollusca*. Synopses of the British Fauna (N.S.) **11**. Linnean Society/Academic Press, London.
Jeffreys, J.G., 1862. *British Conchology*, Vol. 1, p. 279. van Voorst, London.
Jeffreys, J.G., 1869. Last report on dredging among the Shetland Isles. *Report of the 38th meeting of the British Association for the Advancement of Science*, held at Norwich in 1868, Part 1, pp. 232–247.
Kerney, M.P., 1976. *Atlas of the non-marine Mollusca of Great Britain and Ireland*. Institute of Terrestrial Ecology, Cambridge.

- Kerney, M.P. and Cameron, R.A.D.**, 1979. *A field guide to land snails of Britain and North-west Europe*. Collins, London.
- Marshall, J.T.**, 1913. *Additions to British Conchology*, VII. *J. Conch., Lond.* **14**: 65–77.
- McMillan, N.F.**, 1980. Non-marine Mollusca. *The Natural History of Shetland*, ed. R.J. Berry and J.L. Johnston. Collins, London.
- McMillan, N.F.**, 1986. Shetland non-marine Mollusca. *Conchologists' Newsletter*: **99**: 408.
- Oldham, C.**, 1930. Notes on the land and freshwater molluscs of Foula. *Scottish Naturalist*, Glasgow, 37–38.
- Oldham, C.**, 1932. Notes on some Scottish and Shetland *Pisidia*. *J. Conch., Lond.* **19**: 271–278.
- Scott, T.R.**, 1896. *15th Annual Report of the Fishery Board for Scotland*. Part III. Edinburgh.
- Scott, T.R.**, 1897. A series of freshwater shells from Shetland (exhibit). *J. Conch., Lond.* **8**: 376.
- Tallack, R.M.**, 1994. *The non-marine Mollusca of selected SSSIs in Shetland*. Unpublished report for Scottish Natural Heritage.
- Tallack, R.M.**, 1995 A list of the non-marine Mollusca of Shetland. *The Shetland Naturalist*, Vol. 1, part 4, 93–100.

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Annual General Meeting 1997

Members are reminded that they can nominate candidates for election to the Council.

Rule No. 12

Candidates for nomination to the Council shall be paid-up members of the Society and shall be nominated by two members. Nominations, other than those made by the Council itself, shall be sent in writing to the Hon. Secretary at least six weeks before the AGM, and shall be accompanied by a signed declaration of the candidate's willingness to serve.

Note: Nominations must be received by the Hon. Secretary NOT LATER THAN 31 December 1996.

Containers for small shells

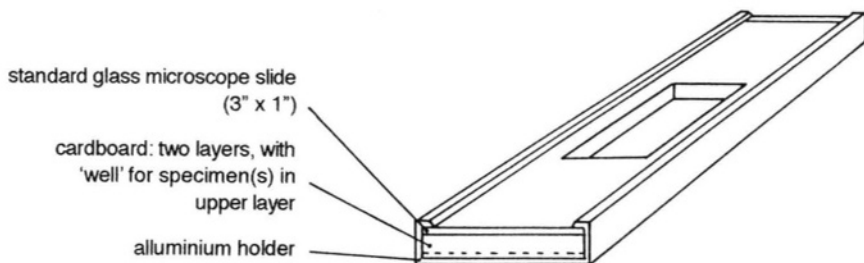
Sebastian Payne

Cambridge

I have been looking for some time for a source of reasonably cheap containers for small shells. At the moment, I mainly use small plastic boxes measuring 31 x 21 x 4 mm and 31 x 21 x 7 mm (internal) costing about 7p/box.

These boxes are not, however, ideal: the plastic is not very clear once you put a specimen in a box under a microscope, and attracts dirt because of electrostatic build-up; smaller, lighter shells also become charged and can cling to corners or edges of the box, or jump up and cling to the lid; and there is no ideal place for the label – outside the box, it needs to be stuck on and either cannot easily be seen or obstructs a clear view of the specimens, while inside the box it again either cannot easily be seen or obstructs a clear view of the specimens, and may damage fragile specimens. Putting fragile shells into a gelatine capsule inside a box reduces the risk of damage, but takes longer and further obscures a clear view of the specimen unless it is taken out every time you want to look at it, which creates another risk of damage.

'Faunal slides' have many advantages as containers for small shells. For those unfamiliar with them, the specimen is put (or can be glued down with gum tragacanth) into a well made by sticking a thick piece of card with a hole punched in it onto a piece of thin card. This is then covered with a standard glass microscope slide, and slid into an aluminium (or wood) outer holder, as in the following illustration:



The advantages of this are that the glass is clear, and does not have electrostatic charging problems; that the slide can be labelled by writing on the card at one end (or both), so that the specimen does not get in the way of the label or vice versa; and that there is less risk of damage (especially if the specimens are glued down – gum tragacanth is water-soluble, and can fairly easily be removed if necessary). However, they are very expensive: the only source of supply I am aware of charges around 70p/slide, which is about ten times the cost of a small box.

I would be very grateful for advice and information from any member of the Society who knows of a cheaper or better solution to the problem of storing small fragile shells. Failing this, it might be possible to get hold of 'faunal slides' very much more cheaply either by approaching suppliers and negotiating for a quantity discount, or by approaching manufacturers direct to make the different pieces. With this in mind, it would be helpful to know whether other members are interested in joining forces – and, in which case, how many slides they might want, and what price they would be willing to pay for them; and whether any members have useful information on possible suppliers, either of slides or of the component parts.

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For Sale

J.G. Jeffreys, *British Conchology*

First edition. 5 volumes. 1862–1869

Highest offer in excess of £300 received by 16 November secures.

Contact

Mr G. Cox, [REDACTED]
North Warnborough, Hook, Hants [REDACTED]

or

Mr K. Brown, [REDACTED] Isleworth, Middlesex [REDACTED]

Latin descriptions

Dr B. Verdcourt

Royal Botanic Gardens, Kew, Richmond TW9 3AB

Was I the last person to describe a new animal in Latin? I described *Ptychotrema usambarens*, a streptaxid snail from Tanzania, in *J. Linn. Soc., Zool.* **43**:714 (1958) in Latin at least half a century after it had ceased to be used for descriptions of animals. Remarkably the editor at the time did not even query it. Although Latin is still mandatory for describing new plants, only the shortest of diagnoses need be in Latin with the rest of the description in English or any other language. Curiously, although Latin was very commonly used for describing both plants and animals last century its use only became mandatory for plants from 1 January 1935. The idea was sensible since although descriptions in English, French, German and a few other Romance languages are understood by most people it is a totally different matter when confronted with them in Japanese, Chinese or Bulgarian etc. There are hundreds of descriptions in difficult languages but now that English is more or less universal many would like to see the need for even Latin diagnoses done away with. I think this may well happen but it will itself lead to some difficulty. Eventually there will be a short period 1936 to 20?? when only Latin diagnoses are valid and the rest of the time when they are not necessary. Retroactive abrogation of the role during this period would mean that numerous descriptions in languages other than Latin would suddenly become valid and lead to yet more name changes so one will be stuck with this curious anomaly. The zoologists will be spared this. Still it is impossible to do without a knowledge of Latin since it was very widely used for centuries before Linnaeus and for a century and a half afterwards.

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Diary of Meetings

Conch. Soc. Field Meetings for 1996 are listed separately.

Saturday 28 September, London: Conch. Soc. indoor meeting. Justin Gerlach (University of Oxford): The Land Shells of the Seychelles. The Natural History Museum at 14.30.

Saturday 5 October, Nidderdale: Yorks. Conch. Soc. field meeting. Mid-Nidderdale. Meet at bridge over the River Nidd, SE 286596 at 11.00.

Friday 11 to Sunday 13 October: Mollusc course at Flatford Mill Field Centre, Suffolk. Tutor: Ian Killeen. Life on the Seashore. Further details from Flatford Mill Field Centre, East Bergholt, Colchester CO7 6UL. Tel. (01206) 298283.

Friday 11 to Sunday 13 October: Mollusc course at Juniper Hall Field Centre. Tutor: June Chatfield. Slugs and snails around Box Hill. Further details from Juniper Hall Field Centre, Mickleham, Dorking, Surrey RH5 6DA. Tel. (01306) 883849.

Saturday 26 October, Leeds: Yorks. Conch. Soc. Annual General Meeting. Leeds City Museum at 13.00.

Saturday 9 November, London: Conch. Soc. indoor meeting. Emily Glover (Institute of Archaeology, London). Molluscs and Man in the Arabian Peninsula. The Natural History Museum at 14.30.

Wednesday 20 to Friday 22 November: Molluscan Conservation: A Strategy for the 21st Century. Conference to be held at the National Museum of Wales, Cardiff. Further details from Mary Seddon [REDACTED] or Ian Killeen [REDACTED]

Saturday 30 November, Woking: Conch. Soc. Molluscan Workshop.

Saturday 14 December, London: Conch. Soc. indoor meeting. Christine Street (Barking). Islands and Shell-sand. The Natural History Museum at 14.30.

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Field Meetings 1996

Hon. Programme Secretary:

Rupert Honnor

Henley-on-Thames

Oxon. [REDACTED]

Tel. [REDACTED]

Important

*Please remember to inform
the leader if you are attending
a field meeting.*

Saturday 19 October

NORTH LONDON

Leader: Jane Reynolds [REDACTED]

Recording in the Highgate Wood in the morning, and the Queen's Wood in the afternoon. Both of these woods represent some of Inner London's scarce ancient woodland. Records will go towards the Molluscan Atlas of Inner London.

Lunch in the pub beside Queen's Wood!

Initial meeting place: Highgate Underground Station (at the Shepherd's Hill car park entrance) at 10.30 am.

